

Prevalence and Factors Associated with Fear of COVID-19 Among Homeless Individuals During the COVID-19 Pandemic: Evidence from the Hamburg Survey of Homeless Individuals

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Purpose: To clarify the prevalence and determinants of fear of COVID-19 among homeless individuals during the COVID-19 pandemic.

Patients and Methods: Data were taken from the Hamburg survey of homeless individuals (n=150) covering homeless adults in Hamburg, Germany. Multiple linear regressions were used. Beyond sociodemographic and lifestyle-related independent variables, COVID-19-related factors were also used as independent variables.

Results: In sum, 56.2% of homeless individuals reported no fear of COVID-19, 23.8% reported a little fear of COVID-19, 9.2% reported some fear of COVID-19 and 10.8% reported severe fear of COVID-19. Regressions showed that an increased fear of COVID-19 was significantly associated with younger age ($\beta=-.01$, $p<0.05$), absence of chronic alcohol consume ($\beta=-.55$, $p<0.01$), an increased perceived own risk of getting infected with the coronavirus one day ($\beta=0.42$, $p<0.001$) and a higher agreement that a diagnosis of the coronavirus would ruin his/her life ($\beta=0.13$, $p<0.01$).

Conclusion: Given the poor hygienic conditions and their increased vulnerability, data surprisingly suggest a quite low fear of COVID-19 among homeless individuals. Efforts may be beneficial which contribute to thinking rationally about COVID-19 among homeless people, since low levels of fear of COVID-19 may contribute to careless behavior and can lead to super-spreading events.

Keywords: homeless, fear of COVID-19, COVID-19 worry, anxiety of COVID-19, SARS-CoV-2, coronavirus, alcohol

Introduction

According to the Federal Association for Assistance to Homeless People (BAGW) slightly less than 680,000 homeless individuals lived in Germany in 2018¹ and about 6600 homeless individuals lived in Hamburg in 2018,² the second largest city in Germany. Compared to the general population, homeless individuals have higher prevalence rates of, among other things, mental disorders and infectious diseases such as HIV or tuberculosis. Furthermore, homelessness is associated with mortality.³ It is worth noting that the number of homeless individuals increased in the past years¹ highlighting the importance of this group.

In light of the COVID-19 pandemic, homeless individuals may represent a particularly important group to study.⁴ They have recently been identified as

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potential “super spreaders” since they are characterized by a high geographic mobility and transience.⁴ Therefore, it has been argued that it is difficult to track and prevent transmission.⁴ Moreover, once getting infected with COVID-19, they may show a greater resistance to required hospital admission, which can make the care process more difficult.⁵ Furthermore, isolation and quarantine may be difficult for homeless individuals. In conclusion, knowledge about this group is of highest importance during the COVID-19 pandemic.

In our current study, we were interested in fear of COVID-19 among homeless individuals during this pandemic. Reporting fear of COVID-19 appears to be plausible, mainly since individuals are worried about their health.⁶ Such a fear has often been reported during this pandemic among different groups.⁷ Due to the poor hygienic conditions⁸ and their increased vulnerability,^{9,10} it particularly appears plausible that homeless individuals report an increased fear of COVID-19.

Knowledge about fear of COVID-19 is important because careful actions, particularly among homeless, are required in these times.¹¹ While we think that low levels of fear of COVID-19 among homeless can contribute to a careless behavior and can ultimately result in super-spreading events, very high levels of fear of COVID-19 among homeless can have mental health consequences.¹² Furthermore, an increased fear (and therefore not thinking clearly) may result in suicide.¹³ Therefore, a rational assessment of COVID-19, its transmission route, how to prevent it spreading and its consequences is supposed to be important among homeless individuals.

Previous studies have shown some correlates of fear of COVID-19. For instance, recent studies showed that an increased fear of COVID-19 is associated with being female¹⁴ or socially vulnerable groups.¹² However, the existing studies mainly focused on samples other than homeless individuals (such as samples derived from the general population^{12,15} or university students^{16,17}). To the best of our knowledge, there is a complete lack of studies focusing on the fear of COVID-19 among homeless individuals during the pandemic. Thus, our purpose was to fill this gap in knowledge.

Patients and Methods

Sample

For the current study, cross-sectional data were used from the recently conducted Hamburg survey of homeless

individuals (25th May to 3rd June 2020). Homeless adults were interviewed in night shelters, specialized medical practices or lodging houses. Only three out of 154 potential participants refused the participation leading to a response rate of about 98%. Due to missing data, the final analytical sample was composed of 150 individuals.

Individuals were interviewed and examined in a separate room (covering, among other things, demographic data, and a questionnaire-based interview). Given the ability to read and understand the questions, the participants could fill out the questionnaire on their own. Most questionnaires were filled out by means of face-to-face interviews due to difficulties in reading and understanding the questions. Prior to investigation, all individuals gave their written informed consent. The study was conducted in accordance with the Declaration of Helsinki, and the ethical statement was obtained from the medical council of Hamburg (application number: PV7333).

Dependent Variables

Individuals were asked: How concerned are you about contracting COVID-19 one day? [1= Not at all; 2 = a little; 3 = somewhat; 4 = severely?]. This is a common way to assess, eg, fear of dementia and was also used in similar studies.^{18,19}

Independent Variables

Based on theoretical considerations and based on previous studies (e.g.,^{14,20}), we included as explanatory variables: age, sex (women; men), individual history of homelessness (ie, time of homelessness in months), family status (married; single; widowed; divorced), country of origin (Germany; neighboring country; other country), educational level (CASMIN classification (Comparative Analysis of Social Mobility in Industrial Nations), distinguishing between primary, secondary and tertiary education²¹). Furthermore, the presence of chronic alcohol consume^{22,23} (defined by carbohydrate-deficient transferrin (CDT) > 2.5) was used.

Furthermore, COVID-19-related variables were included in the regression model:

- How do you estimate your risk of contracting COVID-19 one day? (1=very low, 2=low, 3=average, 4=increased or 5=high)

Additionally, individuals were asked to what extent they agree with these statements (ranging from 1 = does not apply at all to 7 = fully applies):

- There is quite a lot of what I can do by myself to avoid contracting COVID-19.
- The diagnosis of coronavirus disease (COVID-19) would ruin my life.

Statistical Analysis

First, sample characteristics (for our analytical sample with $n=150$) are shown. Descriptive statistics are given as mean and standard deviation for continuous variables and frequency and percentage (%) for categorical variables. Afterwards, factors associated with fear of COVID-19 were investigated using multiple linear regression models. Furthermore, to deal with missing data, full information maximum likelihood was used in a further analysis.^{24,25} In another sensitivity analysis, linear regression models were replaced by ordered probit regression models to take into consideration the potential ordinal nature of the dependent variable. The significance level was set at 0.05 and Stata 16.0 (Stata Corp., College Station, Texas) was used to perform statistical analysis.

Results

Sample Characteristics

The sample characteristics ($n=150$) for the total sample are shown in [Table 1](#). The average age was 44.6 years (SD: 12.5 years, 19 to 86 years), and most individuals were male (80.5%). In sum, 56.2% reported no fear of COVID-19, 23.8% reported a little fear of COVID-19, 9.2% reported some fear of COVID-19, and 10.8% reported severe fear of COVID-19. The average score for fear of COVID-19 was 1.7 (SD: 1.0). Further details are given in [Table 1](#).

Regression Analysis

The findings of multiple linear regressions with fear of COVID-19 as outcome measure are displayed in [Table 2](#) (second column: multiple linear regressions were used and listwise deletion was used to handle missing values). R^2 equaled 0.47. Regressions revealed that an increased fear of COVID-19 was significantly associated with younger age ($\beta=-.01$, $p<0.05$), absence of chronic alcohol consume ($\beta=-.55$, $p<0.01$), an increased perceived own risk of contracting COVID-19 one day ($\beta=0.42$, $p<0.001$) and a higher agreement that a diagnosis of the coronavirus disease would ruin his/her life ($\beta=0.13$, $p<0.01$).

In further analysis, multiple linear regressions with full-information maximum likelihood (to address the

issue of missing values) were performed (third column: multiple linear regressions were used and full information maximum likelihood was used to handle missing values). In terms of effect sizes and significance, results remained nearly the same (see last column, [Table 2](#)). In supplementary file 1 (including [Supplementary Table 1](#) and [Supplementary Table 2](#)), the aforementioned regression models are described in further detail (additionally including standardized regression coefficients and 95% CI).

In sensitivity analysis, multiple linear regressions were replaced using ordered probit regressions (results not shown, but available upon request). In terms of significance, findings remained virtually the same.

Discussion

Using rare data of homeless individuals during the COVID-19 pandemic, our study adds first knowledge to the prevalence and determinants of fear of COVID-19 in this group. Our study showed that while 80% of the homeless individuals reported no/a little fear of COVID-19, the remaining 20% of the individuals reported some/severe fear of COVID-19. Regressions revealed that an increased fear of COVID-19 is significantly associated with younger age, absence of chronic alcohol consume, an increased perceived own risk of contracting COVID-19 one day and a higher agreement that a diagnosis of the coronavirus disease would ruin his/her life.

Given the vulnerability (eg, in terms of multimorbidity) of homeless individuals, the rather low prevalence of fear of COVID-19 (80% reporting no/a little fear) – even compared to other populations in other countries^{12,15} – is noteworthy. Because it has been shown that women reported increased fear of COVID-19 scores,²⁶ we assume that the low prevalence rate can be – at least partly – explained by the low proportion of female homeless individuals in our sample. In our study, women tended to have higher fear scores. However, probably due to a lack of statistical power, gender differences were not statistically significant. Furthermore, homeless individuals may neglect the risks of being infected with SARS-CoV-2 (eg, due to psychiatric illnesses).

Given the probable more severe health consequences of SARS-CoV-2 infection, at first glance it seems counter-intuitive that age is negatively associated with fear of COVID-19 among older homeless individuals. However, we assume that the geographic mobility is increased among younger homeless individuals – which may be associated with a higher perceived risk of being infected. Therefore, they may report an increased fear of COVID-

Table 1 Sample Characteristics for the Total Sample (n=150)

Variables	Mean (Standard Deviation)/N (%)
Gender Male Female	120 (80.5%) 29 (19.5%)
Age	44.6 (12.5)
Family status Single Widowed/Divorced/Married, living separated from spouse	89 (68.5%) 41 (31.5%)
Education Primary education Secondary/tertiary education	42 (32.6%) 87 (67.4%)
Country of origin Germany Neighboring country Other country	64 (45.7%) 40 (28.6%) 36 (25.7%)
Alcohol consume Absence of chronic alcohol consume (CDT \leq 2.5) Presence of chronic alcohol consume (CDT $>$ 2.5)	88 (62.0%) 54 (38.0%)
Fear of COVID-19 (from 1 = not at all to 4 = severely) Not at all A little Somewhat Severely	1.7 (1.0) 73 (56.2%) 31 (23.8%) 12 (9.2%) 14 (10.8%)
Perceived own risk of getting the coronavirus one day (from 1 = very low to 5 = high) Very low Low Average Increased High	2.1 (1.1) 54 (42.9%) 26 (20.6%) 32 (25.4%) 10 (7.9%) 4 (3.2%)
Perception that being infected with the coronavirus is preventable (from 1 = does not apply to 7 = fully applies)	4.9 (2.1)
Agreement that a diagnosis of the coronavirus would ruin his/her life (from 1 = does not apply to 7 = fully applies)	3.1 (2.3)

Notes: Descriptive statistics were given as mean and standard deviation for continuous variables and frequency and percentage (%) for categorical variables.

19. Previous research in other countries (and non-homeless samples) showed conflicting results regarding the link between age and fear of COVID-19.²⁷⁻³¹ Thus, future research is required to clarify the link between age and fear of COVID-19.

Previous research has demonstrated a link between short-term drinking alcohol and increased fear of COVID-19 in medical students in Vietnam.¹⁷ Similar results were found among Russian and Belarusian

university students.¹⁶ However, these previous findings based on student samples and focusing on short-term alcohol consumption are difficult to compare to our findings based on homeless individuals and focusing on chronic alcohol consume. We assume that homeless individuals with a chronic alcohol consume may systematically underestimate or misjudge the risks and consequences of COVID-19 and may therefore report a low fear of COVID-19 in our study. In the same vein, it has been

Table 2 Determinants of Fear of COVID-19. Findings of Multiple Linear Regressions (Second Column: With Listwise Deletion, n=101; Third Column: With Full-Information Maximum Likelihood, n=150)

Independent Variables	Fear of COVID-19 (Using Listwise Deletion)	Fear of COVID-19 (Using Full-Information Maximum Likelihood)
Gender: - Female (Ref.: Male)	0.18 (0.22)	0.22 (0.18)
Age	-0.01* (0.01)	-0.01* (0.01)
Family status: - Widowed/Divorced/Married, living separated from spouse (Ref.: Single)	0.07 (0.18)	-0.00 (0.16)
Education: - Secondary/tertiary education (Ref.: Primary education)	0.12 (0.17)	0.16 (0.14)
Country of origin: - Neighboring country (Germany)	0.18 (0.24)	0.33+ (0.20)
- Other country	-0.15 (0.18)	-0.14 (0.17)
Alcohol consume: - Presence of chronic alcohol consume (CDT > 2.5) (Ref.: Absence of chronic alcohol consume)	-0.55** (0.17)	-0.51** (0.17)
Perceived own risk of getting the coronavirus one day (from 1 = very low to 5 = high)	0.42*** (0.08)	0.46*** (0.07)
Perception that being infected with the coronavirus is preventable (from 1 = does not apply to 7 = fully applies)	-0.01 (0.05)	-0.02 (0.04)
Agreement that a diagnosis of the coronavirus would ruin his/her life (from 1 = does not apply to 7 = fully applies)	0.13** (0.04)	0.12*** (0.03)
Constant	0.34 (0.42)	0.24 (0.37)
Observations	101	150
R ²	0.47	0.47

Notes: Unstandardized beta-coefficients are reported; robust standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05, +p<0.10.

shown that alcohol addicts overestimate their invulnerability and tend to fatalism.³²

In accordance with previous research showing an association between risk perception and fear of other illnesses such as dementia or cancer,^{33,34} we showed that the perceived risk of contracting COVID-19 one day is positively associated with the fear of COVID-19. Therefore, it is plausible that these factors are also associated in our study.

The importance of consequences of illnesses for fear assessment has also been stressed in former research. Such a link has also been demonstrated in cancer and dementia research.^{33,35} Therefore, in our study, homeless individuals reported an increased fear of COVID-19 when this disease has perceived negative consequences for them – which appears to be very plausible.

Several strengths and limitations of our study are worth describing. We used rare data from a particularly vulnerable population (homeless individuals) which is usually difficult to reach. Moreover, interviews were conducted

during the COVID-19 pandemic. The response rate in the Hamburg survey of homeless individuals was very high (98%). To the best of our knowledge, this is the first study assessing the prevalence and investigating the determinants of fear of COVID-19 among homeless individuals during the COVID-19 pandemic. Moreover, another strength of this study is that other COVID-19-related questions were included (perceived risk of contracting COVID-19; consequences of COVID-19 diagnosis for own life; perceived modifiability of getting infected with SARS-CoV-2) in our analysis.

Similar single-item measures were used to measure fear of COVID-19 in previous research¹² and also in assessing fear of other illnesses such as dementia in other large cohort studies.^{18,36,37} Furthermore, we used such a tool due to the vulnerability of this specific group, which generally requires the use of ultrashort tools to avoid misunderstandings and item non-response.² Moreover, our outcome measure showed a high face validity. Nevertheless, it should be

noted that initially validated COVID-19 scales have been developed in the year 2020 such as the tool conducted by Ahorsu et al³⁸. Moreover, since some missing data were present in the Hamburg survey of homeless individuals, we checked the robustness of our results by using ordered probit models and linear regression models with full information maximum likelihood (FIML) for dealing with missing data.^{24,25} The additional models produced nearly identical results. Furthermore, it should be emphasized that this is a cross-sectional study with its inherent limitations regarding causality.

Conclusion

Given the poor hygienic conditions and their increased vulnerability, data surprisingly suggest a quite low fear of COVID-19 among homeless individuals. Efforts may be beneficial which contribute to thinking rationally about COVID-19 among homeless people, since low levels of fear of COVID-19 may contribute to careless behavior and can lead to super-spreading events.

Abbreviations

BAGW, Federal Association for Assistance to Homeless People; CASMIN, Comparative Analysis of Social Mobility in Industrial Nations; CDT, carbohydrate-deficient transferrin; COVID-19, coronavirus disease 2019; FIML, full information maximum likelihood; HIV, human immunodeficiency virus; Ref, reference category; R², coefficient of determination; SARS-CoV-2, severe acute respiratory syndrome coronavirus type 2; SD, standard deviation.

Data Sharing Statement

The datasets analysed during the current study are not publicly available due to ethical restrictions involving patient data but are available from the corresponding author on reasonable request.

Ethics Approval and Informed Consent

Prior to investigation, all individuals gave their written informed consent. The study was conducted in accordance with the Declaration of Helsinki, and the ethical statement was obtained from the medical council of Hamburg (application number: PV7333).

Consent for Publication

Not applicable.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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