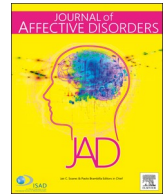




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## Research paper

# Anxiety and depression symptoms, and lack of emotional support among the general population before and during the COVID-19 pandemic. A prospective national study on prevalence and risk factors



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## ABSTRACT

**Background:** The effects of the COVID-19 pandemic on the mental health and emotional support among the general population are unclear. We therefore assessed if the prevalence of high Anxiety and Depression Symptoms (ADS) levels and lack of Emotional Support (ES) increased, and if risk factors of ADS and ES changed. **Methods:** Data was extracted from surveys conducted with the Dutch longitudinal population-based LISS panel ( $N = 3,983$ ). ADS and ES were assessed in March 2019 and 2020. Risk factors for ADS and ES were extracted from surveys in November 2018 and 2019. These were: ADS, gender, education, domestic situation, employment, age, ethnicity, lung and heart problems, and diabetes.

**Results:** The prevalence of high ADS levels and lack of ES did not increase compared to the pre-outbreak prevalence. ADS, non-native ethnic background, (partial) work disabilities and lung problems were predictive of both ADS and lack of ES in March 2019 and 2020. Job seekers, students and those who take care of housekeeping were more at risk for ADS in March 2020, but not in 2019. While 35–49 years old respondents were less at risk for ADS in March 2019, they were more at risk in 2020. Parents with child(ren) at home and those who take care of housekeeping more often lacked ES in March 2020, but not in 2019.

**Limitations:** No other mental health problems were assessed.

**Conclusions:** No increase in the prevalence of ADS and lack of ES was found. Some risk factors remained significant after the outbreak, while others changed notably.

## 1. Introduction

The corona or COVID-19 pandemic (WHO, 2020a, b) is a major global progressive disaster. It negatively impacts the health of infected people, people in quarantine, hospitalized patients and their families and friends, and the health of the bereaved of those who died because of COVID-19. With respect to the clinical spectrum of the disease, Wu and McGoogan (2020) reported that, based on the 44,415 confirmed cases in China, 81% was mild, 14% severe and 5% critical. The overall case-fatality rate in China was 2.3% (among 44,472 confirmed cases). To encapsulate and gain control over this pandemic, many countries have closed important parts of their societies. The effects of this pandemic on

the global economy seem, already at the time the present study was conducted, worse than the devastating effects of the financial crisis in 2008 (IMF, 2020a, 2020b).

A central question is extent to which this pandemic and its consequences affect the mental health of the *general* population because, in contrast to “normal” human-made and natural disasters, this pandemic affects countries as a whole and not local communities. Do anxiety and depression symptoms increase among the general population because of this COVID-19 pandemic? Although a very large number of studies assessed the effects of disasters on mental health (Rubonis and Bickman, 1991; Norris et al., 2002; Neria et al., 2009), it is unclear to what extent the results can be generalized to the *general* population

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during this pandemic. This pandemic is not a “classical” disaster suddenly and directly affecting groups of individuals (such as an airplane disaster), community or cities (such as the 9/11 terrorist attacks) or regions (such as the Katrina disaster and Tjernobył disaster). Nevertheless, and also based on the Conservation of Resources (COR) theory (Hobfoll, 1989, 2002; Hobfoll et al., 2018) we may expect that this pandemic has negative effects among the general population since it directly or indirectly threatens important resources such as safety and health (for instance by being infected), social contacts and support (for instance by social distancing and staying-at-home), housing, and work and income (for instance by loss of job) among the general population.

A search using PUBMED and PsycINFO identified two prospective studies published between Jan 1 and July 31 2020 using probability samples of the general population with pre-outbreak measures indeed found an increase in mental health problems. In the study by Twenge and Joiner (2020), adults were three to four times as likely to screen positive for anxiety and depression disorder according to the PHQ-2, or both, in April–May 2020, compared to U.S. adults in the first half of 2019. About 30% screened positive for these disorders during the pandemic. The study by Pierce and colleagues (2020) among U.K. residents of 16 years and older showed that mean scores on the GHQ-12 increased from 11.5 in 2018–2019 to 12.6 in April 2020, and the increase was not a simply a continuation of previous upwards trends from 2014 to 2019. The prevalence of clinically significant mental distress among the total study sample according to the GHQ-12 increased from 18.9% in 2018–2019 to 27.3% in April 2020. Other pandemic-related studies on mental health were based on non-probability samples and specific groups such as involved health care workers (cf. Jahanshahi et al., 2020; Naser et al., 2020; Newby et al., 2020; Sahu et al., 2020).

In addition, the health threat may especially worry those with pre-conditions, such as a lung disease, heart disease and diabetes, because these patients are more at risk of becoming severely ill when infected (CDC, 2020). According to COR, people strive to obtain, retain, foster, and protect resources they centrally value, and it is the loss or potential loss which causes distress. The circumstances and governmental protective policies surrounding the pandemic, however, may hinder efforts in this respect or contribute to feelings of helplessness that may add further stress. The effects of this pandemic on social contacts and support because of the social distancing and stay-at-home measures are of special interest (cf. Holt-Lunstad et al., 2010; Holt-Lunstad 2018). Does this pandemic and preventive measures negatively affect emotional support among the general population? Social contacts and emotional support are important resources according to COR. Research has shown that emotional support may provide a buffer for and moderate or mediate the potential negative effects of disasters on mental health, although post-event mental health problems such as PTSD-symptoms in turn may erode support at later stages (Adams et al., 2006; Cohen and Wills, 1985; Birkeland et al., 2017; Kaniasty and Norris, 2008; Yap and Devilly, 2004). However, little is known about which other subgroups affected by disasters (besides those with post-event mental health such as PTSD symptomatology) are at risk for a lack of emotional support. Studies on risk factors for a lack of emotional support following disasters and other potentially traumatic events are sparse (cf. Tracy et al., 2014; van der Velden et al., 2020a). It is therefore unclear if and which subgroups are more at risk for a lack of emotional support during this pandemic, for instance due to the ongoing social distancing measures, compared to “normal” circumstances.

The objective of the present prospective population-based study is to shed light on these issues. The first aim was to compare the prevalence of high Anxiety and Depression Symptom (ADS) levels and lack of Emotional Support (ES) during the period in which the COVID-19 pandemic developed very rapidly in the Netherlands (during March 2020), with high ADS levels and lack of ES before the COVID-19

outbreak. The second aim was to examine to what extent specific subgroups are at risk for high ADS levels and lack of ES compared to “normal” circumstances. More specifically: to what extent are pre-outbreak high ADS levels, gender, educational level, domestic situation, employment status, age, ethnicity, and physical illness (lung disease, heart disease and diabetes) risk factors for high ADS levels and lack of emotional support during the outbreak period compared to “normal”, that is pre-outbreak circumstances?

Normally a prospective comparative study design including non-affected adults would be used to assess if changes in the prevalence of high ADS levels and lack of ES and risk factors for high ADS levels and lack of ES can be attributed to the COVID-19 pandemic. After all, it must be ruled out as much as possible that changes in high ADS levels and lack of ES, and risk factors are attributed to the COVID-19 pandemic when the same changes and risk factors are present under normal circumstances, e.g. are caused by possible seasonality effects. However, this pandemic and governmental preventive interventions affect each adult precluding the existence of such a comparison group. Fortunately, we had the unique opportunity to analyze identical data from the same population-based study sample that was obtained in previous surveys before the outbreak (similar risk factors were assessed in November 2018, and similar ADS and lack of ES were assessed four months later in March 2019 respectively). If high ADS levels and lack of ES are more prevalent, and/or if risk factors for high ADS levels and lack of ES differ between pre-outbreak period and outbreak period, then these findings may serve as an indication that the differences can be attributed to the COVID-19 pandemic.

High ADS levels and lack of ES during the COVID-19 epidemic were assessed between March 2 and March 31 2020. In this period the number of confirmed COVID-19 cases in the Netherlands increased from 10 to 12,595. Furthermore, 4,714 corona patients were hospitalized during this period, and 1039 patients with confirmed COVID-19 had died (although the actual numbers of persons infected and deceased persons in this month is (much) higher, because many persons have not been tested). In February 2020, discussions about closing primary and secondary schools, universities, bars and restaurants, and working at home started and around March 15 2020 the Dutch government decided to close these public facilities and advised people to work at home.

## 2. Methods

### 2.1. Sample

For the present study we extracted data from the *Longitudinal Internet studies for the Social Sciences* (LISS) panel which started in 2007. The LISS panel is administered by CentERdata and the setup was funded by the Dutch Research Council (NWO). The panel is based on a probability sample drawn from the Dutch population register by Statistics Netherlands (Scherpenzeel and Das, 2011). Panel members who do not have a computer and/or internet access are provided with the necessary equipment at home. All members receive an incentive of 15 euros per hour for their participation. Further information about the panel and free access to the de-identified data can be found on <https://www.liissdata.nl/> (in English). In accordance with the new General Data Protection Regulation, participants gave explicit consent for the use of the collected data for scientific and policy relevant research.

We extracted and merged data collected in four surveys. Data was extracted from the (yearly) Health module of the longitudinal core study, in this case the surveys conducted in November 2018 ( $N^{\text{invited}} = 6,466$ ,  $\text{response}^{\text{completed}} = 84.4\%$ , T1), and in November 2019 ( $N^{\text{invited}} = 5,954$ ,  $\text{response}^{\text{completed}} = 86.4\%$ , T3). In addition, we used data from two surveys of the longitudinal VICTIMS-study (Van der Velden et al., 2020a, 2020b) conducted in March 2019

**Table 1**  
Sample characteristics and descriptive statistics (N = 3,983).

	November 2018 N (%)	November 2019 N (%)
High ADS levels		
- no	3,316 (83.3)	3,308 (83.1)
- yes	667 (16.7)	671 (16.8)
Gender		
- man	1,963 (49.3)	1,962 (49.3)
- woman	2,020 (50.7)	2,020 (50.7)
Educational level		
- low	1,012 (25.4)	988 (24.8)
- medium	1,455 (36.5)	1,431 (35.9)
- high	1,516 (38.1)	1,563 (39.2)
Domestic situation		
- (un)married cohabitation without child (ren)	1,358 (34.1)	1,380 (34.6)
- (un)married cohabitation with child(ren)	1,358 (34.1)	1,323 (33.2)
- single with child(ren)	226 (5.7)	223 (5.6)
- single	945 (23.7)	955 (24.0)
- other	97 (2.4)	102 (2.6)
Employment status (primary)		
- paid employment	1,915 (48.1)	1,943 (48.8)
- self-employed	205 (5.1)	215 (5.4)
- unemployed/job seeker	106 (2.7)	88 (2.2)
- student	344 (8.6)	276 (6.9)
- takes care of housekeeping	301 (7.6)	311 (7.8)
- pensioner	791 (19.9)	822 (20.6)
- has (partial) work disability	179 (4.5)	186 (4.7)
- other	140 (3.5)	142 (3.6)
Age categories (in years)		
- 18-34	1,062 (26.7)	993 (24.9)
- 35-49	941 (23.6)	911 (22.9)
- 50-64	1,031 (25.9)	1,041 (26.1)
- 65 and older	949 (23.8)	1,038 (26.1)
Ethnicity		
- native	3,164 (79.4)	3,164 (79.4)
- non-native	819 (20.6)	819 (20.6)
Lung problems		
- no	3,151 (79.1)	3,155 (79.2)
- yes	832 (20.9)	828 (20.8)
Heart problems		
- no	3,733 (93.7)	3,719 (93.4)
- yes	250 (6.3)	264 (6.6)
Diabetes		
- no	3,819 (95.9)	3,806 (95.6)
- yes	164 (4.1)	178 (4.5)

ADS = Anxiety and depression symptoms. self-employed = autonomous professional, freelancer, self-employed, or works or assists in family business. Educational level: low = primary education, preparatory intermediate vocational education, or other, medium = higher general secondary/pre-university education, intermediate professional education, high = higher professional education/university.

( $N^{\text{invited}} = 6,298$ ,  $\text{response}^{\text{completed}} = 83.2\%$ , T2) and March 2020 ( $N^{\text{invited}} = 6,568$ ,  $\text{response}^{\text{completed}} = 83.6\%$ , T4). Reminders for non-responders were sent the following month. The longitudinal LISS core study was designed with assistance from international experts in the relevant fields. The different modules were evaluated and approved by the Board of Overseers, the Internal Review Board until 2014. The VICTIMS survey was approved by an Institutional Review Board, consisting of external and internal reviewers of CentERdata not involved in the development of the VICTIMS-study.

In total, 3,983 out of the 5,379 adult respondents at T1 participated in all four surveys (74.0%), and 258 participated at T1 only. We weighted the data using 16 exclusive demographic profiles among the total adult Dutch population 2019 ( $N^{2019} = 13,926,066$ ), based on data of Statistics Netherlands. The 16 profiles were constructed using the following demographic characteristics: gender (man, woman), age (18-34, 35-49, 50-64, 65 years and older) and marital status (married and unmarried), totaling  $2 \times 4 \times 2 = 16$  exclusive demographic profiles. All results are based on the weighted sample ( $N = 3,983$ ).

## 2.2. Measures

### Demographics

The November 2018 and 2019 surveys assessed gender, age, educational level, marital status, domestic situation, and employment status (primary occupation). See Table 1 for subcategories of these demographics.

### Anxiety and depression symptoms (ADS)

Anxiety and depressive symptoms were examined in all four surveys using the 5-item Mental Health Index or Inventory (MHI-5; Means-Christensen et al., 2005; Ware and Sherbourne, 1992). Respondents were asked to rate their mental health during the past month on 6-point Likert scales (0 = never to 5 = continuously). After recoding (reversing) the negative formulated items, the total scores were computed by multiplying the total score by four (Cronbach's Alpha's: T1 = 0.87, T2 = 0.87, T3 = 0.87, and T4 = 0.86) resulting in a score from 0 to 100. Low scores reflect higher symptom levels. A cut-off of < 60 (Driessen, 2011) was used to identify respondents with moderate to high anxiety and depression symptom levels.

### Physical health problems

The Health modules of the LISS Core Study assessed several Physician-diagnosed Diseases (PD) in the past year (1 = yes, 2 = no) and Health Problems (HP) respondents regularly suffer from (1 = yes, 0 = no). For the present study we focused on reported: 1.) lung problems ((PD = chronic lung disease such as chronic bronchitis or emphysema or asthma) or (HP = short of breath, problems with breathing, or coughing, a stuffy nose or flu-related complaints)); 2.) heart problems ((PD = angina, pain in the chest, a heart attack including infarction or coronary thrombosis or another heart problem including heart failure) or (HP = heart complaints or angina, pain in the chest due to exertion)); and 3.) diabetes (PD = diabetes or a too high blood sugar level). These physical health problems were assessed in November 2018 and November 2019.

### Lack of emotional support (ES)

Lack of ES in response to problems was assessed in March 2019 and 2020 using the 8-item subscale of the Social Support List - Discrepancy (SSL-D; Bridges et al., 2002; van Sonderen, 2012). The SSL-D invites respondents to rate their opinions or perceptions about people with whom they interact, and to respond in these situations on 4-point Likert scales (1 = I miss it, I would like it to happen more often, 2 = I don't really miss it, but I prefer more, 3 = Exactly the right amount, 4 = It happens too often; Cronbach's alpha's: T2 = 0.89, and T4 = 0.89). Total scores were subtracted from the total maximum scores whereby high scores reflect more lack of ES. For the present study we, using a cut-off score of 13 that corresponds to the upper two deciles (upper 20%), dichotomized scores into no lack of ES (0 thru 12) and lack of ES (13 thru high).

## 2.3. Data analyses

To examine the extent to which the prevalence of high ADS levels and lack of ES increased between November 2019 and March 2020, and (not) between November 2018 and March 2019 repeated logistic multivariate regression analyses were conducted (GEE) with time as predictor while controlling for gender, educational level, domestic situation, employment status, age, and physical illness in November in the previous year. Similar analyses were conducted for a lack of ES, but then between March 2019 and March 2020, because lack of ES was not assessed in November in previous years.

To examine which subgroups are more at risk for high ADS levels and more at risk for a lack of ES due to the COVID-19 pandemic, we conducted bi-variate chi-square tests and multivariate logistic regression analyses with high ADS levels and lack of ES in March 2019 and



March 2020 as dependent variables. In each regression analyses, high ADS levels, gender, educational level, domestic situation, employment status, age, and physical illness assessed in November of the previous year were entered as predictors. As said, lack of ES was not assessed in November 2018 and 2019.

All analyses were conducted using IBM SPSS 26.0.

### 3. Results

#### 3.1. Non-response analyses

Non-response analyses using multivariate logistic regression analyses with non-response at T2, T3 and T4 as dependent variable showed that the non-response was not significantly associated with anxiety and depression symptoms, gender, education level, lung problems, heart problems and diabetes at T1. Because the results of the three regression analyses were similar, we focus on T4. Respondents aged 50 to 64 years (adjusted Odds Ratio (AOR) = 2.05, 95% confidence interval (CI) = 1.36–3.11,  $p = 0.001$ ) and of 65 years and older (AOR = 2.69, 95% CI = 1.33–5.43,  $p = 0.006$ ) were more likely to participate than 18–34-year old respondents. With respect to employment status, students (AOR = 1.90, 95% CI = 1.06–3.40,  $p = 0.30$ ) and those with (partial) work disabilities (AOR = 3.09, 95% CI = 1.20–7.99,  $p = 0.02$ ) participated more often than respondents with paid employment, but no significant associations were found for the other five employment status categories. Compared to married respondents, respondents with the marital status “other” (see Table 1) participated less often (AOR = 0.42, 95% CI = 0.21–0.83,  $p = 0.013$ ), but no significant associations were found for the other three marital status categories. Non-natives participated less often than Dutch natives at all surveys (AOR = 0.16, 1.23–2.13; Nagelkerke R Square = 0.15). Similar analyses adding social support at T2 to the list of predictors among those who participated at T1 and T2 (because social support was not assessed at T1) showed that social support was not significantly associated with non-response.

#### 3.2. Descriptive statistics

The characteristics in November 2018 and 2019 of the study sample are presented in Table 1.

#### 3.3. High ADS levels and lack of ES before and during the COVID-19 pandemic

The repeated logistic regression analyses (GEE) showed no significant differences in high ADS levels between November 2018 and March 2019 (16.7% and 16.8%) and between November 2019 and March 2020 (16.9% and 17.0%, respectively). Paired t-tests again showed no significant differences in total anxiety and depression symptom scores:  $M^{\text{November 2018}} = 74.5$ ,  $sd = 16.5$  and  $M^{\text{March 2019}} = 74.2$ ,  $sd = 16.7$ ;  $M^{\text{November 2019}} = 74.2$ ,  $sd = 16.4$ ; and  $M^{\text{March 2020}} = 74.1$ ,  $sd = 16.4$ .

For ES in March 2019 and March 2020 we found similar results: repeated logistic regression analyses showed no significant differences (20.4% and 19.7%, respectively). Paired t-test showed that the total scores of lack of ES were significantly lower in March 2020 than in March 2019 ( $M^{\text{March 2019}} = 10.4$ ,  $sd = 3.55$ ;  $M^{\text{March 2020}} = 10.2$ ,  $sd = 3.41$ ;  $t(3,982) = 3.50$ ,  $p < .001$ ). However, the difference in scores was trivial (Cohen's D = 0.055).

#### 3.4. Risk factors for high ADS levels before and during the COVID-19 pandemic

The results of the multivariate logistic regression analyses

predicting high ADS levels in March 2019 and March 2020 are shown in Table 2. Findings clearly demonstrate that respondents with work disabilities, lung problems, a non-native ethnic background and especially previous high ADS levels more often had high ADS levels before (March 2019) and during the COVID-19 pandemic (March 2020) than employed respondents, respondents without lung problems, Dutch natives and respondents without previous high ADS levels respectively.

Table 2 furthermore shows that risk factors for high ADS levels in March 2019 and March 2020 partly differed. Those with heart problems more often had high ADS levels during the COVID-19 pandemic, in contrast to one year earlier. During the COVID-19 pandemic, women were not more at risk for high ADS levels in contrast to one year earlier. Risk factors related to the domestic situations such as being single with and without children were no longer significant in predicting high ADS levels in March 2020, in contrast to high ADS levels in March 2019. Job seekers, students and those who take care of the housekeeping significantly more often had high ADS levels in March 2020 than those with paid employment, while they were not more at risk for high ADS levels in March 2019. In addition, while 35–49 years old respondents were less at risk for high ADS levels in March 2019 than 18–34 years old respondents, they were more at risk for high ADS levels in March 2020 than the youngest age group. There was a statistical trend ( $p < .010$ ) that self-employed more often had high ADS levels in March 2019 than those with paid employment, but less often in March 2020.

#### 3.5. Risk factors for lack support before and during the COVID-19 pandemic

Table 3 shows the results of the multivariate logistic regression analyses with lack of ES in March 2019 and March 2020 as dependent variables. Similar to risk factors of high ADS levels in March 2019 and March 2020, respondents with high ADS levels, work disabilities, lung problems about four months earlier, and those with a non-native ethnic background, were more at risk for a lack of ES in March 2019 and in March 2020 during the COVID-19 pandemic than the reference groups.

Again, there are a few differences in risk factors for a lack of ES in March 2019 and 2020. While those who take care of the housekeeping more often lack ES in March 2020, students less often lacked ES in March 2020 than those with paid employment, but no differences were found for a lack of ES in March 2019. In addition, no differences were found between 18–34 years old respondents and older respondents in both periods. Finally, there was a significant trend that those with heart problems and diabetes more often lacked ES in March 2020, but not in March 2019.

The March 2020 survey was completed by 1,980 respondents between March 2 and March 12, by 1,130 respondents between March 13 and March 22, and by 873 respondents between March 23 and March 31. To assess if respondents who participated later in March 2020 differed in high ADS levels and lack of ES from those who participated soon after the start of the survey, we repeated the bi-variate and multivariate logistic regression analyses adding the period of participating (three categories) to the list of predictors. Results of the bi- and multivariate analyses showed no significant differences between these three subgroups. In the multivariate analyses all other adjusted Odds Ratios did not or hardly change (see online appendix).

## 4. Discussion

### 4.1. Differences in prevalence high ADS level and lack of ES

Aim of the present population-based study was to assess if the COVID-19 pandemic affected the mental health and emotional support among the general population. This was done by comparing the prevalence of high Anxiety and Depression Symptom (ADS) levels and lack

**Table 2**  
Predictors of high anxiety and depression symptom levels (N = 3,983).

Predictors November	high ADS levels March 2019 (N = 3,983)		high ADS levels March 2020 <sup>2</sup> (N = 3,980)	
	N (%)	aOR (95% CI) <sup>1</sup>	N (%)	aOR (95% CI) <sup>2</sup>
High ADS levels				
- no (ref.)	239 (7.2)***	1	257 (7.8)***	1
- yes	430 (64.5)	19.2(15.5-23.9)***	419 (62.4)	15.3 (12.4-19.0)***
Gender				
- man (ref.)	287 (14.6)***	1	306 (15.6)*	1
- woman	382 (18.9)	1.26 (1.01-1.56)*	370 (18.3)	1.04 (0.84-1.29)
Educational level				
- low (ref.)	199 (19.7)***	1	206 (20.9)***	1
- medium	267 (18.4)	1.08 (0.82-1.41)	235 (16.4)	0.73 (0.56-0.96)*
- high	203 (13.4)	0.83 (0.62-1.11)	235 (15.0)	0.91 (0.69-1.19)
Domestic situation				
- (un)married co. without c. (ref.)	163 (12.0)***	1	167 (12.1)***	1
- (un)married co. with c.	230 (16.9)	1.12 (0.84-1.51)	238 (18.0)	1.04 (0.78-1.38)
- single with c.	56 (24.8)	1.82 (1.15-2.88)*	49 (22.0)	1.14 (0.72-1.81)
- single	196 (20.7)	1.47 (1.10-1.96)**	206 (21.6)	1.24 (0.94-1.64)
- other	25 (25.8)	1.88 (0.98-3.58)*	16 (15.7)	1.08 (0.54-2.16)
Employment status (primary)				
- paid employment (ref.)	272 (14.2)***	1	281 (14.5)***	1
- self-employed	34 (16.6)	1.59 (0.98-2.58) <sup>+</sup>	20 (9.3)	0.58 (0.33-1.02) <sup>+</sup>
- job seeker	21 (19.8)	1.08 (0.57-2.03)	29 (33.0)	1.98 (1.09-3.58)*
- student	85 (24.7)	0.92 (0.62-1.36)	82 (29.7)	2.38 (1.58-3.60)***
- takes care of housekeeping	57 (18.9)	1.41 (0.91-2.18)	61 (19.6)	1.67 (1.10-2.54)*
- pensioner	85 (10.7)	1.48 (0.84-2.60)	92 (11.2)	1.68 (0.97-2.90) <sup>+</sup>
- (partial) work dis.	88 (49.2)	3.16 (2.02-4.93)***	80 (43.0)	1.99 (1.30-3.03)**
- other	26 (18.6)	0.68 (0.38-1.22)	32 (22.5)	1.25 (0.73-2.16)
Age categories (in years)				
- 18-34 (ref.)	245 (23.1)***	1	196 (19.7)***	1
- 35-49	181 (19.2)	0.72 (0.53-0.98)*	201 (22.1)	1.49 (1.09-2.03)*
- 50-64	139 (13.5)	0.46 (0.33-0.64)***	170 (16.3)	1.06 (0.77-1.48)
- 65 and older	103 (10.9)	0.36 (0.20-0.64)***	110 (10.6)	0.48 (0.27-0.85)*
Ethnicity				
- native (ref.)	460 (14.5)***	1	464 (14.7)***	1
- non-native	209 (25.5)	1.41 (1.10-1.80)**	213 (26.0)	1.41 (1.11-1.79)**
Lung problems				
- no (ref.)	446 (14.2)***	1	444 (14.1)***	1
- yes	223 (26.8)	1.59 (1.24-2.03)***	233 (28.1)	1.61 (1.28-2.04)***
Heart problems				
- no (ref.)	596 (16.0)***	1	591 (15.9)***	1
- yes	73 (29.2)	1.23 (0.82-1.85)	86 (32.6)	1.49 (1.02-2.17)*
Diabetes				
- no (ref.)	640 (16.8)	1	646 (17.0)	1
- yes	29 (17.7)	1.06 (0.62-1.81)	31 (17.4)	0.74 (0.45-1.21)

ADS = Anxiety and depression symptoms. aOR = Odds Ratios adjusted for all other predictors in Table 2. CI = Confidence interval. Ref. = Reference category. self-employed = autonomous professional, freelancer, self-employed, or works or assists in family business. (un)married co. with c. = (un)married cohabitation with child(ren). (un)married co. without c. = (un)married cohabitation without child(ren). single with c. = single with children. (partial) work dis. = has (partial) work disability. Ref. = Reference category. Educational level: low = primary education, preparatory intermediate vocational education, or other, medium = higher general secondary/pre-university education, intermediate professional education, high = higher professional education/university. \* p < 0.05. \*\* p < 0.01. \*\*\* p < 0.001. <sup>+</sup> < 0.10. The asterisks near the percentages refer to the p-values of the chi-square tests, and the asterisks near the 95% CI's to the p-values of the aOR's. <sup>1</sup>Nagelkerke R Square = 0.42<sup>2</sup> Nagelkerke R Square = 0.39.

of Emotional Support (ES) during this pandemic (March 2020) with the prevalence before this pandemic (in November and March 2019 respectively). The results showed a clear pattern: we found no indications that the prevalence of high ADS levels and lack of ES increased (or decreased) during our study period among the total study sample compared to the pre-outbreak prevalence. In other words, in contrast to the studies of [Twenge and Joiner \(2020\)](#) and [Pierce and colleagues \(2020\)](#) on a group level the prevalence mental health problems, e.g. high ADS levels, and lack of ES appeared to be very stable. These results suggest that the general Dutch population was capable to cope with and capable of adjusting to the drastic developments and changes due to the COVID-19 pandemic in the short term (March 2020; cf. [Chen and Bonanno, 2020](#); [Wessely, 2005](#)).

How can we explain the absence of differences in the Netherlands on a population level? The way in which the general population experienced the pandemic during the study period is, among others, also related to how the Dutch government reacted and intervened and to

existing social welfare and health care systems in the Netherlands. Adult people without a job can invoke for unemployment benefits and, in principle, each Dutch citizen has a health care insurance regardless of being employed. In March 2020, each day the Dutch government and/or the Dutch National Institute for Public Health and the Environment (RIVM), informed the public in a non-political way about factual developments. This included the number of infected, number of deceased persons, number of patients in Intensive Care, and risks and taken measures (preventive, curative, financial). The government explicitly and repeatedly praised and acknowledged the work of all people working in and outside the frontline organizations (such as hospitals, nursing homes, schools, public transport, et cetera) and how the general population complied with all preventive measures. More than 5 million citizens followed the special press conferences via the national public broadcasting company. On March 11, the European Commission invested 25 billion (euros) to combat the (first) effects of this pandemic and relaxed regulations about state aid to companies. On March 17, the

**Table 3**  
Predictors of lack of emotional support (N = 3,983).

Predictors November	Lack of emotional support March 2019 (N = 3,983)		Lack of emotional support March 2020 (N = 3,980)	
	N (%)	aOR (95% CI) <sup>1</sup>	N (%)	aOR (95% CI) <sup>2</sup>
High ADS levels				
- no (ref.)	511 (15.4)***	1	475 (14.4)***	1
- yes	301 (45.1)	3.68 (3.04-4.45)***	308 (45.9)	4.21 (3.47-5.12)***
Gender				
- man (ref.)	387 (19.7)	1	356 (18.1)*	1
- woman	425 (21.0)	1.04 (0.88-1.23)	428 (21.2)	1.07 (0.90-1.28)
Educational level				
- low (ref.)	244 (24.1)***	1	222 (22.4)***	1
- medium	308 (21.2)	0.86 (0.70-1.06)	303 (21.2)	1.06 (0.86-1.32)
- high	260 (17.2)	0.71 (0.57-0.88)**	259 (16.6)	0.84 (0.67-1.06)
Domestic situation				
- (un)married co. without c. (ref.)	215 (15.8)***	1	210 (15.2)***	1
- (un)married co. with c.	301 (22.1)	1.20 (0.96-1.51)	277 (20.9)	1.36 (1.08-1.72)*
- single with c.	53 (23.3)	1.06 (0.72-1.56)	52 (23.3)	1.42 (0.97-2.09) <sup>+</sup>
- single	222 (23.5)	1.29 (1.03-1.62)*	220 (23.0)	1.37 (1.09-1.73)**
- other	21 (21.9)	1.17 (0.69-2.00)	25 (24.8)	1.65 (1.00-2.75) <sup>+</sup>
Employment status				
- paid employment (ref.)	373 (19.5)***	1	355 (18.3)***	1
- self-employed	39 (19.0)	1.04 (0.71-1.54)	32 (15.0)	0.86 (0.57-1.29)
- job seeker	36 (33.6)	2.01 (1.28-3.15)**	26 (29.5)	1.31 (0.78-2.21)
- student	82 (23.8)	0.92 (0.66-1.29)	52 (18.8)	0.65 (0.44-0.95)*
- takes care of housekeeping	61 (20.3)	0.90 (0.63-1.28)	80 (25.7)	1.46 (1.04-2.05)*
- pensioner	121 (15.3)	0.84 (0.55-1.28)	144 (17.5)	1.14 (0.76-1.72)
- (partial) work dis.	64 (35.8)	1.26 (0.87-1.83)	62 (33.2)	1.21 (0.83-1.76)
- other	37 (26.4)	1.03 (0.66-1.60)	34 (23.9)	1.05 (0.67-1.65)
Age categories (in years)				
- 18-34 (ref.)	238 (22.4)***	1	198 (20.0)**	1
- 35-49	242 (25.7)	1.27 (0.99-1.62) <sup>+</sup>	214 (23.5)	1.06 (0.82-1.37)
- 50-64	178 (17.3)	0.78 (0.60-1.02) <sup>+</sup>	189 (18.2)	0.85 (0.65-1.11)
- 65 and older	154 (16.2)	0.92 (0.60-1.43)	183 (17.6)	0.84 (0.55-1.65)
Ethnicity				
- native (ref.)	571 (18.0)***	1	566 (17.9)***	1
- non-native	241 (29.4)	1.56 (1.29-1.90)***	218 (26.6)	1.41 (1.16-1.73)**
Lung problems				
- no (ref.)	584 (18.5)***	1	562 (17.8)***	1
- yes	228 (27.4)	1.35 (1.11-1.64)**	223 (26.9)	1.27 (1.04-1.55)*
Heart problems				
- no (ref.)	737 (19.7)***	1	700 (18.8)***	1
- yes	75 (29.9)	1.28 (0.93-1.77)	84 (31.8)	1.33 (0.97-1.82) <sup>+</sup>
Diabetes				
- no (ref.)	776 (20.3)	1	735 (19.3)**	1
- yes	36 (21.8)	1.06 (0.70-1.60)	49 (27.5)	1.38 (0.95-2.00) <sup>+</sup>

ADS = Anxiety and depression symptoms. aOR = Odds Ratios adjusted for all other predictors in Table 3. CI = Confidence interval. Ref. = Reference category. self-employed = autonomous professional, freelancer, self-employed, or works or assists in family business. (un)married co. with c. = (un)married cohabitation with child(ren). (un)married co. without c. = (un)married cohabitation without child(ren). single with c. = single with children. (partial) work dis. = has (partial) work disability. Ref. = Reference category. Educational level: low = primary education, preparatory intermediate vocational education, or other, medium = higher general secondary/pre-university education, intermediate professional education, high = higher professional education/university. \* p < 0.05. \*\* p < 0.01. \*\*\* p < 0.001. <sup>+</sup> < 0.10. The asterisks near the percentages refer to the p-values of the chi-square tests, and the asterisks near the 95% CI's to the p-values of the aOR's. <sup>1</sup>Nagelkerke R Square = 0.13<sup>2</sup> Nagelkerke R Square = 0.14.

Dutch government opened a 20 billion (euros) emergency fund for the next three months to financially support employers and self-employed. According to Hobfoll's COR theory, people strive to obtain, retain, foster, and protect resources they centrally value such as social contacts. All digital infrastructures remained intact enabling people to stay in contact and interact via telephone, social media and apps like WhatsApp and FaceTime. During "normal" disasters, the absence of information about loved ones may cause extra worries and stress. During this pandemic these facilities may have prevented these worries because people could speak and inform each other.

4.2. Similarities and differences in risk factors

Results with respect to risk factors showed that those with high pre-outbreak ADS levels were most at risk for high ADS levels and lack of ES during the pandemic. Of those with high pre-outbreak ADS levels, 62%

had high ADS levels and 46% lack of ES during the pandemic. However, an identical pattern was found one year earlier indicating that this pattern was not unique for the COVID-19 pandemic. Similarly, those with a non-native ethnic background, (partial) work disabilities and lung problems, compared to the reference groups, were more at risk for high ADS level and lack of support during this pandemic, but they were also more at risk one year earlier. With respect to age a striking difference emerged: 35-49 years old respondents were more at risk for high ADS levels than 18-34 years old respondents during the pandemic, but one year earlier findings showed the opposite suggesting that this pandemic especially hits people during the "rush hour of life" (Zannella et al., 2018). However, the finding with respect to pre-outbreak high ADS levels that older respondents had less often high ADS levels than the youngest group of respondents is in line with previous studies (Jorm, 2000).

With respect to employment status, the finding that self-employed,

in contrast to one year earlier, were *less* at risk for high ADS levels than paid employed respondents during the pandemic is more or less counter-intuitive. Possible explanations are that the (partial) loss of work due to the pandemic also created some rest (in terms of workload), that the government recognized that self-employed are at high risk to lose work and offered financial support, and that self-employed are better prepared for uncertainties. Relevant but less surprising are the findings that job seekers, students, and those who take care of the housekeeping were more at risk for high ADS levels than paid employed respondents. Unemployment rates are expected to increase fast, there are unknown effects on study careers and post-graduation work, and people are disturbed in their daily routines. The finding that persons with heart problems (a risk factor for becoming ill when infected) had a higher prevalence of ADS and somewhat more often lacked ES, indicate that, like persons with lung problems, they must be considered a group at risk.

Importantly, those who take care of the housekeeping also more often lacked emotional support in contrast to one year earlier suggesting this group is especially at risk for more persistent mental health problems. This may also be true for parents with children and singles because, although they did not more often suffer from high ADS levels during this pandemic, they more often lacked ES. This may be considered a risk factor for later mental health problems.

In line with other research (McLean et al., 2011), in the year before this pandemic women more often had high ADS levels than men but this difference was absent during this pandemic, but men are more at risk becoming very ill or to die when infected than women (RIVM, 2020). A somewhat similar pattern was found in the study by Katikireddi et al. (2012) showing an increase in poor mental health for men but not women following the Great Recession, with no clear evidence for an increase in socioeconomic inequalities. The results of the longitudinal study by Thomson et al. (2018) also showed that gender inequalities in poor mental health narrowed following the Great Recession, but widened during austerity, creating the widest gender gap since 1994.

#### 4.3. Strengths and limitations

The use of a large longitudinal sample based on a random sample of the Dutch population with non-retrospective data on pre-outbreak on anxiety and depression symptoms, emotional support, and physical illness is a major strength of the present study. We used well-validated instruments to assess anxiety and depression symptoms and perceived lack of emotional support. Unfortunately, we have no data on other relevant mental health problems such as fatigue and sleep problems in March 2019 and 2020. We did not conduct clinical interviews to assess mental disorders and the use of mental health services during the pandemic compared to earlier periods. In their systematic review, Silva et al. (2018) concluded that economic crises might be associated with a higher use of prescription drugs and an increase in hospital admissions for mental disorders. It was outside the aim of the present study to assess measurement invariance of the MHI-5 and SSL-D across surveys. However, given the differences in MHI-5 and SSL-D scores between victims and non-victims of potentially traumatic events (Van der Velden et al., 2019) events we do not consider it very likely that large differences are masked by measurement invariance.

Anxiety and depression symptoms, and perceived emotional support during the COVID-19 pandemic were assessed in March 2020. Some governmental preventive measures were taken in the second half of March 2020, but we found no differences in symptoms and support between those who participated in the beginning of March versus those who participated at the end of March. Nevertheless, future research is

needed to gain insight in how mental health problems and various forms of social support among the general population develop in the next months and years. The 2-wave longitudinal study by Wang et al. (2020) with a four-week time interval between two assessed cohorts, found no changes in initial outbreak stress (8.1%), anxiety (28.2%) and depression symptoms (16.5%) but a significant decrease in mean posttraumatic stress symptoms scores. However, it may be expected that, when the threat or loss of important resources (such as employment, income, housing) intensify and become chronic mental health and social problems increase (Chang et al., 2013; Hobfoll, 1989, 2002; Hobfoll et al., 2018; Glonti et al., 2015). The dramatic forecasts of the IMF about the economic developments in the near future possibly resulting in a global recession (IMF, 2020ab) leaves little doubt in this perspective. The study by Brugging et al. (2016) showed that the prevalence of “mental health less than good” in the Netherlands increased from 9.2% among pre-financial crisis cohorts in the Netherlands (2006–2008) to 10.4% among the post-financial crisis cohorts (2009–2013). However, it is unknown whether these results can be generalized to this COVID-19 pandemic.

#### 4.4. Conclusions

This study is one of the very few prospective and national probability studies on the effects of the COVID-19 pandemic on the mental health and social support among the general population. In contrast to the U.S. and U.K., we found no indications that high anxiety and depression symptom levels increased in March 2020, compared to pre-outbreak symptom levels in November 2019. This pattern was similar to the pattern of symptoms between November 2018 and March 2019. No difference in lack of support was found. These findings suggest that the Dutch general population was able to adjust to and cope with all COVID-19-related changes and threats. Results showed that a few subgroups were at risk, who were not at risk one year earlier, such as job seekers, students, those who take care of the housekeeping, people with heart problems and those in the age category 35–49 years old.

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One co-author is an employee of the Victims Support Foundation, the sponsor of the VICTIMS-study. All authors had complete freedom to direct the analysis and its reporting without influence from the sponsor. There was no editorial direction or censorship from the sponsor.

#### CRediT authorship contribution statement

**Peter G. van der Velden:** Visualization, Formal analysis, Writing - original draft, Writing - review & editing. **Carlo Contino:** Visualization, Writing - review & editing. **Marcel Das:** Visualization, Formal analysis, Writing - review & editing. **Peter van Loon:** Visualization, Writing - review & editing. **Mark W.G. Bosmans:** Visualization, Formal analysis, Writing - review & editing.

#### Declaration of Competing Interest

There are no conflicts of interest in relation to this article.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jad.2020.08.026](https://doi.org/10.1016/j.jad.2020.08.026).

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