



**UiT** The Arctic University of Norway

Department of Community Medicine, UiT the Arctic University of Norway

**Student wellbeing: Living alone and psychological distress among university students during the COVID-19 pandemic; a descriptive cross-sectional study in Northern Norway**

With data from the “E-health: Coping during the Corona pandemic with daily self-help apps” pilot study

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Master's thesis in Public Health, HEL-3950, June 2022

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## Acknowledgements

First, I want to give my heartfelt thank you to my main supervisor, Kristin Benjaminsen Borch. Without her I would never have become part of this project and gained the unique experience and knowledge from working with so many talented people. I am extremely thankful for our discussions and all her feedback and availability throughout the entire process. Her knowledge, kindness and motivation has been inspiring through the entire MPH program. A big thank you to my co-supervisor, Sarah Cook, as well, for all the meetings, helpful feedback, and language related corrections. Another big thank you to Gerit Pfuhl and Sunday Oyeyemi/Femi who were also part of the original pilot project, for their feedback, good ideas and SPSS support.

I would also like to thank the entire MPH program at UiT, all the teachers, and especially Janne E. Strømmesen, our personal oracle. It has been truly eye opening and humbling to study at such an amazing academic level. A thank you to all my fellow students from 2019, whom all gave me such an incredible year, before COVID-19 forced us to split out across the world again. Also, a thank you to all the friends and amazing network in Tromsø for helping and supporting me one way or another throughout my studies.

Lastly, my biggest and warmest thank you to my family: My husband and best friend, Joseph. Thank you for listening, questioning, and pushing me. Without you I probably never would have had the courage to pursue this master. And mostly, thank you for your patience with me when struggling with statistics and your never-ending desire to help and teach me. And my daughter Alma, who gave me a new motivation to return and finish my studies, even when pregnancy and a pandemic had made it seem impossible.

# Abstract

**Background:** Mental health issues have recently received increased awareness worldwide, with 17.6% of adults having experienced a common mental disorder within the past 12 months. Psychological distress refers to non-specific symptoms of anxiety, stress and depression and is indicative of impaired mental health and potentially reflective of mental disorders. Students have been identified as an especially vulnerable group, with estimated 1 in 5 students affected by mental disorders, making this a growing concern globally. The novel COVID-19 pandemic and the effects of restrictions, such as social distancing, has been linked with increased levels of psychological distress and loneliness among students, increasing the focus on mental health of students during the pandemic.

**Objective:** To describe and investigate the relationship between psychological distress and living alone amongst students a year into the pandemic.

**Method:** Entry data from an ongoing pilot study project was used as a descriptive cross-sectional study. 117 students from the Arctic University of Norway volunteered for this study and 113 were included in the analyses. The outcome was psychological distress measured by an edited version of the CORE-OM tool (CORE-28), and the exposure was living alone. The relationship between psychological distress and living alone was explored by different statistical analyses, including multivariate regression. Other possible factors associated with psychological distress were investigated as well.

## Key points

- \* Increased levels of psychological distress and loneliness among students has been linked with the COVID-19 pandemic
- \* There appears to be a higher level of psychological distress among students living alone compared to those living with others, but findings are uncertain
- \* Even when adjusting for potential confounders in a multivariate regression, the association between living alone and psychological distress is unclear
- \* Bigger studies investigating risk factors related to psychological distress among students are needed

**Results:** The overall CORE-28 score was 1.67, indicating a moderate level of psychological distress amongst the students. The results suggested that there was a higher level of psychological distress amongst those living alone, compared to those living with others, however, the estimates were not strong. Only the group of students living in a room in a block had a large effect size and statistically significant difference in means with a higher level of psychological distress found in those living alone. In addition, the other largest effect size was found in fifth year students (comparing living alone or with others), however this finding was not statistically significant. Even when accounting for potential confounders in a multivariate regression analysis, the association between living alone and psychological distress was still unclear.

**Conclusion:** This study found an overall moderate level of psychological distress among students in Northern-Norway a year into the COVID-19 pandemic. There was an observed difference in level of psychological distress between those living alone and those living with others. However, the estimates were not strong and revealed uncertainty of the results. The findings of this study were therefore uncertain and future studies with larger sample sizes could investigate the association between psychological distress and living alone further.

**Keywords:** COVID-19, student mental health, living alone, loneliness, psychological distress, CORE-OM, pandemic

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## Abbreviations

COVID-19	Corona Virus Disease 19
WHO	World Health Organization
DSM	Diagnostic and Statistical Manual of Mental Disorders
ICD	International Classification of Diseases
SDG	Sustainable Development Goals



DALY	Dissability Adjusted Life years
YLD	Years Lived with Dissability
SHOT	Studenternes Helse og Trivselsundersøkelse
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
OR	Odds Ratio
NPI	Non-pharmaceutical Intervention
UiT	Arctic University of Norway
CORE-OM	Clinical Outcomes in Routine Evaluation - Outcome Measures
SPSS	Statistical Package for the Social Sciences
SD	Standard Deviation
ANOVA	Analysis of Variance
CI	Confidence Interval
SE	Standard Error
LSD	Least Significant Difference
TLS	Transport Layer Security
REK	The Regional Committee of Medical and Health Research Ethics
NSD	Norwegian Data Protection Authority
IBS	Irritable Bowel Disease
HSCL-5/10	The Hopkins Symptom Checklist 5 or 10

PA Physical Activity

K10 Anxiety and depression checklist

DQ5 The Distress Questionnaire-5

# 1 Introduction

In the wake of the coronavirus disease 2019 (COVID-19) pandemic, there has been a lot of focus on our mental health and well-being. People with poor mental health or mental disorders, will be less or completely unable to carry out activities of daily life, such as education, employment and participation in social life (1). Good mental health is therefore vital for productive societies and well-functioning individuals globally.

## 1.1 What is mental health?

Mental health includes our emotional, psychological, and social well-being and is described by the World Health Organization (WHO) as “ (...) *a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community*” (2). This definition has been criticized for not considering negative emotions as part of mental health; certain unavoidable life events such as the death of a beloved or unemployment would raise negative emotions in most individuals. If the mentioned life event was faced with well-being, we would consider this person mentally unbalanced or being at risk for developing mental health problems (3). Accordingly, individuals who cope with negative life events with an appropriate emotional (negative) response show resilience and can be considered as mentally balanced or healthy, and not at risk to develop a mental disorder. This would mean that people in good mental health face negative emotions such as sadness, anger, and unhappiness without this automatically being labelled as a sickness or disorder when it is considered an appropriate response to certain life events (e.g., grief). Overall, good mental health is paramount for a successful life. Studying the factors affecting our mental health during a crisis is important.

Related to, but not identical to, mental health problems, is psychological distress. It refers to non-specific symptoms of anxiety, stress, and depression, and can vary in intensity over time. Distress is a subjective measure of perceived stress that could negatively affect our immune system and health (4). A high level of psychological distress could indicate impaired mental health and potentially reflect mental disorders, such as depression or anxiety (5) but not necessarily at a level where a clinical diagnosis would be considered. Psychological distress can also predict work disability and sickness absence in working-age populations. Lack of social support and loneliness are both risk factors associated with psychological distress (5).

Furthermore, psychological distress is important in terms of our ability to cope and manage difficult life events, such as a pandemic (4).

Severe psychological distress can therefore – but not necessarily - be connected to mental disorders. The WHO describes mental disorders as generally characterized by a combination of abnormal thoughts, perceptions, emotions, behavior, and relationships with others (2).

Mental disorders are diagnosed by a health professional after eliminating any potential somatic reason for the symptoms. This is to adjust and streamline treatment, as well as help health professionals communicate clearly with each other (6). There are mainly two diagnostic systems in use: The Diagnostic and Statistical Manual of Mental Disorders (DSM) is used by American physicians, while in Europe and the rest of the world, the International Statistical Classification of Diseases (ICD) system from the WHO is widely used (7). Major mental disorders such as depression, anxiety and schizophrenia are covered by both the ICD and DSM (6). However, symptoms such as negative emotions or behaviors can occur without it meeting the established criteria of getting diagnosed as having a mental disorder.

Psychological distress would have to last and prevent the person from living a normal life for it to be diagnosable, while having negative emotions or psychological distress for a few weeks after e.g., a break-up, is part of normal grieving process.

Our mental health therefore affects how we feel, think and act, and can include varying levels of psychological distress, which can in turn become a mental disorder.

## **1.2 Mental disorders in numbers**

Even before the COVID-19 outbreak, mental health has received increased awareness and is a main part of the Sustainable Development Goals (SDG) (1). In 2014, a systematic review and meta-analysis conducted across 26 high-income countries and 37 low and middle income countries, found that 17.6% of adults have experienced a common mental disorder within the past 12 months and 29.2% during their entire lifetime (8). Another review from 2016, estimated that more than a billion people were affected by mental and addictive disorders with depression associated with most Disability Adjusted Life Years (DALY) for both sexes (9). The prevalence of psychological distress and internalizing disorders, such as depression, bipolar, anxiety and eating disorders are higher among women than in men, whereas men have higher rates of addictive disorders (5, 9). The global prevalence of mental disorders among adults has been slightly increasing over time, most likely due to an aging population in developed countries (10). Additionally, a national survey in the U.S conducted from 2005-

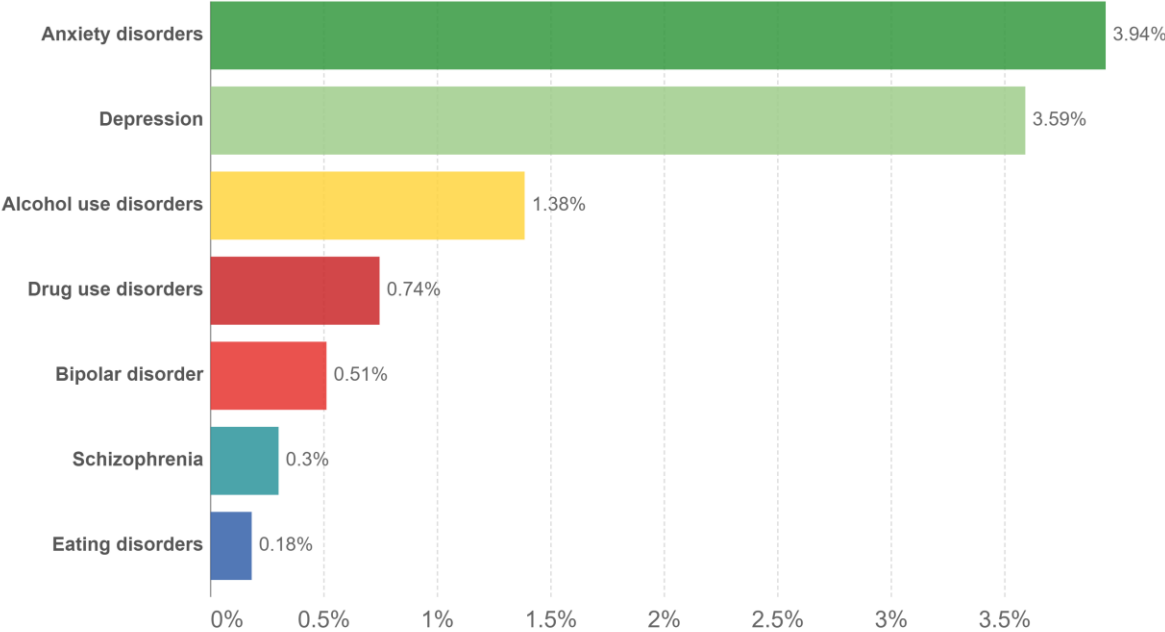
2017, found an increase in mood disorders and serious psychological distress amongst adolescents and young adults. It is speculated that this change could be attributed to the increased use of digital media and shorter sleep durations, affecting the younger generations more than previously (11). In Europe, mental disorders are the main cause of disability and the third leading cause of overall disease burden, only topped by cardiovascular disease and cancers. The European prevalence of mental disorder, including substance abuse, was estimated to be 15% in 2015 (1).

Even though mental health services are used by people with and without a diagnosed condition, many people with need for treatment will not receive it (12). In Europe, it is estimated that half of those with a diagnosed mental disorder in need of healthcare do not receive needed treatment (13).

### Prevalence by mental and substance use disorder, World, 2019



Share of the total population with a given mental health or substance use disorder. Figures attempt to provide a true estimate (going beyond reported diagnosis) of disorder prevalence based on medical, epidemiological data, surveys and meta-regression modelling.



Source: IHME, Global Burden of Disease

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Figure 1 Prevalence by mental and substance use disorder, 2019. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019). Published online at OurWorldInData.org. Retrieved from: ' [https://ourworldindata.org/grapher/prevalence-by-mental-and-substance-use-disorder?country=~OWID\\_WRL](https://ourworldindata.org/grapher/prevalence-by-mental-and-substance-use-disorder?country=~OWID_WRL) ' [Online Resource]

Anxiety and Depression, the two most common mental disorders, are globally costing 1 trillion US\$ a year because of lost productivity. In total, poor mental health was estimated at costing the world economy 2.5 trillion US\$ per year due to poor health and lost productivity

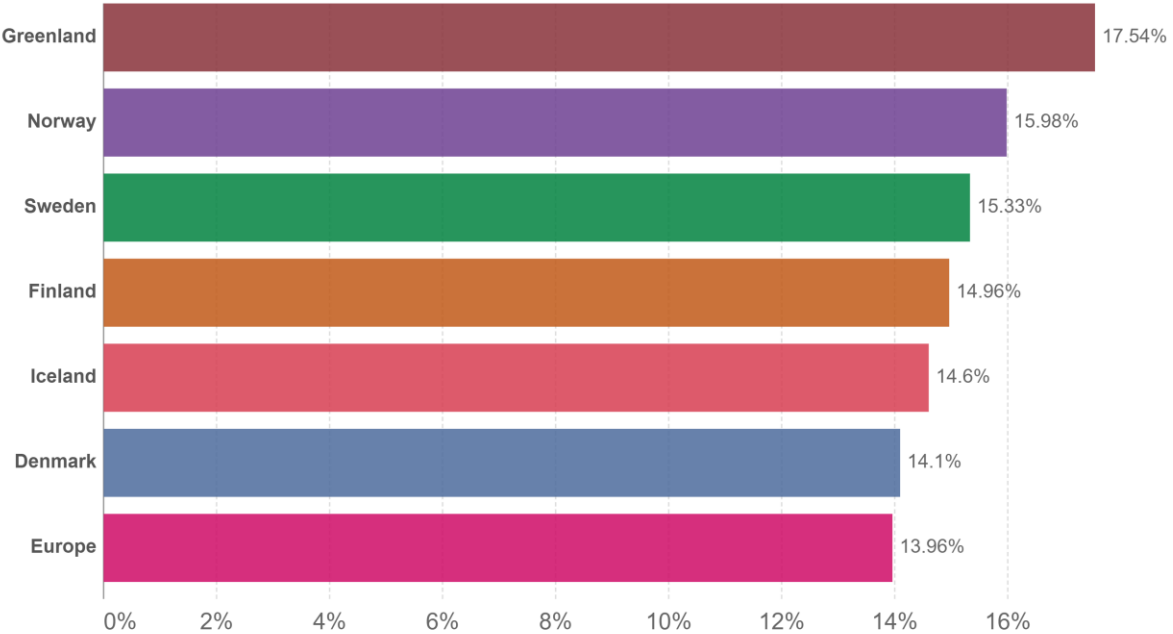
in 2010 (14). Additionally, depression is one of the leading causes of disability, and suicide is the second leading cause of death amongst 15–29-year-olds. People with severe mental health conditions have a shortened life expectancy of up to two decades. Despite progress in some countries, people with mental health problems still experience stigma, discrimination and severe human rights violations, even in Europe (15).

These numbers are consistent with findings from Norway. A report from 2016 estimated that 16-22% of the adult population had experienced a mental disorder over the past 12 months, with anxiety disorders and depression being the most common. The unmet needs for treatment of mental disorders are high as well; Only 13% and 25 % of those with symptoms of depression or anxiety, respectively, had sought help. This is also a challenge among adolescents, where only half of those with the most severe symptoms have sought help. In Norway as well, mental disorders are an important causes of health loss among people under 50 years of age, with depressive and anxiety disorders ranging as the third and fourth place on the list of Years Lived with Dissability (YLD) (16).

### Share of population with mental health disorders, 2019



Share of population with any mental health; this includes depression, anxiety, bipolar, eating disorders and schizophrenia. Due to the widespread under-diagnosis, these estimates use a combination of sources, including medical and national records, epidemiological data, survey data, and meta-regression models.



Source: IHME, Global Burden of Disease

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Figure 2 Share of population with mental health disorders, 2019. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019) Published online at OurWorldInData.org. Retrieved from: ' <https://ourworldindata.org/grapher/share-with-mental-and-substance->

[disorders?tab=chart&time=latest&country=GRL~NOR~SWE~FIN~ISL~DNK~European+Region+%28WHO%29](#)  
[Online Resource]

When comparing Norway to the other Scandinavian countries and Europe in general, a higher percentage of the population appear to suffer from mental disorders. There is no evidence suggesting that the prevalence is increasing in the adult Norwegian population, it is however, increasing among young girls, who are also seeking more specialized help. Immigrant populations in Norway are generally suffering more from mental disorders and are less likely to seek help. This is dependent on their country of origin, resulting in a large variance within the group (17).

Interestingly, the prevalence of mood-, anxiety and abuse disorders appears to be higher among the younger populations. In a European study, the incidence of mental disorders within the past 12 months was more than twice as high among people between 18 and 24 years of age, compared to people above age 65 (18). In Norway, data regarding the distribution of mental disorders based on different age groups, is still unclear or missing (17).

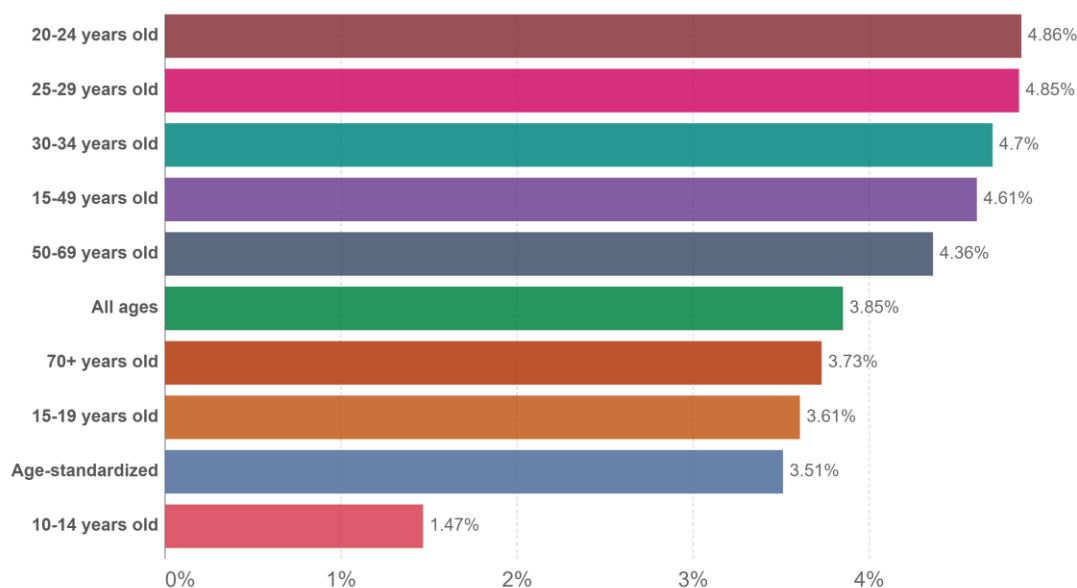
### **1.3 Mental health among students**

The onset of most mental disorders has previously been established at occurring by the mid-tweens, depending on the type of disorder (19, 20). However, a new study suggests that the onset for mental disorders such as social anxiety and autism occurs as early as between 8 and 13 years, eating disorders at 17-22 years and depressive and generalized anxiety disorders at 30-35 years (21). With the onset in early or middle adolescence, many students at college or university will have to deal with common mental disorders, such as mood, anxiety, and substance abuse disorders during their studies (22). Mental disorders among students are common with an estimated 1 in 5 students affected, making this a growing concern globally (23-25). The rate of depression is even estimated as being higher in student populations compared to the general adult population in various developed countries (26).

## Prevalence of depression by age, Norway, 2019



Share of individuals within a given age category with depressive disorders. This is measured across both sexes. Figures attempt to provide a true estimate (going beyond reported diagnosis) of depression prevalence based on medical, epidemiological data, surveys and meta-regression modelling.



Source: IHME, Global Burden of Disease

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Figure 3 Prevalence of depression by age, Norway, 2019. From ourworldindata.org. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019". Published online at OurWorldInData.org. Retrieved from: '<https://ourworldindata.org/grapher/prevalence-of-depression-by-age?country=~NOR>' [Online Resource]

This is somewhat consistent with a Norwegian national student survey from 2018 (SHOT; Studentenes helse- og Trivselsundersøkelse), which is based on data collected from 50,054 full-time students (31% participation rate) between 18 and 35 years old. However, the representability of this study can be questioned due to the response rate, with an overrepresentation of women, but with a similar age distribution compared to the general student population.

16% of students in SHOT reported having a diagnosed mental disorder (translated from “psykisk lidelse”). The two most common reported mental disorders were depression (11.1%) and anxiety (10.1%) with overall higher odds ratio (OR) among women compared to men (OR = 1.8 [1.7-1.9]). Furthermore, there has been an increase in self-reported serious psychological distress (translated from “psykiske plager”) from 1 in 6 in 2010, to 1 in 4 students in 2018. This increase is seen in both men and women, but especially among women, where the odds of reporting serious psychological distress was 2 to 3 times as high. It is worth



noting that a serious level of psychological distress does not necessarily meet the criteria for a mental disorder diagnosis. The level of psychological distress is found to be lowest in universities in mid-Norway and highest in southeast and northern Norway. Furthermore, 20% of students reported self-harming behavior, and 20% reported suicidal thoughts, while 4% have actually attempted suicide (27). Depression and other mood disorders are widely recognized as the most important risk factors for suicide (28).

### **1.3.1 Loneliness**

Loneliness is defined as a subjective feeling of absence of social relationships in a quantitative or qualitative way. It can be divided further into social loneliness: lack of network, and emotional loneliness: lack of close and intimate relationships (29). Loneliness is not the same as social isolation, even though there are similarities; where social isolation is characterized by a lack of social contacts and being physically removed from social connections, loneliness is experienced at a more emotional, subjective level (30). Overall, loneliness has been associated with a greater risk for all-cause mortality, cardiovascular health, depression, and suicidal behavior (31-33). Loneliness is often associated with older age or adolescence but is, however, a common experience worldwide. A meta-analysis from 2021 confirms that overall prevalence among European older adults (11.9%) is higher than in young- (5.3%) and middle-aged (6.9%) adults with data lacking regarding adolescents. However, it has been suggested that age patterns of loneliness might be context specific, and more data is needed to reach a better understanding of this (34). In Europe, prevalence of loneliness is highest in eastern Europe, and lowest in northern European countries (35). Some have even labelled loneliness as an epidemic with several global initiatives launched to address this. Furthermore, in the United Kingdom the first minister for loneliness was appointed in 2018. Loneliness is therefore considered an important public health threat worldwide (34).

Starting university studies and moving away from home is already associated with increased stress and may be linked to increased feelings of loneliness (29, 36). Among students, loneliness can negatively impact academic achievements (37), and is one of the strongest predictor of psychological distress, while strong social connections at universities had a protective effect (38). Being married or in a committed relationship had a further protective effect, while physical inactivity, immigrant background and studying social studies were related to higher social loneliness (29). Even though the prevalence of loneliness is lower

among young adults compared to older adults, students might be vulnerable due to the stressors of moving away from home. Strong social connections at the universities are therefore essential to avoiding loneliness and mental distress, and aid to good academic performance (38).

## **1.4 COVID-19 and social distancing**

In late 2019, cases of high fever and pneumonia spread around Wuhan province, China. The culprit was the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and by the time the first cases were detected, it is estimated that between 2,300 and 4,000 people were already infected, and the spread continued exponentially (39). The virus caused COVID-19, that was declared a Public Health Emergency of International Concern, the highest level of Public Health emergency, on January 30<sup>th</sup>, and later on, a pandemic on March 11<sup>th</sup>, 2020 by the WHO (40).

In the absence of vaccines and effective medical treatment, many countries used non-pharmaceutical interventions (NPI) to control the spread of the SARS-CoV-2 in the early stages. This was done in varying forms and degrees to limit the human-to-human transmission. In Norway NPIs consisted of recommendations and direct public orders (41); On March 12<sup>th</sup>, 2020, the Norwegian government physically closed schools, universities, and day-care centers, and keeping a limited number of social contacts outside of the household (social distancing) was strongly encouraged. Working and studying from home became mandatory when possible, and other services such as hairdressers and fitness centers were closed. This was considered the strongest and most sweeping measures Norway had seen in peacetime (42).

Even after the introduction of the mass vaccination program in the end of 2020, social distancing is still recommended in most parts of western countries (43, 44). In Norway, further restrictions such as closure of schools and universities were extended or repeated several times following waves with high number of daily cases. The consequences were that in 2020 and 2021, all teaching activities were mainly digital, with students studying from home and being physically isolated from friends and classmates. Additional restrictions included quarantine after being defined as a close contact, when returning from some local or international journeys or when symptomatic of COVID-19, and the periodic closure of non-essential functions, e.g., restaurants, bars, and cultural and sporting events. This further

resulted in many students losing their part-time jobs and ultimately having financial difficulties (45).

## **1.5 Student mental health during covid-19**

Mental health amongst students was already of international concern before the pandemic (23-25). Due to NPI's, such as social distancing and studying from home, the effect on students' mental health and risk factors such as loneliness, has received a lot of attention. Social distancing and other restrictions slowed down infection rates and relieved the pressure on hospitals and health care workers, but they also resulted in social isolation and increased feelings of loneliness (46-48). Among the general adult population, psychological distress, fear, depression, and anxiety have increased since the COVID-19 outbreak and following lockdowns (49-51). Factors such as being a female gender, young age and of student status appear to increase the psychological distress during the pandemic (52, 53), while those living alone appear to be affected more in regards of increased loneliness (54). Furthermore, several studies have documented the early decrease in mental wellbeing among students on parameters such as depression and anxiety. This has been linked to the first stages of the pandemic and the following restrictions on social life and mobility (55-57). Additionally, economic insecurity and living alone was also associated with higher scores for depression amongst French students (58).

The academic success of students was also likely affected by the pandemic and lockdowns; The inclusion in school-related networks is vital for academic success, and has been strongly limited by social distancing and digitalized teaching since the outbreak . Further, low social support has also been linked with psychological distress among students, stressing the importance of maintaining social life (59). Being single in marital status and living alone has been shown to be a risk factor for loneliness in student populations, exposing the additional vulnerability of this group during the pandemic (60).

However, a Swedish cohort study looking into the changes of depression, anxiety and stress among students before and 6 months into the pandemic, found that symptom levels were stable for the first 3 months, and slightly decreasing the following 3 months (61). This could be due to seasonal changes, and might not be representative for other European countries due to differences in general COVID-19 and lockdown strategies (62).

Studies regarding students' mental health in the face of the pandemic, has mainly been focused on the earlier stages of the pandemic or comparing conditions before and during. Meanwhile, the general mental health status and the long-term effects of social distancing and the consequences on mental health among students after, or at the end of the pandemic, is still limited. With the pandemic entering its third year in early 2022, European countries started reopening the society and lifting the restrictions. Norway announced on February 12<sup>th</sup> 2022 that almost all of their restrictions would be removed (63). However, NPI-related loneliness, anxiety and depression might continue, even after lifting the restrictions (64, 65). Even though the mental health and effects of the earlier stages of the pandemic has been well-documented, it is still important to follow the mental health of the student population in the later stages of the pandemic and to the end of the use of NPI. Students have been identified as a vulnerable group with an increased risk of a negative impact on mental health from the NPI's. Among them are several sub-groups that appear to be more vulnerable, such as those who are living alone.

### **1.5.1 Background for the Master Thesis**

The Arctic University of Norway (UiT) is located in the northern region of Troms, north of the arctic circle. With more than 1700 km by road and 2 hours by airplane from the capital of Oslo, the geography of Troms could make it challenging to visit friends and family for out-of-towners and international students due to travel restrictions in times of lockdown.

Students at UiT were sent home along with students all over Norway in March 2020 due to the outbreak of the SARS-CoV-2. For the remainder of that spring semester, the teaching shifted to digital platforms, which became the standard for the following year as well. The worry about students' mental health during lockdown and the absence of face-to-face counselling, justified the development of a pilot study designed as a one-year longitudinal study: "E-health: Coping during the Corona pandemic with daily self-help apps". It was initiated to investigate whether the use of self-help apps could contribute to improvements of students' mental health. The aim of the pilot study project was to monitor change of symptoms of depression and anxiety during the reduced social life period of the COVID-19 pandemic using a self-help app to cope with stress. Additionally, the study aimed to measure the efficacy and feasibility (attrition, duration, participant evaluation) of two different apps for mental self-help. The pilot study project had a longitudinal design with three follow-up points of the participants after the baseline measure at enrolment and continued until early 2022.

Data collection started in January 2021, almost a year into the pandemic, when digital teaching and other restrictions was still imposed on students. This master thesis project used only the data collected at enrolment of the pilot study due to the timeline for the master project. Therefore, the pilot study project gives the frames and design of the master thesis project.

## **1.6 Purpose of master thesis**

### **1.6.1 Objective**

The purpose of this Master thesis was to describe and investigate the relationship between living alone and psychological distress amongst students a year into the pandemic at a Northern Norwegian University.

- The primary aim was to explore the relationship between psychological distress and living alone.
- The secondary aim was to investigate other possible factors associated with psychological distress.

## **2 Materials and Method**

### **2.1 Study Design**

This study was conducted as a cross-sectional study, using one data point (at enrolment of participants) from the longitudinal pilot study “E-health: Coping during the Corona pandemic with daily self-help apps” from the Department of Community Medicine and Department of Psychology at UiT, The Arctic University of Norway. The original project collected the data between January 2021 and March 2022, and only the data collected at enrolment of participants (hereafter defined as baseline) with information regarding participants demographics and mental health status are included in this master thesis.

### **2.2 Study population**

Study participants were university students at UiT, The Arctic University of Norway, invited from all campuses (Figure 4). The recruitment was focused on volunteer students who were invited to download and use a self-help app as a part of the study. There were two methods of recruitment. Students were recruited through the Student Welfare Service (Norges arktiske studentsamskipnad) and invited to use the app as a supplement to counselling. In addition, the general student population with a self-perceived need for help were invited to take part in the

study. A total of  $n=117$  students consented to attend, of whom 22 received counselling and 95 were from the general student population.

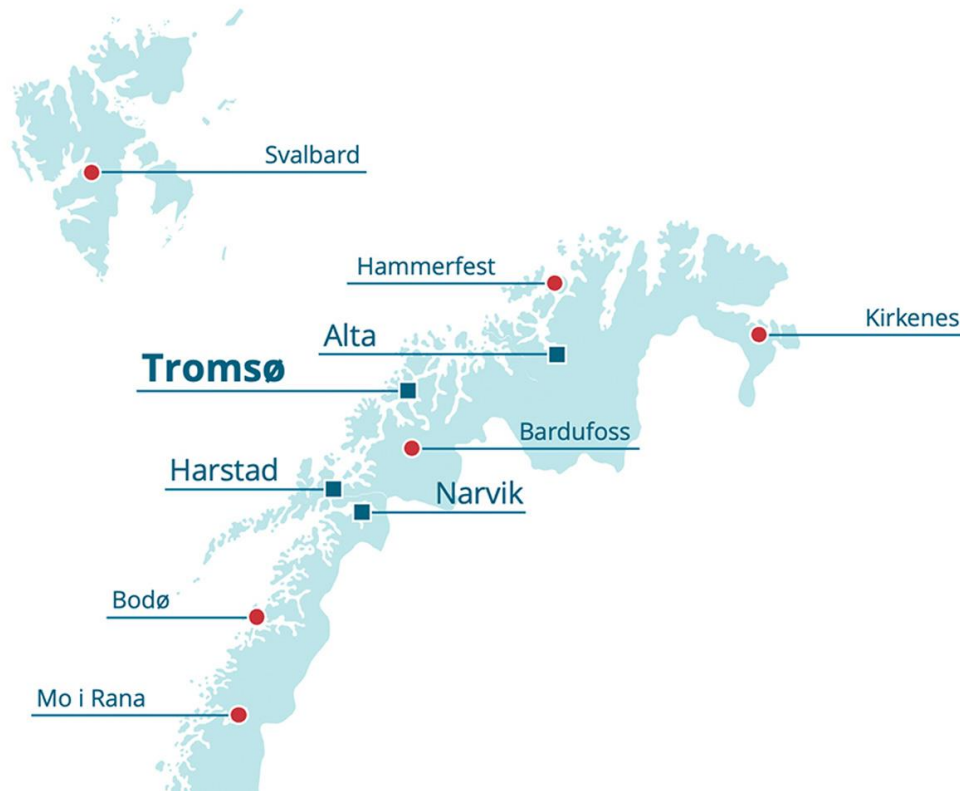


Figure 4 Map over campuses at UiT, The Arctic University of Norway. From UiT, Norges Arktiske Universitet.official webpage. Retrieved from: '<https://uit.no/finnplassendininord>' [Online Resource]

### 2.2.1 Inclusion and exclusion Criteria

All students with valid emails who volunteered were included in the main project ( $n=117$ ). For the master thesis, only students without missing data in the demographic section were included ( $n=116$ ). Students that answered 'other' ( $n=3$ ) as gender identity were included in the descriptive part but were excluded from the statistical analysis due to the small number which left a total of  $n=113$  for analysis.

### 2.3 Data Collection and setting

Students were recruited over a two-months period via counselors at the Students Welfare Service and general recruitments through advertisements flyers (digital and paper on campuses) and social media. (See appendix number 1 for recruitment flyer used). Participants were asked to complete an online survey using Qualtrics

(<https://www.qualtrics.com/blog/citing-qualtrics/>), including questions on demographic factors, current mental health status, previous and current mental disorders, perceived social support and anticipated benefits of treatment. Furthermore, they were asked about perceived risk and worries related to the pandemic situation. The participants could choose to answer in either English or Norwegian. For the original pilot project study, participants received follow-up questionnaires via email at 3, 6 and 12 months. However, this master thesis only focused on data collected at enrolment since the pilot project study had not finished the data collection at the start of the master thesis project.

### **2.3.1 Main Outcome**

The main outcome of interest was psychological distress, which refers to feelings and symptoms of stress, depression and anxiety and can be indicative of impaired mental health (5). This was measured by the dimensions of subjective well-being, symptoms and functioning, as defined in the Clinical Outcomes in Routine Evaluation – Outcome Measurement (CORE-OM) tool, also known as CORE-34 (66).

CORE-OM is a self-report questionnaire consisting of 34 items, intended to measure psychological distress and to be used in evaluating effect of counselling and psychological therapy (67). The items in the CORE-OM can be divided into 4 domains: specific problems (depression, anxiety, physical problems, trauma); functioning (general day-to-day functioning, close relationships, social relationships); subjective well-being (feelings about self and optimism about the future); and risk (risk to self, risk to others). Subjects were asked to answer the items on a five-point scale, ranging from 0 (not at all) to 4 (most or all the time). The mean score is then calculated by first adding the overall score and then dividing it with 34, provided there is no missing data. This will give a mean score between 0 and 4, e.g., 1.86. A cutoff score of 1.0 to define clinical cases is used, but it has been suggested that this score should be higher among adolescents, and that a gender difference in cut-off score could be justified (girls: 1.44, and boys: 1.02) (68). Over time, it has become standard to multiply this by 10 to get a more approachable score, e.g., 18.6 for clinical settings (67). The CORE-OM has been translated and validated in several languages, including Norwegian (69, 70). The domain on risk covers self-harm and suicidal ideation, as well as violent behaviors. This domain separates the most from indicating psychological distress and is instead used to help clinicians observe adverse effects in patients with mental health problems (70). Because of this, in addition to ethical reasons, the risk domain was excluded from the main pilot study

project and therefore not available for this master thesis. This leaves 28 questions, hence CORE-28.

### **2.3.2 Main Exposure**

The main exposure was living alone. The original living alone question for the participants asked: “How many people live in the same household with you?”, and the available options included “none/I live alone”, “1”, “2”, “3”, “4”, or “more than 4”. The information of the number of people in the household was dichotomized into “living alone” and “living with others” due to low number of participants. The new variable was named “living alone or with others” and is referred to hereafter in the text and tables. Demographic variables were used to describe and investigate the secondary aim.

### **2.3.3 Demographic information**

The information collected as demographic variables include age, gender (male, female, other), study year (1-6), type of degree (“other types of study”, “bachelor’s degree”, “master’s degree”, or “professional study”), type of housing (“house”, “flat in shared house”, “flat in apartment block”, “a room in an apartment”, “other types of housing” or “a room in a block (i.e. student housing)”), civil status (“single”, “in a relationship/married but living alone” or “in a relationship/married and cohabiting”), current/previous mental health issues (do you have or have you had ... clinical depression, clinical anxiety or other mental conditions, with the options “no”, “yes, now”, “yes, previously”) and current/previous health issues (do you have or have you had ... diabetes, asthma or other chronic disease, with the options “no”, “yes” or “do not know”) were used to describe the demographics of the study participants.

## **2.4 Statistical Analysis**

After receiving the raw, anonymous dataset, an individual mean score of the CORE-28 questions was calculated. First, the eight positively framed questions were recoded to fit the original paper-format and the value appointed to that question (see appendix number 2 and 3 for a table of the eight positively framed question and the original CORE-OM questionnaire). This would otherwise have given a falsely high score, given that the lower the score, the better.

Secondly, the mean was calculated, using all the 28 questions from CORE-28. The new continuous variable of CORE-28 values was then used in the further analysis.



The dichotomized exposure variable “living alone or with others” was used together with the score from the CORE-28 to investigate the relationship between living alone and psychological distress.

It was intended to stratify by gender in the different analyses, however this was not possible due to small numbers that gave limitations in the dataset. All the variables were checked for normal distribution and other assumptions related to the statistical method used.

All statistical analyses were performed by using IBM Statistical Package for the Social Sciences (SPSS), version 28 for Windows. A p-value <0.05 was considered statistically significant.

#### **2.4.1 Descriptive characteristics**

For continuous variables, the mean, range, and standard deviation (SD) were calculated. Frequency tables and cross tables were used to describe basic information about the frequencies and percentages for categorical variables. A mean score of the CORE-28 was used to compare groups by gender, relationship status, year of study, living conditions, and other health issues, divided by living alone or with others.

#### **2.4.2 Hypothesis testing**

The primary aim of this master thesis was to investigate the relationship between CORE-28 and living alone. This was done by using the non-parametric Mann-Whitney u-test since the CORE-28 value for those living alone was not normally distributed. In this test, the CORE-28 score was compared between ‘living alone’ and ‘living with others’. The  $H_0: \text{Mean}_{\text{living alone}} = \text{Mean}_{\text{living with others}}$ , indicates that there is no differences between the groups. The effect size ( $r$ ) was computed manually, using the formula  $r = \frac{|z|}{\sqrt{n}}$  and absolute value was reported (71).

Additionally, sub-group testing between living alone or with others and CORE-28 scores were done using the Welch test for p-value and Hedge’s  $g$  for effect size when subsamples  $n < 20$  and Cohen’s  $d$  when  $n > 20$ . This was done to test if other subgroups such as gender or single status, would cause a stronger association between psychological distress and those living alone further.

The secondary aim was to investigate which other factors were related to psychological distress. The Pearson correlation coefficient ( $r$ ) was computed to assess the linear relationship

between CORE-28 and age, and the Spearman rank correlation (*rho*) was computed to assess the relationship between the CORE-28 and year of study.

The assumptions for conducting the independent sample t-test were met for groups within relationship status and gender. This test was therefore used to test the CORE-28 mean between relationship status (single vs. in a relationship married and cohabiting and single vs. in a relationship married and not cohabiting) and gender (men vs. women). Cohen's *d* was used for estimation of the effect size.

To investigate the nominal variables (type of study, type of housing, clinical depression, clinical anxiety, other mental issues, asthma, diabetes, and other chronic diseases) and CORE-28, one-way analysis of variance (ANOVA) was used to determine if there was a difference between CORE-28 score based on the nominal variable. Eta square ( $\eta^2$ ) was used for effect size. If the results of the ANOVA test were significant, post hoc testing was done to specify which of the subgroups had the significant difference in means. The Least Significant Difference (LSD) was chosen for this.

### **2.4.3 Regression analysis**

A simple linear regression was done with CORE-28 as the dependent variable and living alone as the independent variable. This was purely done to be able to compare crude and adjusted estimates, since the  $H_0$  was tested by the Mann-Whitney u-test.

To account and adjust for other factors in addition to living alone, a multiple regression model was done. To remove unnecessary noise and avoid overfitting, each variable was included one at a time in addition to the living alone variable to check the effect on the estimate. Only those variables that gave more than 10% change in the estimate were included in the final model (72). Year of study and other chronic diseases were therefore the only variables included in the adjusted regression model in addition to living alone. The living alone variable was recoded to fit the purpose of a multiple regression, with living with others being the non-exposed (value 0) and living alone were exposed (value 1). The same was done with 'other chronic diseases': 'no' was the non-exposed group (value 0) and 'yes' + 'I do not know' was the exposed (value 1) (73). The variables 'clinical depression', 'clinical anxiety' and 'other mental health issues' were not included due to an obvious overlap with the CORE-28 assessment.

The regression analysis was presented using unstandardized beta (b; the CORE-28 value) and standardized beta ( $\beta$ ; the difference in mean from non-exposed to exposed) in addition to Confidence Interval (CI), p-value, and Standard Error (SE) to describe the association.

#### **2.4.4 Missing Data**

Only students with no missing data in the demographic section were included (n=116), and those answering “others” for gender identity, were excluded from the statistical analysis (n=3) but included in the descriptive section. A sensitivity analysis was performed beforehand to ensure that overall results would not be altered because of this. CORE-OM with 3 or fewer missing items are generally considered reliable (66). Since the domain on risk was removed from the assessment in this project, only one missing point was allowed in the CORE-28 when calculating the mean score. No study participants were missing more than one point in the CORE-28; therefore all 113 participants were included in the final analyses.

### **2.5 Data Safety**

All information from the questionnaires was stored safely in the online platform Qualtrics. Transport Layer Security (TLS) encryption was used for all transmitted data. Surveys were protected with personal passwords, with access limited to the persons in the main pilot study project group. The respondents were identifiable by email on Qualtrics but were given an anonymous study ID before the dataset was made available to study investigators when working with the raw data.

### **2.6 Ethical considerations**

The main pilot study project “E-health: Coping during the Corona pandemic with daily self-help apps” in which this master thesis project is integrated within, has been approved by The Regional Committee of Medical and Health Research Ethics (REK) [Case no. at REK 155666] and the Norwegian Data Protection Authority (NSD) [reference code 850249]. All study participants gave written informed consent at the start of data collection. All participation was voluntary and rewarded with a voucher. Participants could withdraw from the main pilot study project at any time without any consequences.

Additionally, the researchers of the pilot study project committed to offer proper care for any participant who were at risk for serious mental disease or harm to themselves or others based on their answers. Due to this, the risk domain of the CORE-34 was excluded from the study as described in section 2.3.1. Anyone reporting mental health symptoms which indicate levels

of symptoms requiring treatment, received an automated message advising them to seek help and where they could get it.

## **3 Results**

### **3.1 Demographics**

The baseline data gave a study population of 116 participants and the demographic information is shown in table 1. The age ranged from 18 to 35 years, with a mean of 24.7 (SD 3.66). The majority were female (77.5%, n=90), compared to male (20%, n=23) and other gender identities (2.5%, n=3). Most of the participants were living with others (n=94), while n=22 reported that they lived alone. Regarding relationship status, 50% reported to be single (n=58) and 50% were in a relationship or married (n=58), with 41% of them not living together (n=24). Of the single students, 86.4% (n=19) were living alone. The students were mainly studying at bachelors' level (49.1%, n=57) and accumulated 81.9% of these were studying within their first 3 years (n=95). Of the participants, 15.5% were living in a house (n=18), while 44% (n=51) were living in a flat in either a block or a shared house. A total of 37% were living in a room in either an apartment (n=10) or a block, e.g., student housing (n=33).

### **3.2 Clinical characteristics**

7.8% (n=9) of the participants informed that they currently had a clinical depression, with 14.7% (n=17) informing that they previously had it, with the rest of the participants answering that they did not have it (n=90). Similar numbers were found for clinical anxiety, with 12.1% (n=14) reported they currently had it, and 10.3% (n=12) reported they had it previously and the rest answering that they did not have it (n=90). For other mental conditions, 84.5% of the participants denied any, while 10.3% (n=12) reported that they currently had one and 5.2% stated that they previously had it (n=6). 12.8% (n=16) had or previously had asthma, while 1.7% (n=2) had diabetes and 1.7% (n=2) answered that they did not know. 16.4% (n=19) had other chronic diseases, such as irritable bowel syndrome (IBS), tinnitus, migraine, allergies, and eczema, with 5.2% (n=6) answering that they did not know.

Table 1 Descriptive characteristics in a student population (n=116) at UiT, The Arctic University of Norway

Number of people in household	Living alone (n=22)	Living with others (n=94)	Total, n (%)
<b>Age, years (mean)</b>	24.8	24.7	
<b>Gender, n (%)</b>			
Male	5 (22.7%)	18 (19.1%)	23 (19.8%)
Female	17 (77.3%)	73 (77.7%)	90 (77.6%)
Other	-	3 (3.2%)	3 (2.6%)
<b>Relationship status, n (%)</b>			
Single	19 (86.4%)	39 (41.5%)	58 (50%)
In a relationship/married but living apart	3 (13.6%)	21 (22.3%)	24 (20.7%)
In a relationship/married and cohabiting	-	34 (36.2%)	34 (29.3%)
<b>Type of study, n (%)</b>			
Bachelor's degree	10 (45.5%)	47 (50%)	57 (49.1%)
Master's degree	12 (54.5%)	34 (36.2%)	46 (39.7%)
Professional study	-	10 (10.6%)	10 (8.6%)
Other types of study (e.g., A course, etc.)	-	3 (3.2%)	3 (2.6%)
<b>Year of study, n (%)</b>			
First year	4 (18.2%)	29 (30.9%)	33 (28.4%)
Second year	6 (27.3%)	28 (29.8%)	34 (29.3%)
Third year	8 (36.4%)	20 (21.3%)	28 (24.1%)
Fourth year	2 (9.1%)	7 (7.4%)	9 (7.8%)
Fifth year	2 (9.1%)	8 (8.5%)	10 (8.6%)
Sixth year	-	2 (2.1%)	2 (1.7%)
<b>Type of Housing, n (%)</b>			
House	-	18 (19.1%)	18 (15.5%)
Flat in shared house	9 (40.9%)	20 (21.3%)	29 (25%)
Flat in apartment block	7 (31.8%)	15 (16%)	22 (19%)
Room in apartment	-	10 (10.6%)	10 (8.6%)
Room in block (e.g., student housing)	4 (18.2%)	29 (30.9%)	33 (28.4%)
Other	2 (9.1%)	2 (2.1%)	4 (3.4%)
<b>Clinical depression, n (%)</b>			
No	17 (77.3%)	73 (77.7%)	90 (77.6%)
Yes, now	3 (13.6%)	6 (6.4%)	9 (7.8%)
Yes, previously	2 (9.1%)	15 (16%)	17 (14.7%)
<b>Clinical anxiety, n (%)</b>			
No	16 (72.7%)	74 (78.7%)	90 (77.6%)
Yes, now	4 (18.2%)	10 (10.6%)	14 (12.1%)
Yes, previously	2 (9.1%)	10 (10.6%)	12 (10.3%)
<b>Other mental conditions, n (%)</b>			
No	20 (90.9%)	78 (83%)	98 (84.5%)
Yes, now	-	12 (12.8%)	12 (10.3%)
Yes, previously	2 (9.1%)	4 (4.3%)	6 (5.2%)
<b>Asthma, n (%)</b>			
No	18 (81.8%)	82 (87.2%)	100 (86.2%)
Yes, now	1 (4.5%)	7 (7.4%)	8 (6.9%)
Yes, previously	3 (13.6%)	5 (5.3%)	8, (6.9%)
<b>Diabetes, n (%)</b>			
No	22 (100%)	90 (95.7%)	112 (96.6%)
Yes	-	2 (2.1%)	2 (1.7%)
Do not know	-	2 (2.1%)	2 (1.7%)
<b>Other chronic disease, n (%)</b>			
No	18 (81.8%)	73 (77.7%)	91 (78.4%)
Yes	3 (13.6%)	16 (17%)	19 (16.4%)
Do not know	1 (4.5%)	5 (5.3%)	6 (5.2%)

### 3.3 Psychological distress (CORE-28) by living alone or with others

In table 2, the CORE-28 scores are presented for those living alone and those living with others. The overall mean score for the CORE-28 was 1.67 (SD 0.72) ranging from 0.21 – 3.39, with a higher score for those living alone (1.89) compared to those living with others (1.61) (Table 2). When investigating the mean difference of the CORE-28 score between those living alone and those living with others, the Mann-Whitney U-test resulted in  $U=751.5$ ,  $p = .07$ ,  $r = .17$ . An effect size of  $< 0.3$  was considered small (71). The mean difference between those living alone and those living with others was therefore small and statistically not significant. For differences in gender, females scored higher (1.69) than males (1.56) and with overall higher CORE-28 scores for both males and females living alone compared to those living with others. When comparing females living alone with those that lived with others, the effect size was  $g=.47$  ( $p=.11$ ). Regarding relationship status, the score for those who were single and lived alone (1.93) were higher than for the ones in a relationship/married; those in a relationship/married and living together had a higher score (1.64) compared to those in a relationship/married but living apart (1.58) – of those 3 where living alone (1.67) and 21 were living with others than their partner (1.56). Overall, when investigating the relationship status, the highest scores were found amongst singles living alone and those in a relationship/married that lived alone.

For those doing a master's degree (1.73) or 'other types of study' (1.76) the CORE-28 scores were higher compared to bachelor's degree (1.67) and professional study (1.25). Only 10 students at the bachelor's level and 12 at the master's level were living alone, but their CORE-28 score was higher (1.89 for both groups) compared to those living with others (1.62 and 1.67 respectively), however this was not statistically significant when testing the difference in means ( $g=.40$ ,  $p=.37$  and  $g=.28$ ,  $p=.38$  respectively). As for year of study, there was not a linear relationship with the overall CORE-28 score. However, when investigating students living with others, the CORE-28 score increased for every additional study year, except for those studying in their fourth year. For the students living alone, scores are generally higher compared to living with others, except for fifth year students living alone. When testing the differences between those living alone and those living with others based on year of study, effect sizes were  $g=.91$ ,  $g=.89$  and  $g=1.45$  for second, fourth and fifth year, respectively, but none was statistically significant.

When investigating types of housing, the highest CORE-28 scores were found in students who reported living alone in a single room in a block (2.28) or under other housing conditions (2.46). The lowest CORE-28 scores were found amongst those living in the same types of housing but living together with others instead of alone (1.52 and 0.54 respectively). When comparing those living with others with those living alone in a room in a block (e.g., student housing), the effect size was large,  $g=1.12$  ( $p=.03$ ).

As for clinical depression and clinical anxiety, the CORE-28 score were higher among those who answered yes: 2.46 among those with current clinical depression and 2.10 among those who had it previously. For clinical anxiety, numbers were 2.25 and 2.11, respectively. Those who reported not having a depression or anxiety, had a lower CORE-28 score both for clinical depression (1.51) and clinical anxiety (1.52). Again, the CORE-28 scores were found to be higher among those living alone, compared to living with others, but a moderate effect size was observed for those with current and previous clinical depression, and those with current clinical anxiety (none statistically significant). For other mental conditions, CORE-28 scores were highest amongst those who answered that they previously had it and were living alone (2.46) and those answering that they currently had it and were living alone (2.38).

For students with asthma and/or diabetes, it was hard to compare between living alone and living with others due to low numbers in these groups. However, the results showed that those who had asthma (1.75), diabetes (2.0) or were unsure about diabetes status (2.21), had a higher CORE-28 score than those who did not have it (asthma:1.68, diabetes:1.66) with the lowest CORE-28 score appearing with those who previously had asthma (1.48). As for other chronic diseases, the highest scores are found among those who did not know if they have any (2.20). Those answering yes (2.01) had an overall higher CORE-28 score than those answering no (1.57), again with higher CORE-28 scores among those living alone (yes: 2.07, no:1.81) compared to living with others (yes: 2.0 versus no:1.51).

Table 2 Psychological distress (CORE-28) for living alone or with others in a student population (n=113) at UiT, The Arctic University of Norway

	CORE-28 mean overall score	CORE-28 mean score for living alone (n)	CORE-28 mean score for living with others (n)	Effect size*	P-value
<b>Overall mean</b>	1.67	1.89 (22)	1.61 (91)	r = 0.17	.07
<b>Gender (n)</b>					
Male (23)	1.56	1.66 (5)	1.53 (18)	g=0.16	.77
Female (90)	1.69	1.96 (17)	1.63 (71)	g=0.47	.11
<b>Relationship status (n)</b>					
Single (58)	1.72	1.93 (19)	1.61 (39)	g=0.44	.15
In a relationship/married but living apart (24)	1.58	1.67 (3)	1.56 (21)	g=0.14	.68
In a relationship/married and cohabiting (31)	1.64	-	1.64 (31)	-	-
<b>Type of study (n)</b>					
Bachelor's degree (56)	1.67	1.89 (10)	1.62 (46)	g=0.40	.37
Master's degree (46)	1.73	1.89 (12)	1.67 (34)	g=0.28	.38
Professional study (8)	1.25	-	1.25 (8)	-	-
Other types of study (e.g., A course, etc.) (3)	1.76	-	1.76 (3)	-	-
<b>Year of study (n)</b>					
First year (32)	1.52	1.78 (4)	1.49 (28)	g=0.43	.60
Second year (33)	1.71	2.26 (6)	1.59 (27)	g=0.91	.07
Third year (28)	1.66	1.79 (8)	1.61 (20)	g=0.27	.56
Fourth year (8)	1.71	2.23 (2)	1.54 (6)	g=0.89	.10
Fifth year (10)	1.70	1.05 (2)	1.87 (8)	g=1.45	.22
Sixth year (2)	2.93	-	2.93 (2)	-	-
<b>Type of Housing (n)</b>					
House (17)	1.74	-	1.74 (17)	-	-
Flat in shared house (29)	1.67	1.75 (9)	1.64 (20)	g=0.16	.75
Flat in apartment block (21)	1.67	1.69 (7)	1.66 (14)	g=0.04	.93
Room in apartment (10)	1.63	-	1.63 (10)	-	-
Room in block (e.g., student housing) (33)	1.61	2.28 (4)	1.52 (29)	g=1.12	.03**
Other (3)	1.81	2.46 (2)	0.54 (1)	-	-
<b>Clinical depression (n)</b>					
No (89)	1.51	1.69 (17)	1.47 (72)	g=0.32	.27
Yes, now (9)	2.46	2.63 (3)	2.38 (6)	g=0.71	.33
Yes, previously (15)	2.10	2.46 (2)	2.05 (13)	g=0.70	.18
<b>Clinical anxiety (n)</b>					
No (88)	1.52	1.70 (16)	1.48 (72)	g=0.33	.30
Yes, now (14)	2.25	2.54 (4)	2.13 (10)	g=0.71	.13
Yes, previously (11)	2.11	2.11 (2)	2.11 (9)	g=0.00	.99
<b>Other mental conditions (n)</b>					
No (97)	1.57	1.83 (20)	1.50 (77)	d=0.46	.09
Yes, now (10)	2.38	-	2.38 (10)	-	-
Yes, previously (6)	2.07	2.46 (2)	1.88 (4)	g=0.72	.31
<b>Asthma (n)</b>					
No (97)	1.68	1.96 (18)	1.61 (79)	g=0.50	.06
Yes, now (8)	1.75	2.36 (1)	1.66 (7)	-	-
Yes, previously (8)	1.48	1.31 (3)	1.58 (5)	g=0.27	.76
<b>Diabetes, n (%)</b>					
No (110)	1.66	1.89 (22)	1.60 (88)	d=0.40	.11
Yes (2)	2.00	-	2.00 (2)	-	-
Don't know (1)	2.21	-	2.21 (1)	-	-
<b>Other chronic disease (n)</b>					
No (90)	1.57	1.81 (18)	1.51 (72)	g=0.41	.16
Yes (19)	2.01	2.07 (3)	2.00 (16)	g=0.15	.82
Don't know (4)	2.20	2.86 (1)	1.98 (3)	-	-

\* Effect sizes was computed either manually (r) from the Mann-Whitney u-test, by using Hedge's g (g) or Cohen's d (d)

\*\*Statistically significant at 0.05 level



### 3.3.1 Regression analysis

A simple linear regression was first done to get the crude estimates of the impact of living alone on psychological distress (CORE-28) as shown in table 3. The psychological distress (CORE-28) unstandardized b (intercept) was 1.61 (95% CI = 1.46 - 1.76). For living alone, the standardized (mean difference)  $\beta$  = .15 (95% CI -.06 - .62, SE = .17, p = .104). Living alone was therefore not significantly associated with psychological distress in the crude model.

Then, a multiple linear regression was used to take the effect of potential confounders into account. For this, year of study and other chronic diseases were included. The psychological distress (CORE-28) unstandardized b (intercept) was 1.33 (95% CI = 1.04 - 1.61). For living alone, the standardized (mean difference)  $\beta$  = .15 (95% CI -.05 - .60, SE = .16, p = .099). The mean response difference between exposed (living alone) and non-exposed (living with others) did not change with adjustments,  $\beta$  = .15 and still not statistically significant. Therefore, even when including and adjusting for potential confounders, the association between psychological distress and living alone is neither clear nor statistically significant.

Table 3 Regression analysis for psychological distress (CORE-28) and living alone.

	Unstandardized beta, intercept (b)	Standardized Beta coefficient ( $\beta$ )	95% CI	Std. Error	t	Sig.
<b>Crude*</b>	1.61	.154	-.06-.62	.171	1.64	.104
<b>Adjusted**</b>	1.33	.150	-.05-.60	.164	1.67	.099

\* Simple linear regression including living alone.

\*\* multiple linear regression including living alone, other chronic diseases and year of study

### 3.4 The relationship between psychological distress (CORE-28) and other factors

To study the relationship between CORE-28 and other factors, several different statistical methods were applied, depending on the type of variable (categorical, ordinal, continuous) (table 4). The tests revealed no statistical significance when comparing the CORE-28 scores between groups, except in groups with or without clinical depression, anxiety, other mental issues, or other chronic diseases as shown in table 4.

Table 4 The relationship between psychological distress (CORE-28) and other factors amongst a student population (n=113) at UiT, The Arctic University of Norway

Factors	Test	Effect Size	p-value
Year of study (1-6)	Spearman rank correlation	$\rho = .137$	.15
Age	Pearson correlation	$r = .042$	.66
Single or in a relationship/married and cohabiting	Independent samples t-test	$d = .10$	.86
Single or in a relationship married and not cohabiting	Independent samples t-test	$d = .195$	.49
Gender (male or female)	Independent samples t-test	$d = -.191$	.10
Type of study (Bachelor's level, Master's level, professional study, or other type of study)	ANOVA	$\eta^2 = .027$	.39
Type of housing*	ANOVA	$\eta^2 = .004$	.99
Clinical depression ("No", "yes, now", "yes, previously")	ANOVA	$\eta^2 = .182$	<.001**
Clinical anxiety ("No", "yes, now", "yes, previously")	ANOVA	$\eta^2 = .150$	<.001**
Other mental issues ("No", "yes, now", "yes, previously")	ANOVA	$\eta^2 = .119$	<.001**
Asthma ("No", "Yes, now", "Yes, previously")	ANOVA	$\eta^2 = .006$	.73
Diabetes ("No", "Yes", "Do not know")	ANOVA	$\eta^2 = .009$	.60
Other chronic diseases ("No", "Yes", "Do not know")	ANOVA	$\eta^2 = .073$	.02**

\* House, flat in shared house, flat in apartment block, a room in an apartment, other types of housing or a room in a block (i.e., student housing)

\*\*Statistically significant at 0.05 level

The Spearman rank correlation was positive between CORE-28 and year of study,  $\rho$  (111) = .137,  $p = .15$ . The Pearson correlation between the CORE-28 and age was small,  $r$ (111) = .042,  $p = .66$ . The effect sizes for relationship status and gender were all small ( $d < 0.2$ ) (74) and statistically not significant. When looking at the other effect sizes, the  $\eta^2$  was small-medium and not statistically significant, except from clinical depression, anxiety, and other mental health issues that had a large effect size and were all statistically significant (74).

For CORE-28 and clinical depression, clinical anxiety, other mental issues, and other chronic disease the LSD Post Hoc test was done to assess exactly which of the subgroups that had a statistically significant difference in mean. For clinical depression and clinical anxiety, all the group comparison were significant, except from when comparing “yes, now” with “yes, previously” in both variables ( $p=.20$  and  $p=.61$ , respectively). For other mental issues, the result was statistically significant when comparing “no” with “yes, now” ( $p<.001$ ). When comparing “yes, previously” with “no” ( $p=.08$ ) and “yes, now” ( $p=.39$ ) results were not statistically significant. For other chronic diseases, only comparing “yes and “no” gave a significant result ( $p=.01$ ). When looking at “I don’t know” and “no” ( $p=.08$ ) or “I don’t know” and “yes” ( $p=.64$ ) none of the groups were significantly different.

## **4 Discussion**

The primary aim of this master thesis was to describe and explore the relationship between psychological distress and living alone, while the secondary aim was to investigate whether other possible factors were associated with psychological distress among students.

### **4.1 Key results**

The results showed an overall score of CORE-28 at 1.67, that indicated a moderate level of psychological distress among students. Furthermore, the descriptive results suggested that there was a difference between the psychological distress among those living alone, compared to those living with others. However, the estimates were not strong and revealed uncertainty of the results. When investigating subgroups, almost all the CORE-28 scores were higher among those living alone across the different groups. However, only the group of students living in a room in a block had a large effect size and significant difference in means with a higher level of psychological distress found in those living alone. In addition, the other largest effect size was found in fifth year students (comparing living alone or with others), however this finding was not statistically significant. The linear regression showed a statistically non-significant difference in CORE-28 means between those living with others and those living alone, even when adjusted for potential confounders.

The findings also revealed a relationship between a high score of psychological distress and clinical depression, clinical anxiety, other mental issues, and other chronic diseases as CORE-28 intended to assess.

## **4.2 Interpretation of main findings**

### **4.2.1 Psychological distress among students (CORE-28 scores)**

With an suggested clinical cutoff at 1.0 (75) and an overall CORE-28 score of 1.68 in the current study, the students in this population indicated a moderate level of distress. Even before the COVID-19 pandemic, university students have been known to have a substantially higher level of psychological distress compared to the general population (76). A study from the UK conducted between 2017 and 2018, estimated a mean score at 19.8, or 1.98 if not multiplying by 10, based on CORE-34 and the short CORE-10 version that are often used in student populations (77). However, this study was only based on students attending counselling and the pre-counselling scores were chosen to better compare with the results in the current master thesis study (78). Another UK study from 2007 compared CORE-34 scores between students attending counseling against an age matched primary care sample. The scores for the students (aged 16-64) was 18.2, or 1.82 (79). However, the student data was collected between 1999 and 2001. Since then, a lot has changed in the general society, also changing the context for the students with other factors, e.g., social media, now playing an important role for student mental health. This means that the study results might no longer be representative for a current student population to compare with. Furthermore, the large range of age could also make it harder to compare with our current findings.

These two studies observed higher scores compared to findings in this current master thesis study, supporting a moderate level of psychological distress amongst student populations pre-pandemic as well. However, since both the mentioned studies only included students attending counselling, and one of them was probably not representative of a more current student population, it might not give a representative CORE-OM score for a normal pre-pandemic student population. Therefore, it is challenging to compare the findings. It could however be argued that the students included in this master thesis study are not representative off the student population as well, given that recruitment was targeted students who were interested in testing self-help apps to manage possible COVID-19 related stress and worries – making it plausible that these students would score higher than a larger student population selected randomly for invitation to participate.

As for psychological distress during the pandemic, studies using the CORE-OM measurement are few. One such study was however identified, aimed at comparing distress between students of different European countries during the pandemic (80). This study used a pre-

pandemic normative mean score from the general UK population of 0.47 – well below the clinical cutoff. The scores measured during the pandemic, ranged from 1.24 (Germany) to 1.52 (Italy and Spain), with an overall mean score of 1.42 (80). These scores are higher than the pre-pandemic scores from a general population with which they compared the result, but lower than the scores from the pre-pandemic students attending counselling (80). They were also lower than the score found in this current master thesis study of 1.68. However, the sample sizes were larger and not exclusively including students attending counselling. They are, however, still above the clinical cutoff at 1.0, indicating a mild-to-moderate level of psychological distress. An Italian study conducted shortly after the first lockdown, concluded that traumatic events (such as the COVID-19 pandemic) increase the risk for psychological distress amongst university students (81). Levels of psychological distress would therefore be expected to be higher during the COVID-19 pandemic compared to before, but this could possibly be explained by the difference in the included study participants as mentioned above.

As for comparing mental health between countries, a cross-country comparative study found that a general Norwegian adult population reported better mental health and lower levels of loneliness compared to other countries (82). This indicates that a more severe COVID-19 situation and stricter lockdown measures could have a stronger impact on mental health, and that psychological distress in Norway might be generally lower compared to other countries.

Additionally, the timeline of the pandemic should be considered when interpreting the results. The data for this master thesis was collected in early 2021, almost a year into the pandemic, while the study comparing CORE-OM scores amongst students in different countries, collected data between 12<sup>th</sup> and 14<sup>th</sup> of May 2020, still in the early stages of the COVID-19 pandemic. The last Norwegian SHOT survey (SHOT2021) was collected in early 2021, around the same time as the data for this master thesis project. At that time, Norway had again been imposing stricter measures due to fear of new variants spreading and the rise of the third wave - resulting in some of the strictest travel bans in Europe when crossing into Norway, with following testing and quarantining. Furthermore, university campuses were still closed for students and teaching was conducted digitally (83, 84). The SHOT2021 used the Hopkins Symptoms Checklist (HSCL-5) to measure psychological distress and referred to it as mental health problems. The results showed a significant increase in mental health problems among students between 2018 and 2021. Unlike earlier surveys, there were also large geographical differences in the level of mental health problems, correlating with the levels of regional COVID-19 cases and related restrictions (85). This suggests that levels of psychological

distress could be even higher in more urban areas such as Bergen and Oslo compared to Tromsø. This is further supported by a longitudinal Norwegian study among the general adult population, conducted between March 2020 and August 2021, where it was found that depressive symptoms fluctuated corresponding with the level of COVID-19 related restrictions (86).

This all supports the finding that psychological distress could be increased due to the pandemic – both amongst students and the general population – depending on the level of COVID-19 related restrictions. However, the level of psychological distress might be lower in Norway and certain geographical areas compared to other countries and more urban areas (82, 85). As for comparing levels of psychological distress among students pre- and during the pandemic, a direct comparison is difficult, since the pre-pandemic studies were conducted exclusively using students attending counselling. The level of psychological distress found in this master thesis project, could therefore be explained by both a) the students who volunteered for this project might have at a higher level of psychological distress than the general student population, and b) the effect of the pandemic, relative to local levels of pandemic-related restrictions.

#### **4.2.2 Living alone and psychological distress (CORE-28)**

Loneliness has been established as the strongest predictor of psychological distress among students, while having strong social connections with your peers at the university had a protective effect (38). During the pandemic, being a student, young age, and living alone were risk factors of loneliness (87). The results of this master thesis study showed an increased level of psychological distress (CORE-28) among those living alone compared to those living with others. However, this finding is uncertain as the estimate was small (71) and did not reach statistical significance. When exploring further into subgroups, almost all the CORE-28 scores were higher among those living alone, with the highest estimates found amongst those studying in their second, fourth and fifth year, as well as those living in a room in a block (e.g., student housing). However, the overall results did not account for multiple testing, which potentially negatively effects statistical significance but not effect sizes (88).

One explanation of these findings could simply be the small number of participants, particularly the exposed group (students living alone n=22); a larger sample size could have brought more power to the statistical analyses (both the main and the subgroup analyses) and given more certainty to the results. However, the small effect size for the association between

those living alone compared with those living with others and their overall mean, indicates that living alone does not associate with the level of psychological distress very well.

Another potential explanation could be that those living alone do not necessarily experience loneliness and social isolation, leading to psychological distress. This is purely speculative, since the data of the current master thesis study does not support any causal direction. Many students might already have had a strong social network before the pandemic and are therefore not experiencing the same level of social isolation as those who did not, independent of housing situation. International students and students living far away from home, could therefore potentially be more vulnerable to this. This is supported by a study that concluded that international students who stayed in their host country instead of returning home during the pandemic, experienced higher levels of stress from COVID-19 related stressors such as worries about personal health and lack of social support (89).

This could potentially explain the significant difference in psychological distress between students living alone or living with others in a room in a block/students housing; international students would typically live in student housing, and many of them would maybe not have had any daily contact with their Norwegian fellow-students pre-pandemic (90). With a weak or non-existing social network, social isolation and loneliness would be enforced during the pandemic when living alone. Having a feeling of not belonging could also increase feelings of loneliness during the COVID-19 pandemic (91). However, students from this vulnerable group who were living with others, might not experience the same level of psychological distress and loneliness. Local students reside in student housing as well (90) but would likely have family and other social support systems established nearby and would therefore not be as affected by the restrictions as international and students living far away from home.

Overall, living with others did not associate with level of psychological distress very well – despite when students residing in student housing were investigated, assuming they mainly consist of international and students living far away from home. Other factors such as feelings of loneliness and social isolation might be worth investigating further to establish stronger associations with psychological distress among students during the COVID-19 pandemic.

#### **4.2.3 Other possible factors and psychological distress (CORE-28)**

Mental disorders like clinical depression, clinical anxiety, other mental issues, and other chronic diseases were all associated with psychological distress assessed by the CORE-28.

Since the intention of the CORE-28 is to assess psychological distress, this was not a surprisingly finding. However, this was not investigated further as it was not part of the aim in this current master thesis study. It would however be relevant to investigate this further in a validation study for the CORE-OM.

As mentioned before, feelings of loneliness and social isolation could potentially be stronger associated with psychological distress than living alone. This is supported by a Canadian study from 2021, that also linked increased social isolation with psychological distress among postsecondary students (92). Common spaces such as university campuses, cafés, and recreational facilities might be of higher importance for the maintenance of social life among students, compared to other age groups. The SHOT2021 study also found an association between days spent on campus within the past 2 weeks and mental health problems (85). This could further highlight the vital role of a functional social life and the physical frames to support this among students in relation to mental health.

Even though young age, being single, and female gender are known risk factors for loneliness and psychological distress (27, 29, 52, 53) they were not found to be associated with psychological distress in this master thesis study. The low number of participants could again be a possible explanation for this, affecting the significance level. The effects sizes for these factors were, however, small as well, indicating that the practical significance was negligible. However, due to limitations in the available dataset, many potential confounders were not accounted for. These potential confounders could possibly have had a stronger correlation with psychological distress, than any of the factors included in this master thesis study did. Examples of these potential confounders could be level of physical activity (PA) and financial worries. These factors have been investigated by other studies that found a negative impact on mental health among students (93, 94). Had they been included in this study they could have been adjusted for and potentially strengthened the findings of this master thesis study.

This master thesis study mainly focused on living alone due to a gap in the current literature and did therefore not include more data from the original pilot study project that could potentially have been of relevance, such as financial worries. Factors such as level of PA, feelings of loneliness, social isolation, employment status, and nationality/international student status were not included in the original pilot project study but should be investigated further in future studies in relation to psychological distress among students. Especially financial worries might be of interest in relation to living alone during the COVID-19



pandemic since this could further affect the financial stability when not sharing living costs with others in times of crisis.

## **4.3 Methodological discussion**

### **4.3.1 Strengths of this study**

One of the main strengths of this master thesis study is the real-life data that was used. The study was a descriptive study and can therefore provide an in-depth view of the relationship between psychological distress and living alone among this specific student group. The anonymity of the students would also allow them to be honest about their emotions. This gave a unique insight to the mental well-being of a North Norwegian student population a year into the COVID-19 pandemic. Furthermore, the timing regarding the COVID-19 pandemic is important as well. There are still many unknowns regarding the effects of the restrictions on mental health. A large part of published data revolves around the earlier stages of the pandemic, while long-term effects and longitudinal studies are still few. This is to my knowledge, the only study primarily aimed to investigate the relationship between psychological distress and living alone among students, a year into the COVID-19 pandemic.

Another strength is the CORE-OM tool. It is validated in several languages and is widely used in clinical settings. The internal consistency of the CORE-OM has been reported as very good ( $\alpha=0.94$ ) and the 1-week test-retest reliability as high (Spearman's  $\rho=0.90$ ) (66). The main intend of the CORE-OM is to measure and evaluate effect of treatment. CORE-OM therefore fits the purpose of the original project with repeated measurements at 4 timepoints, testing the effect of a self-help app. However, for this master thesis study and its main objective, other and more widely used tools for measuring psychological distress could have been used as well: For instance the shorter tools Anxiety and Depression checklist (K10)(95), Hopkins Symptom Checklist-10 (HSCL-10) (96), or Distress Questionnaire-5 (DQ5) (97). This could potentially have made comparison between pandemic and pre-pandemic levels of psychological distress easier.

### **4.3.2 Limitations and generalizability**

#### **Study design**

The limitations regarding this master thesis study mainly revolves around the study design itself. In cross-sectional studies, exposure and outcome are assessed at the same timepoint, making it impossible to draw any temporal relationship (98). It is therefore not possible to

establish cause and effect for the association between psychological distress and living alone or other factors for this type of study. Even though an association can be found, there will be no evidence that the exposure caused the outcome. Furthermore, since the data is only collected at one point in time, the data must be viewed considering current events possibly affecting the study participants at the time of data collection. For instance, in the case of this master thesis study, findings will have to be interpreted in the current context and state of the pandemic situation, as well as considering natural dips in mental health during polar nights (“mørketid”) in the arctic winter. This means that level of psychological distress could change in any direction at any other timepoint, depending on current events and development of the pandemic, and other factors affecting the student’s life.

The limitation of available data in the original pilot project study and the likewise limited inclusion of potential confounders in this master thesis project is another weakness. As described in 4.2.3., there might be other factors, such as level of PA, that should have been included and accounted for as a potential confounder. This was however not done and could therefore affect the strength of the results (99).

### **Types of bias**

Selection bias is another main limitation to this master thesis study. The study participants were recruited based on their availability and willingness to take part in the study. The theme of the main study would likely mainly attract students experiencing distress related to the COVID-19 pandemic. This would cause prevalence-incidence and volunteer bias, resulting in the study participants included in the study potentially having increased levels of psychological distress compared to a larger student population. This would result in the study participants no longer being representable for a student population (98).

Another type of bias related to the cross-sectional method is information bias. For this master thesis project, especially recall and misclassification bias might be an issue affecting the results. The CORE-28 asks the participants to answer based on feelings and thoughts taking place in the past week. The current mood and circumstances affecting the individual study participant in the time of answering the questionnaire could affect and skew the results and therefore not give a true estimate for the entire week. This is the challenge when using a questionnaire to define potential mental health issues; the student might experience psychological distress at an increased level that could be interpreted as risk of a mental

disorder. It could also be a normal reaction to outer stressors, that is coped with in an acceptable way. However, when asking about subjective feelings, we must fully accept the answers given no matter the risk of bias. The feelings expressed by the study participants is their personal experience and should not be questioned based on potential bias. It could be argued that a qualitative or a mixed method study would be more suitable for this type of topic, widening the chance of reaching a deeper level of understanding of the narrative and feelings of the students. This could further strengthen the assessment of the mental health status of the individual student and better define the clinical cases among the students.

The misclassification bias occurs when participants are assigned to a different category than they should. For instance, some students living in a room in student housing might consider themselves as living alone, while others might consider it living with others if they share the floor with other students, but still have a private room. These mentioned type of bias are, however, normal in all types of study involving self-reporting (100).

### **Sample size**

Another main limitation is the sample size. The sample size calculation for the original pilot study project was based on previous findings of small effect sizes for helping with feelings of lowered mood in non-clinical samples and was aimed at  $n=80$  (with an expected attrition rate of 20% and four time points of data collection in the span of 12 months). However, this was intended for a different purpose and proved not to be sufficient for hypothesis testing in this master thesis study, especially for the sub-group analyses. When attending to test hypothesis and mean differences, a certain amount of power from the sample size is needed to obtain a certain and precise result. There might have been a true difference between living alone or living with others, but there was not enough power to detect it. A larger sample size could therefore have yielded stronger results than what was found in this master thesis project. As a result of this, the findings in this master thesis study should be interpreted with caution.

### **The exclusion of the risk domain from the CORE-OM**

Since the risk domain from the original CORE-OM tool was excluded due to ethical reasons, the overall score of CORE-28 could have been affected. The risk domain contains questions regarding potential harm to self and others and include questions such as “within the past week”: “I have been physically violent to others” or “I have thought it would be better if I were dead”. The risk domain is therefore mainly included to assist the clinician in spotting the

most adverse outcomes (70). Most students would score low on the questions regarding risk, overall lowering the CORE-OM mean score of that student. By completely excluding the risk domain, the overall mean might become higher than if it was included.

### **Generalizability**

The types of selection biases mentioned above would affect the generalizability and external validity of this study (98). A direct comparison with other student populations should therefore not be made but seen in the context of the study participants of this master thesis study, timeline of the COVID-19 pandemic and geography.

#### **4.3.3 Future perspective**

This master thesis study was aimed to describe and explore the relationship between psychological distress and living alone among students. It is the hope that this data can contribute to the ongoing research of collecting and exploring as much data as possible regarding the COVID-19 pandemic and mental health in young adults. It is vital to uncover risk factors related to impaired mental health among vulnerable groups, such as students. This will help allocate scarce resources to those most in need, both during the COVID-19 pandemic, in its aftermath and as preparation for potential future pandemics. This will hopefully be able to help prevent serious mental health problems among those most vulnerable in the future.

The original project, from which the data for this master thesis project was obtained, also contributes with some important findings: it was done as a pilot study to investigate the effect and feasibility of two different self-help apps in a time where face-to-face counselling was limited (the paper regarding this, has been submitted and is under publication in the time of writing this and is therefore not yet available as a reference).

The findings of the relationship between psychological distress and living alone was uncertain in this master thesis study. A future study with more power could investigate this further to ensure a more certain and stronger conclusion. Furthermore, future longitudinal studies could be designed to focus on establishing or confirming risk factors regarding psychological distress of students, ultimately to better prevent serious mental health problems among vulnerable groups.

## 5 Conclusion

This study found an overall moderate level of psychological distress among students in Northern-Norway a year into the COVID-19 pandemic. There was an observed difference in level of psychological distress between those living alone and those living with others. However, the estimates were not strong and revealed uncertainty of the results. Only the group of students living in a room in a block had a large effect size and significant difference in means with a higher level of psychological distress found in those living alone. Even when accounting for potential confounders in a multivariate regression analysis, the association between living alone and psychological distress was still unclear. The findings of this study were therefore uncertain and future studies with larger sample sizes should investigate the association between psychological distress and living alone further.

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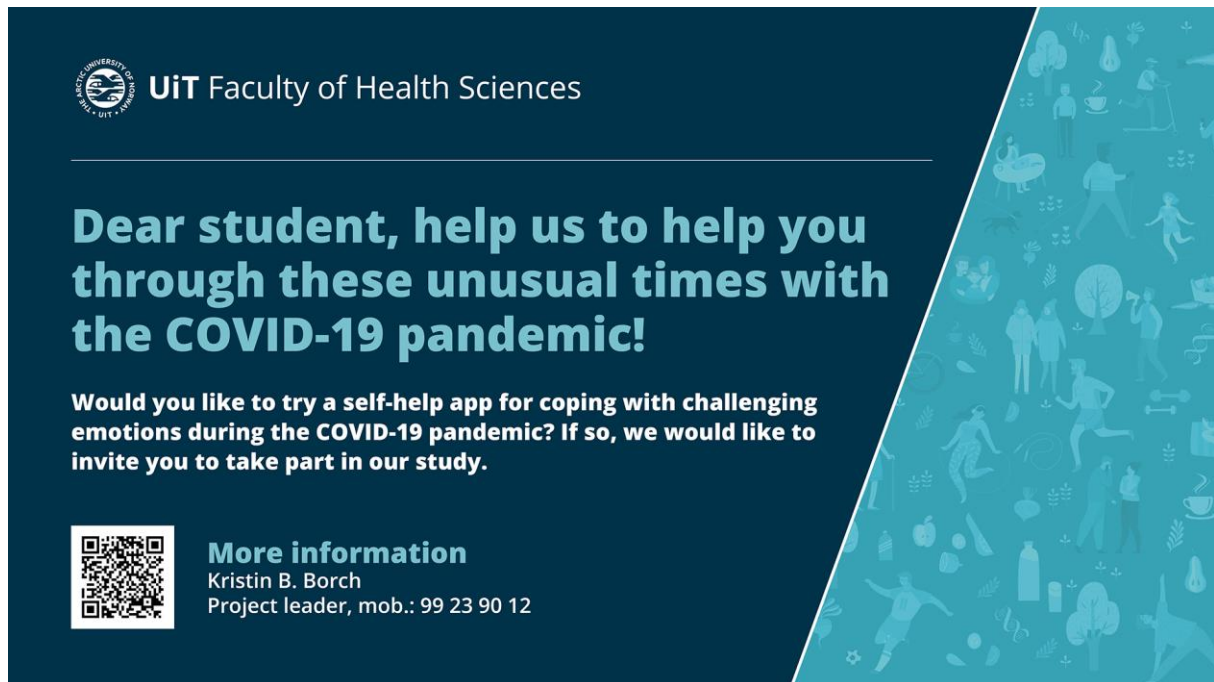
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# Appendix

## 1. Flyer used for general student recruitment



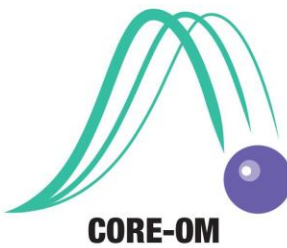
## 2. Recoding of positively charged questions for CORE-28

Table 5 Recoding of positively charged questions for CORE-28

Question	Original value	New value
I have felt I have someone to turn to for support when needed	0=Not at all	0=Most or all the time
I have felt O.K about myself	1=Only occasionally	1=Often
I have felt able to cope when things go wrong	2=Sometimes	2=Sometimes
I have been happy with the things I have done	3=Often	3=Only occasionally
I have felt warmth or affection for someone	4=Most or all the time	4=Not at all
I have been able to do most things I needed to		
I have felt optimistic about my future		

I have achieved the things I wanted to		
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### 3. CORE-34 questionnaire



Site ID:

Client ID:

Therapist ID:

Date form given

D D M M Y Y Y Y

Age

Gender: M  F

**Stage Completed:**

S Screening  
R Referral  
A Assessment  
F First Therapy Session  
P Pre-therapy (unspecified)  
D During Therapy  
L Last therapy session  
X Follow up 1  
Y Follow up 2

**Stage**

**Episode**

**IMPORTANT - PLEASE READ THIS FIRST**

This form has 34 statements about how you have been **OVER THE LAST WEEK**.  
Please read each statement and think how often you felt that way last week.  
Then tick the box which is closest to this.

	<i>Not at all</i>	<i>Only occasionally</i>	<i>Sometimes</i>	<i>Often</i>	<i>Most or all the time</i>	
1 I have felt terribly alone and isolated	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> F
2 I have felt tense, anxious or nervous	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
3 I have felt I have someone to turn to for support when needed	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> F
4 I have felt O.K. about myself	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> W
5 I have felt totally lacking in energy and enthusiasm	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
6 I have been physically violent to others	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> R
7 I have felt able to cope when things go wrong	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> F
8 I have been troubled by aches, pains or other physical problems	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
9 I have thought of hurting myself	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> R
10 Talking to people has felt too much for me	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> F
11 Tension and anxiety have prevented me doing important things	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
12 I have been happy with the things I have done	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> F
13 I have been disturbed by unwanted thoughts and feelings	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
14 I have felt like crying	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> W

Please turn over



## Over the last week ...

	Not at all	Only occasionally	Sometimes	Often	Most or all the time	OFFICE USE ONLY
15 I have felt panic or terror	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
16 I made plans to end my life	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> R
17 I have felt overwhelmed by my problems	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> W
18 I have had difficulty getting to sleep or staying asleep	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
19 I have felt warmth or affection for someone	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> F
20 My problems have been impossible to put to one side	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
21 I have been able to do most things I needed to	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> F
22 I have threatened or intimidated another person	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> R
23 I have felt despairing or hopeless	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
24 I have thought it would be better if I were dead	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> R
25 I have felt criticised by other people	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> F
26 I have thought I have no friends	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> F
27 I have felt unhappy	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
28 Unwanted images or memories have been distressing me	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
29 I have been irritable when with other people	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> F
30 I have thought I am to blame for my problems and difficulties	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> P
31 I have felt optimistic about my future	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> W
32 I have achieved the things I wanted to	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> F
33 I have felt humiliated or shamed by other people	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> F
34 I have hurt myself physically or taken dangerous risks with my health	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> R

THANK YOU FOR YOUR TIME IN COMPLETING THIS QUESTIONNAIRE

<b>Total Scores</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	→ <input type="text"/>	→ <input type="text"/>
	↓	↓	↓	↓	↓	↓
<b>Mean Scores</b> <small>(Total score for each dimension divided by number of items completed in that dimension)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	(W)	(P)	(F)	(R)	All items	All minus R

