

Article

# Suicide thoughts and attempts in the Norwegian general population during the early stage of the COVID-19 outbreak

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**Abstract:** The aim of the study was to examine the prevalence of suicide thoughts and -attempts during the early stage of the COVID-19 outbreak and examine factors associated with suicide thoughts in the general Norwegian population. A sample of 4527 adults living in Norway were recruited via social media. Data related to suicide thoughts and attempts, mental health variables, pandemic-related concerns and sociodemographic variables were collected. Associations with suicide thoughts were analyzed with logistic regression analysis. In the sample, 3.6 % reported suicide thoughts during the last month, while 0.2 % had attempted to commit suicide during the same period. Lower age (OR: 0.66,  $p < 0.001$ ), daily alcohol use (OR: 3.29,  $p < 0.001$ ), being in the risk group for COVID-19 complications (OR: 2.38,  $p < 0.01$ ), and having economic concerns related to the pandemic (OR: 2.51,  $p < 0.001$ ) were associated with having suicide thoughts. In addition to known risk factors, the study suggests that aspects specific to COVID-19 may be important for suicidal behaviors during the pandemic.

**Keywords:** coronavirus, pandemic, population survey, suicidal behavior, suicide,

## 1. Introduction

Suicide and suicide attempts convey unbearable personal suffering, and suicides give rise to considerable, long-lasting suffering for family and close ones [1-3]. At the population level, the rate of suicide in a country may be considered a crude indicator of the population's mental health. In Norway, between 500 and 600 persons commit suicide each year [4], and it is suggested that the number of suicide attempts is approximately ten times higher [5]. While the current population suicide rate is somewhat lower compared with the peak in 1988 [4], it has been fairly unchanged since the mid-1990s [6]

and appears to remain similar to other countries in Western Europe and North-America (approximately 12-13 deaths per 100.000 inhabitants) [4]. Mental health policies in Norway continue to aim to reduce the population suicide rate [7].

While having thoughts about suicide is far more common than performing actual or attempted suicide, having suicide thoughts has been found to predict subsequent suicide attempts [8,9]. In the USA in 2008-2009, more than eight million people over 18 years of age (3.7 % of the adult population) reported having suicidal thoughts during the last year, while approximately one million people (0.5% of the adult population) reported having attempted suicide in the last year [1]. While most suicides are performed by men [4,10,11], suicide thoughts and non-fatal suicidal behaviors are more often found among women. Suicide thoughts are also more commonly found in persons of young age and persons with mental health problems [8]. Mood disorders, depression in particular, are strongly linked with suicidal behavior, but other mental health problems, such as anxiety disorders, substance use disorders and impulse control disorders, have also been found to increase the risk of suicide thoughts and -attempts [11-14].

Since the outbreak of COVID-19, instigating a lockdown of society, restrictions in people's social life and a sharp increase in unemployment, much research has been concerned with the population's mental health in the pandemic context. A meta-analysis of studies published before May 2020 found high prevalence rates of stress (29.6 %), anxiety (31.9 %) and depression (33.7 %) in general population studies [15]. With regards to suicidal ideation, a 3-wave study from the UK found that more participants had suicide thoughts during the second (9.2 %) and third waves (9.8 %) of data collection, compared to the first wave (8.2 %), thus indicating a worrying time trend [16]. In a recent Norwegian study, however, the increase in point estimates of suicide thoughts in the population from before (3.2 %) to after the COVID-19 outbreak (4.1 % - 4.2 %) was not statistically significant [17].

Changes in the rates of and risk factors for suicidal behavior in the population have important implications for the targeting and planning of mental health care services. Increased knowledge in this area may assist more targeted initiatives for suicide prevention. Previous studies have found that potentially stressful aspects specific to COVID-19, such as having economic concerns, experiencing isolation or quarantine, and perceiving to have high risk of complications, were associated with higher risk of mental health problems [18-20]. Although reviews have found weak evidence of increased suicidal behavior during previous emerging viral outbreaks [21], recent studies suggest that mental health problems combined with a long-lasting stressful life experience, such as the COVID-19, may constitute a particularly problematic situation that can have an impact on suicide thoughts and behaviors in the population [22,23].

### *1.1 Study aim*

The aims of the study were to examine the prevalence of suicide thoughts and -attempts during the early stage of the COVID-19 outbreak and examine factors associated with suicide thoughts in the general Norwegian population.

## 2. Materials and Methods

### 2.1 Design

The CORONAPOP study, a population-based cross-sectional survey, was open to all citizens between April 8<sup>th</sup>, 2020 and May 20<sup>th</sup>, 2020. Several institutions, including Oslo University Hospital, Sunnaas Hospital, University of Oslo, and Oslo Metropolitan University, hosted and disseminated the web-link to the survey. The link to the survey was openly disseminated on social media platforms, such as Facebook, Twitter, LinkedIn and Instagram, by the individual researchers and other individuals. The study was also featured in national and local newspapers.

### 2.2 Sample

Norwegian citizens aged 18 years or older were invited to participate. There were no exclusion criteria.

### 2.3 Measures

Through the web-based survey, sociodemographic and health-related data were collected as self-report measures. Several of the employed measures were identical to the ones used in the Norwegian population health survey (NORPOP), which was conducted as a postal survey in 2014-2015 [24-27].

#### 2.3.1 Sociodemographic variables

Data were collected for age group (18-29 years, 30-39 years, 40-49 years, 50-59 years, 60-69 years, and 70 years or older) gender (male/female), highest completed education level (elementary school, high school, less than four years of higher education, and four years of higher education or more), employment status (working/in education versus not), cohabitation status (living with spouse or partner versus not), and size of place of residence (< 200 inhabitants, 200-19.999 inhabitants, 20.000-99.999 inhabitants, 100.000 inhabitants or more). A significant part of the Norwegian population lives in rural areas. The categories were constructed based on the consideration that about 20%-30% of the population belongs to each of the categories, and the NORPOP study used the same categories.

#### 2.3.2 Suicide thoughts and -attempts

We used the phrase: "Below is a list of health problems. Do you have, or have you had, any of these?" Among the listed problems were suicide thoughts and suicide attempts. The response alternatives were "no", "yes previously, but not during the last month" and "yes, during the last month". Those who confirmed having one or more of the listed health problems during the last month were classified as currently having the relevant mental health problems.

#### 2.3.3 Alcohol use

We used the phrase: "Use of alcohol and addictive drugs and pharmaceuticals: have you used any of these?" Below was a list containing alcohol and other substances.

Response options were “no”, “sometimes”, “weekly”, and “daily”. Participants who reported that they used alcohol daily were classified as daily drinkers.

#### 2.3.4 Problems related to the pandemic

Relating to the COVID-19 situation, participants were asked to respond “yes” or “no” to the following questions in relation to the pandemic: a) “Do you have economic concerns?”, b) Have you been in quarantine or in isolation due to the coronavirus?”, and c) “Are you in the risk group for complications if infected by COVID-19?”

#### 2.4 Statistical analysis

Frequencies and proportions (%) were calculated for all categorical variables, and all sociodemographic variables were cross tabulated with the reported suicide thoughts and -attempts. Single and multiple logistic regression analyses were performed to assess associations between sociodemographic variables (age and gender), alcohol use, COVID-19 related problems (risk group, economic concerns and experienced quarantine/self-isolation), and current suicide thoughts. Odds ratio (OR) with 95% confidence interval (CI) was reported. IBM SPSS Statistics version 26 [28] was used for statistical analyses, and the significance level was set at 5%.

#### 2.5 Ethics

The questionnaires were answered anonymously. Ethical approval for conducting the study was granted from the Regional Committee for Medical and Healthcare Ethics (REK no. 130447).

### 3. Results

#### 3.1 Sample characteristics

The sociodemographic characteristics of the sample ( $n = 4527$ ) is displayed in Table 1. Over half of the sample was below 40 years of age. A majority were women (85.0%), had higher education (75.5%), were employed or enrolled in education (81.0%). With respect to urbanity, the larger group of participants lived in cities with more than 100.000 inhabitants (46.3 %).

In the sample, 161 (3.6 %) reported to have had suicide thoughts during the last month, while seven (0.2 %) had attempted to commit suicide. Among those with suicide thoughts during the last month, 4.3 % reported that they also had attempted suicide in the same period. In addition, 138 (3.0 %) reported daily use of alcohol, 1061 (23.4 %) reported to be in the risk group, 985 (21.8 %) reported to have economic concerns, and 1278 (28.2 %) reported to have been in quarantine or self-isolation due to COVID-19.

**Table 1. Sociodemographic characteristics of the sample, and suicide thoughts and suicide attempts in sample subgroups**

| Characteristics | Total sample | Suicide thoughts |            | Suicide attempts |            |
|-----------------|--------------|------------------|------------|------------------|------------|
|                 |              | Last month       | Previously | Last month       | Previously |

|  | <i>n</i> (%) | <i>n</i> (%) | <i>n</i> (%) | <i>n</i> (%) | <i>n</i> (%) |
|--|--------------|--------------|--------------|--------------|--------------|
| All                                      | 4527 (100.0) | 161 (3.6)    | 479 (10.6)   | 7 (0.2)      | 153 (3.4)    |
| Age group                                |              |              |              |              |              |
| 18-29                                    | 1156 (25.5)  | 71 (6.1)     | 193 (16.7)   | 4 (0.3)      | 63 (5.4)     |
| 30-39                                    | 1220 (26.9)  | 48 (3.9)     | 146 (12.0)   | 0 (0.0)      | 43 (3.5)     |
| 40-49                                    | 931 (20.6)   | 19 (2.0)     | 79 (8.5)     | 2 (0.2)      | 18 (1.9)     |
| 50-59                                    | 766 (16.9)   | 16 (2.1)     | 47 (6.1)     | 1 (0.1)      | 16 (2.1)     |
| 60-69                                    | 354 (7.8)    | 7 (2.0)      | 10 (2.8)     | 0 (0.0)      | 11 (3.1)     |
| 70 or above                              | 100 (2.2)    | 0 (0.0)      | 4 (4.0)      | 0 (0.0)      | 2 (2.0)      |
| Gender <sup>a</sup>                      |              |              |              |              |              |
| Male                                     | 659 (14.6)   | 17 (2.6)     | 57 (8.6)     | 2 (0.3)      | 14 (2.1)     |
| Female                                   | 3850 (85.0)  | 143 (3.7)    | 422 (11.0)   | 5 (0.1)      | 139 (3.6)    |
| Highest completed education <sup>b</sup> |              |              |              |              |              |
| Elementary school                        | 591 (13.1)   | 30 (5.1)     | 92 (15.6)    | 1 (0.2)      | 43 (7.3)     |
| High school                              | 514 (11.4)   | 32 (6.2)     | 72 (14.0)    | 3 (0.6)      | 32 (6.2)     |
| Higher education < 4 years               | 1376 (30.4)  | 55 (4.0)     | 147 (10.7)   | 1 (0.1)      | 38 (2.8)     |
| Higher education ≥ 4 years               | 2041 (45.1)  | 44 (2.2)     | 168 (8.2)    | 2 (0.1)      | 40 (2.0)     |
| Employment                               |              |              |              |              |              |
| Employed or in education                 | 3667 (81.0)  | 99 (2.7)     | 348 (9.5)    | 4 (0.1)      | 92 (2.5)     |
| Not employed and not in education        | 860 (19.0)   | 62 (7.2)     | 131 (15.2)   | 3 (0.3)      | 61 (7.1)     |
| Cohabitation status                      |              |              |              |              |              |
| Living with spouse or partner            | 2714 (60.0)  | 44 (1.6)     | 265 (14.6)   | 2 (0.1)      | 53 (2.0)     |
| Not living with spouse or partner        | 1813 (40.0)  | 117 (6.5)    | 214 (7.9)    | 5 (0.3)      | 100 (5.5)    |
| Size of place of residence <sup>c</sup>  |              |              |              |              |              |
| Rural                                    | 187 (4.1)    | 4 (2.1)      | 20 (10.7)    | 0 (0.0)      | 6 (3.2)      |
| Village                                  | 1141 (25.2)  | 34 (3.0)     | 123 (10.8)   | 3 (0.3)      | 37 (3.2)     |
| Town                                     | 1091 (24.1)  | 30 (2.7)     | 113 (10.4)   | 2 (0.2)      | 35 (3.2)     |
| City                                     | 2098 (46.3)  | 93 (4.4)     | 222 (10.6)   | 2 (0.1)      | 75 (3.6)     |

Note. <sup>a</sup>18 participants (0.4%) did not state gender, <sup>b</sup>5 participants (0.1%) did not state education level, <sup>c</sup>10 participants (0.2%) did not state size of place of residence. Rural is < 200 inhabitants, village is 200-19,999 inhabitants, town is 20,000-99,999 inhabitants, and city is > 100,000 inhabitants

### 3.2. Factors associated with current suicide thoughts

The results from the single and multiple logistic regression analysis are reported in Table 2. The unadjusted analyses showed that lower age, daily alcohol use, considering

oneself to be in the risk group, and having economic concerns were associated with current suicide thoughts. In the adjusted model, all of these variables remained significantly associated with the outcome: lower age (OR: 0.66,  $p < 0.001$ ), daily alcohol use (OR: 3.29,  $p < 0.001$ ), considering oneself to be in the risk group (OR: 2.38,  $p < 0.01$ ), and having economic concerns (OR: 2.51,  $p < 0.001$ ).

**Table 2. Associations with suicide thoughts last month ( $n = 4493$ )**

| Independent variables           | Unadjusted                       |           |         | Adjusted |           |         |
|---------------------------------|----------------------------------|-----------|---------|----------|-----------|---------|
|                                 | OR                               | 95%CI     | $p$     | OR       | 95%CI     | $p$     |
| Higher age group                | 0.67                             | 0.58-0.77 | < 0.001 | 0.66     | 0.56-0.76 | < 0.001 |
| Female gender                   | 1.46                             | 0.88-2.43 | 0.15    | 1.30     | 0.77-2.20 | 0.33    |
| Daily alcohol use               | 2.98                             | 1.64-5.39 | < 0.001 | 3.29     | 1.76-6.15 | < 0.001 |
| Risk group                      | 1.68                             | 1.21-2.35 | < 0.01  | 2.38     | 1.66-3.40 | < 0.001 |
| Economic concerns               | 3.22                             | 2.34-4.42 | < 0.001 | 2.51     | 1.81-3.50 | < 0.001 |
| Quarantine/isolation            | 0.95                             | 0.67-1.36 | 0.80    | 0.82     | 0.57-1.17 | 0.27    |
| <b>Model fit</b>                | <b><math>p &lt; 0.001</math></b> |           |         |          |           |         |
| <b>Nagelkerke R<sup>2</sup></b> | <b>8.6 %</b>                     |           |         |          |           |         |

*Note.* Dependent variable is having had suicide thoughts during the last month. Age group is ten-year intervals. Risk group is based on self-classification. Economic concerns are concerns related to the pandemic situation. Quarantine/isolation refers to having been in quarantine or self-isolation due to COVID-19.

## 4. Discussion

### 4.1 Summary of results

This study examined the prevalence of suicide thoughts and -attempts during the early stage of the COVID-19 outbreak and examined factors associated with current suicide thoughts in the general Norwegian population. In this sample, 161 participants (3.6 %) reported to have had suicide thoughts during the last month, while seven (0.2 %) had attempted suicide. In the fully adjusted model, lower age, daily alcohol use, risk of complications and having economic concerns were associated with higher odds of current suicide thoughts.

### 4.2 Suicide thoughts and attempts

The prevalence of suicide thoughts during the last month (3.6 %) reported in this early-stage COVID-19 study is similar to the prevalence reported in a previous general population study from Norway (4.1-4.2 %) [17], while lower than the prevalence found around the same time in the UK (8.2-9.8 %) [16] and USA (10.7 %) [23]. The similar rates reported across the Norwegian studies conducted during the same time strengthen our findings. The differences in comparison to other countries may reflect general cross-national differences in suicidal ideation, considering that large differences in lifetime prevalence have been found between

countries and regions [8,11]. Possibly, the differences may also reflect differences related to the impact of COVID-19 between countries. No doubt, UK and USA have had much higher numbers of infected and dead than Norway [29]. Infection rates and the number of citizens hospitalized or dead, but also burdens related to the general pandemic situation (restrictions on meeting people, worry about family and friends, financial concerns etc.) may translate into higher rates of suicide thoughts in those countries most strongly affected by COVID-19.

Among those with suicide thoughts during the last month, 4.3 % reported that they also had attempted suicide in the same period. Suicide thoughts have been found to be strongly related to suicide attempt during the lifetime [30]. Based on cross-national data from 17 countries, Nock and colleagues [8] reported that more than 60 % of all suicide attempts occur within one year after the onset of suicide thoughts. Considering these findings, our study's ratio of those with suicide attempt among those who currently have suicide thoughts, seems low. It may reflect that having suicide thoughts is a longstanding problem among a proportion of the sample, i.e., suicide thoughts occurred before the pandemic emerged, and many people may live with them over time without progressing into suicide attempts. Suicide thoughts do not necessarily indicate imminent risk of a suicide attempt. For some people, contemplating suicide may be associated with a feeling of having an exit if life gets worse. However, for persons with suicide thoughts first arising during the early stage of COVID-19, one may be concerned about their development and whether they will translate into suicide attempts at a later stage.

#### *4.3 Factors associated with suicide thoughts*

Lower age and using alcohol daily were associated with higher odds of current suicide thoughts. These results are in concert with findings from other general population studies. For example, Nock and colleagues [8] reported that younger age and having a mental disorder were consistent predictors of suicide thoughts, plans and attempts. Moreover, during the COVID-19 pandemic, suicidal ideation has also been found to decrease progressively by age [23]. Mental disorders such as anxiety [31,32] and depression [33,34] have often been linked with higher risk of suicide thoughts, and use of alcohol – i.e., higher drinking frequency, higher drinking quantity and binge drinking – has also been found to increase the risk [35,36].

With a view to the COVID-19 situation, the study showed that risk of complications from contracting the virus and having economic concerns related to the pandemic were associated with higher risk of having suicide thoughts. Both factors have been found previously to be related to high stress levels corresponding to symptom-defined PTSD [18], and a pathway from risk group and economic concerns via high stress and anxiety to suicide thoughts, is viable. A pathway to suicide thoughts may also go via depression, as self-identifying as being in the risk group and having economic concerns have been found to be associated with higher risk of depression [19].

#### 4.4. Study limitations

The cross-sectional survey makes it impossible to establish causal relationships between variables. The study is therefore limited in its mere detection of factors statistically associated with suicide thoughts. While a range of variables were used as possible predictors of suicide thoughts, the inclusion of additional variables might well have improved the model.

The recruitment strategy was based on disseminating the link to the survey via various social media. As a result, the study sample was dominated by young, urban, and highly educated persons, and the vast majority were female. Generalization of findings to the national population should therefore be done with caution. Prevalence rates must be interpreted with caution, while associations with risk factors are more likely to be universal [8].

#### 5. Conclusion

Among those responding to the survey, 3.6 % reported suicide thoughts during the last month and 0.2 % reported suicide attempt during the same period. Younger age, daily use of alcohol, being in the risk group of complications if infected by COVID-19 and experiencing economic concerns during the pandemic outbreak were associated with having suicide thoughts. The study supports previous findings concerned with age and alcohol use in relationship to suicide thoughts and suggests that specific aspects of the pandemic situation may be important for suicidal behaviors during the pandemic.

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