

University Students' Financial Situation During COVID-19 and Anxiety and Depressive Symptoms: Results of the COVID-19 German Student Well-Being Study (CI9 GSWWS)

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Background: The COVID-19 pandemic has had a major impact on students' financial situation as well as on their mental health.

Aim: To examine the reported change in the financial situation of German university students before and across two time points of the COVID-19 pandemic and to evaluate its associations with anxiety and depressive symptoms.

Methods: We used data from the cross-sectional COVID-19 German Student Well-being Study conducted at five German universities (N = 7203). Linear regression models were used to analyze associations between a reported change in financial situation and anxiety and depressive symptoms.

Results: Twenty-eight percent of the participants reported to have a worsened financial situation at the time of the survey compared to the time prior to the pandemic. A worsened financial situation at the time of the survey as compared to prior to the pandemic was associated with higher levels of anxiety and depressive symptoms reported in all three depression and anxiety scales [a 1.46 point increase on the CES-D 8 scale (95% confidence interval (CI): 1.19; 1.73), a 0.37-point increase in PHQ-2 (95% CI: 0.28; 0.46), and a 0.45-point increase in GAD-2 (95% CI: 0.35; 0.55)]. An improved financial situation, on the other hand, was associated with lower levels of anxiety and depressive symptoms. As for the second change, comparing the current financial situation with the situation during the first wave of the pandemic, the associations with anxiety and depressive symptoms were broadly similar.

Conclusion: Our findings suggest that students are a vulnerable population in need of mental and financial support during times of crisis. Future research is needed to obtain insights into potential long-term effects of the pandemic on students' mental health.

Keywords: higher education, pandemic, financial situation, mental health, students' well-being

Introduction

The COVID-19 pandemic and the protective measures imposed to mitigate the spread of infections led to substantial health-related and economic challenges worldwide.¹⁻³ Vulnerable populations were particularly affected, including university students, who, already preceding the pandemic, were exposed to multiple stressors, such as a high workload in their studies or holding a job, while studying to be financially independent.^{4,5} Previous research established that these stressors put them at a higher risk for mental health problems, such as depression and anxiety.⁶⁻⁸ With the COVID-19

pandemic unfolding, further potential stressors emerged from restrictions, such as prolonged social distancing measures and remote learning formats, as a result of closed universities. Recent evidence suggests an adverse impact of those measures on student mental well-being.⁶

Financial stress has consistently been shown to be one of the risk factors to predict poor mental health in students,^{8,9} and has been recognized as the second most influential factor affecting students' quality of life and general well-being.¹⁰ In the wake of the pandemic and the resulting economic fallout, it became more difficult for students who worked part-time to finance their studies and on-going living costs, as they were dealing with decreased or loss of income from their student jobs.^{1,11,12} Similarly, the income of students' parents may have been impacted, hampering their ability to provide financial support for their children's education.^{6,9} With an aggravated employment situation for students and possibly worsened income situation for parents,¹³ the pandemic hit the two central pillars of study financing.¹⁴ A study among German university students conducted during the first COVID-19-related lockdown in spring 2020 highlighted that more than one third of respondents reported income losses and an increase in financial constraints.¹

Findings of previous studies suggested that financial constraints were one of the reasons why students reported having concerns about completing their studies.^{9,15} The risk of dropping out of studies is also directly related to the students' financial possibilities, and, therefore, it can be assumed that this risk increases, especially for those students whose financial situation deteriorated in the wake of the pandemic.¹⁶ The COVID-19-induced economic crisis resulted in substantial financial reverberations for young adults who reported financial stress, increasing feelings of precarity and uncertainty about their career prospects.¹⁷ These emotional stressors are considered critical risk factors for mental health issues, including depressive symptoms and anxiety.¹⁷⁻¹⁹

Already prior to the pandemic, university students were considered a high-risk population for mental health problems worldwide,²⁰ including in Germany.²¹ Empirical data indicated a mean prevalence rate of depression of around 30% among university students, substantially higher than in the general population.²² In this line, Auerbach et al identified depression as one of the most prevalent health issues in higher-education students.²⁰ There is ample evidence indicating that these mental health issues are distributed along a socioeconomic gradient,²³⁻²⁵ with the most disadvantaged groups being disproportionately affected due to lack of financial or social resources²⁶ and exposure to psychosocial stress.²⁷ During the COVID-19 pandemic, university students were among the most negatively affected in terms of well-being with an elevated risk for developing mental health problems due to the pandemic.²⁸ Empirical findings indicate elevated levels of anxiety and depressive symptoms in university students during the first wave of the COVID-19 pandemic,^{18,29-31} as well as later in the pandemic.^{32,33} Previous evidence indicates an impact of the protection measures linked with the pandemic and the associated life changes on students' mental health.³⁴⁻³⁷ These life changes were likely to be perceived as stressful by the students.³⁵⁻³⁷ In addition to governmental lockdown measures, students were also confronted with measures implemented by their respective higher education institutions. High levels of persistent stress, in turn, are reported to be linked to failure, disruptions in academic progress and drop out.^{38,39}

Poor mental health in students often intersects with other dimensions of vulnerability, such as financial hardship.⁴⁰ Richardson et al reported that financial problems appear to lead to poor mental health in students with the possibility of a vicious cycle of financial issues and mental health.⁸ In fact, results from several international studies suggested that mental health problems are linked to financial problems.^{1,8,41-43}

During the pandemic, not only students' psychological health was affected, but also their economic situation with possible changes in their financial status.^{44,45} Continuous socio-economic pressures led to disturbances in students' mental well-being,^{1,42,46,47} who were confronted with an increased level of stress resulting in financial constraints from unintended effects of containment, such as loss of student jobs, financial worries, and uncertainty about the employment opportunities after graduating.^{6,48} Several studies conducted in Germany indicate that financial constraints were associated with higher depressive symptoms during the first wave of COVID-19 in spring 2020.^{15,45,49} Data from several studies suggest that the prolonged duration of the austerity measures increased students' perception of financial insecurity along with elevated levels of mental health symptoms.^{47,49,50} Moreover, a recent study conducted among university students 20 months after the COVID-19 outbreak in Germany reported that worse perceived study conditions were associated with poorer mental health outcomes.⁵¹ However, this study has not considered students' changed financial situation during the pandemic as an important social determinant of health in this context. In fact, the literature to date has rarely investigated the financial situation of students in a later phase of the COVID-19-pandemic, and if studied, changes in income were used as a proxy for assessing the financial situation, which only represents

one part of students' financial resources.^{47,49,50} Additionally, while existing literature demonstrated the relationship between financial stress and mental health outcomes at the beginning of the pandemic, it remains unclear whether the pandemic affected this relationship in vulnerable young adults in a later phase of the COVID-19 pandemic. This underscores the need to further investigate the role of students' financial situation for mental well-being, as the long-term duration of the pandemic and persistence of stressors may have exacerbated the challenges experienced by students with a potentially profound impact on their mental health.^{45,52}

In light of the research gaps outlined above, this study aimed to examine the financial situation of German university students during the later phase of COVID-19 pandemic in autumn 2021 and its associations with anxiety and depressive symptoms, addressing the following research questions:

1. How has the financial situation of university students reportedly changed before and across two time points of the COVID-19 pandemic (during the early pandemic and a later phase)?
2. What are the associations between change in financial situation and anxiety and depression symptoms among university students?
3. What factors are associated with a changed financial situation among university students?

Applied to our research questions, we hypothesized that a change in financial situation related to the COVID-19 pandemic is associated with higher levels of anxiety and depressive symptoms.

Methods

Study Design

Data for this cross-sectional study stem from the German COVID-19 Student Well-being Study (C19 GSWS), which was conducted at a later phase of the pandemic in autumn 2021. The study was based on and followed the COVID-19 International Student Well-being Study (C19 ISWS) which aimed to understand the impact of the COVID-19 pandemic on students' well-being in 26 countries during the first wave of the pandemic.⁵³ A modified version of the C19 ISWS questionnaire was used in this study taking the progress of the pandemic into account. It contained questions about socio-demographic factors, as well as about various aspects of students' well-being (eg, perceived study conditions, mental well-being, and financial conditions before and during the COVID-19 pandemic at two different time points).

Study Population and Context

The data collection for the C19 GSWS was carried out at five participating universities Heinrich-Heine-University Duesseldorf, University of Siegen, University of Bremen, Martin Luther University Halle-Wittenberg, and Charité – Universitätsmedizin Berlin. All participants provided their informed consent before completing the survey. The ethics committees of the participating universities granted ethical approval for the study (University of Bremen 2021–28-EIL, University Halle-Wittenberg 2020–066, Heinrich-Heine-University Duesseldorf 2020–958_1; Charité – Universitätsmedizin Berlin and University of Siegen accepted the ethical approval of the University of Bremen).

Participants were eligible, if they were aged 18 years and above, had provided informed consent, and were enrolled at one of the five participating universities (Charité – Universitätsmedizin Berlin, University of Bremen, University of Siegen, Heinrich-Heine-University Duesseldorf, and Martin Luther University Halle-Wittenberg). The students were invited to participate in the study via e-mail, e-learning platforms (Martin Luther University Halle-Wittenberg and University of Bremen) or via social media (Instagram) (Heinrich-Heine-University Duesseldorf). They were given the option to complete the online survey in German or English. Data collection was conducted between October 27th and November 14th, 2021, using LimeSurvey.

During this time, COVID-19 incidence rates increased a fourth time, which brought along substantial adjustments for the learning and teaching situation at German universities throughout the entire winter semester. Federal state-based COVID-19 regulations varied across regions, ranging from almost complete remote teaching to face-to-face teaching in smaller learning groups with thorough hygiene concepts in place.

Measures

Financial Situation and Reported Change in Financial Situation During COVID-19

Students' financial situation was assessed by asking participants to indicate to what extent they agreed with the statement "I have sufficient financial resources to cover my monthly costs" at three different time points: before the COVID-19 pandemic, as well as during the COVID-19 pandemic at two different time points: 1) during the first wave of the COVID-19 pandemic and 2) during the last month. "Before the outbreak" referred to the average situation during the month prior to the time point when the first COVID-19 measures were implemented, "during the first wave of the COVID-19 pandemic", referred to the time period from January to June 2020, and "during the last month", referred to the month prior to filling out our survey (which was during the fourth wave). Response categories forming a 5-point Likert scale ranged from strongly agree (1) to strongly disagree (5).

The first comparison in financial situation was calculated by subtracting the score of the item "before the pandemic" from the score of the item "during the fourth wave of the pandemic" (Change 1), whereas the second comparison was calculated by subtracting the score of the item "during the first wave of the pandemic" from the score of the item "during the fourth wave" (Change 2). For the analysis, we used three categories -4 to -1 "better financial situation"; 0 "no change"; 1 to 4 "worse financial situation".

Depressive Symptoms and Anxiety

Subjective depressive symptoms were assessed using an eight-item version of the Center for Epidemiologic Studies-Depression Scale (CES-D 8),⁵³ and the two-item version of the Patient Health Questionnaire (PHQ-2).^{54,55} The eight items of the CES-D 8 captured whether students felt depressed and that everything was an effort, had restless sleep, could not get going, felt lonely or sad, or enjoyed life and felt happy, whereby the last two items were reversely coded items. Students were asked on a 4-point Likert scale to indicate the frequency during the past week the symptoms listed above occurred: (0) none or almost none of the time, (1) some of the time, (2) most of the time, (3) all or almost all of the time. The CES-D 8 was composed by the sum of all items, ranging from 0 to 24, with a higher score indicating a higher frequency and severity of depressive symptoms.

The PHQ-2 is comprised of the first two items of the 9-item Patient Health Questionnaire (PHQ-9).⁵⁴ These items inquire about the frequency of depressive symptoms (feeling down, depressed or hopeless) and anhedonia (little interest or pleasure in doing things). For each item, the scores are from 0 (not at all) to 3 (nearly every day). Thus, the total score of the PHQ-2 can range from 0 to 6.⁵⁵ As previously recommended in the scientific literature,⁵⁴ we used a cut-off point of 3 to indicate whether the respondents were showing depressive symptoms or not (0 to 3 "no depressive symptoms"; 4 to 6 "depressive symptoms"). The PHQ-2 has been previously validated in the university context.⁵⁶

Anxiety was assessed with the 2-item Generalized Anxiety Disorder scale (GAD-2), a reliable scale to assess generalized anxiety symptoms that also has been previously validated in the university context.⁵⁷ It is based on the GAD-7 (and evaluates how respondents/participants were bothered over the last two weeks by "feeling nervous, anxious, or edge" and "not being able to stop or control worrying").⁵⁴ Responses were given on a 4-point Likert scale in the same way as the PHQ-2. The GAD-2 sum score also ranges from 0 to 6 with scores ≥ 3 indicating whether the participants showed anxiety symptoms.^{54,57} The Cronbach's alpha in our sample was 0.86 for CES-D 8, 0.79 for PHQ-2, and 0.78 for GAD-2.

Covariates

The following covariates were included in the analyses: Age, gender (female, male, diverse), relationship status (single, in a relationship, it's complicated), migration background (yes vs no), educational level of parents (at least one academic vs both no academics), living situation (living alone and living with other persons in the household), field of study (health related field of study vs other), perception of academic frustrations, study program (Bachelor, Master, Doctoral/Ph.D., state exam (eg, law, medicine), and other (eg, Diploma), and availability of a person to discuss intimate matters with (yes vs no).

To assess students' perceived COVID-19 related academic stress and academic frustrations with reference to Tasso et al an academic frustrations index was composed based on the following eight items:⁵⁸ (1) "My university/college workload has significantly increased since the COVID-19 outbreak;" (2) "I know less about what is expected of me in the different course modules/units since the COVID-19 outbreak;" (3) "I am concerned that I will not be able to successfully

complete the academic year due to the COVID-19 outbreak;” (4) “The university/college provides poorer quality of education during the COVID-19 outbreak as before;” (5) “The change in teaching methods resulting from the COVID-19 outbreak has caused me significant stress;” (6) “The university/college has sufficiently informed me about the changes that were implemented due to the COVID-19 outbreak;” (7) “I am satisfied with the way my university/college has implemented protective measures concerning the COVID-19 outbreak;” (8) “I feel I can talk to a member of the university/college staff (eg, professor, student counselor) about my concerns due to the COVID-19 outbreak.” For each item, a Likert scale with five response options from 1 “strongly agree” to 5 “strongly not agree” was used. The perceived academic frustrations were summed up to an overall score whereby positive items were reverse coded. The theoretical range of the score was 8 to 40 with higher scores indicating higher levels of academic frustration.

Additionally, the following variables related to financial situation were assessed: ability to easily borrow 500 euros within 2 days from at least one person (answer options: yes/no), payment of tuition fee (publicly funded and scholarship, by other person, by student him/herself, loan, and combination of the before mentioned or other), and work (yes vs no).

Statistical Analysis

We computed descriptive statistics for socio-demographic characteristics, as well as outcomes regarding study-related aspects, financial situation and mental health.

To study the associations between changes in financial situation and depressive and anxiety symptoms, we employed multivariable linear regression models. Based on a thorough literature review, we adjusted for potential confounders, including for socio-demographic variables, study-related factors, and social interactions [e.g].^{59–62} The first change in the financial situation refers to the comparison between the financial situation at the time point of the survey and before the pandemic, whereas the second change refers to the comparison between the financial situation at the time point of the survey (autumn 2021) and the first wave of COVID-19 (spring 2020).

To investigate which factors were associated with a changed financial situation (worse and better), we ran a multinomial logistic regression. Socio-demographic variables, study-related factors (except perceptions of academic frustrations during the COVID-19 pandemic), and variables related to financial situation were included as independent variables in the model.

All analyses were conducted using Stata 18 (StataCorp LLC, College Station, TX). For the multinomial logistic regression, the function `mlogit` was used, whereas for the linear regression, the standard `regress` function was used. Ninety-five percent confidence intervals were estimated.

Results

Sample Characteristics

The characteristics of the participants are summarized in [Table 1](#). After data cleaning, 7203 observations remained for data analysis. Overall, 67.1% of the participants indicated being female, 30.6% being male and 1.1% being diverse. Regarding the financial situation, 3.8% of students reported that they did not have sufficient financial resources to cover

Table 1 Participants' Characteristics (n = 7203)

Socio-demographic	Age, mean (SD)	24.1 (4.9)
	Female, n (%)	4824 (67.1)
	Male, n (%)	2199 (30.6)
	Diverse, n (%)	77 (1.1)
	Single, n (%)	2963 (41.2)
	In a relationship, n (%)	3797 (52.8)
	It is complicated, n (%)	302 (4.2)

(Continued)

Table I (Continued).

	Migration background, n (%)	1632 (22.8)
	Both parents not academics, n (%)	1714 (25.3)
	Living with parents, n (%)	1548 (21.6)
	Living in student hall, n (%)	612 (8.5)
	Living in accommodation with others, n (%)	3350 (46.7)
	Living alone, n (%)	1482 (20.7)
	Other form of accommodation, n (%)	167 (2.3)
Study related	Health related field of study, n (%)	1905 (26.4)
	Perceptions of academic frustrations during COVID-19 pandemic, mean (SD)*	23.5 (5.5)
	Bachelor, n (%)	3305 (46.1)
	Master, n (%)	1385 (19.3)
	Doctoral, PhD, n (%)	149 (2.1)
	State exam (eg, law, medicine), n (%)	2306 (32.2)
	Other (eg, Diploma), n (%)	27 (0.4)
Finances	Tuition fee publicly funded, scholarship, n (%)	830 (11.6)
	Tuition fee paid by other person, n (%)	2550 (35.5)
	Tuition fee paid by student, n (%)	2334 (32.5)
	Tuition fee paid with loan, n (%)	209 (2.9)
	Combination of above or other, n (%)	1263 (17.6)
	Not being able to borrow money from at least one person, n (%)	369 (5.1)
	Spending time in paid jobs, n (%)	3838 (59.2)
	Not sufficient financial resources to cover monthly costs before COVID-19, n (%)	275 (3.8)
	Not sufficient financial resources to cover monthly costs during first wave of COVID-19, n (%)	970 (13.5)
	Not sufficient financial resources to cover monthly costs during fourth wave of COVID-19, n (%)	995 (13.9)
Depressive symptoms	CES-D 8 score, mean (SD)**	9.4 (4.9)
	PHQ-2, mean (SD)***	2.0 (1.6)
Anxiety symptoms	GAD-2, mean (SD)****	2.0 (1.7)
Social contact	No person to discuss intimate and personal matters with, n (%)	601 (9.6)
Study site	Charité Universitätsmedizin Berlin, n (%)	1131 (15.7)
	University of Bremen, n (%)	1819 (25.3)
	Heinrich-Heine University, n (%)	520 (7.2)
	University of Siegen, n (%)	1565 (21.7)
	Martin Luther University Halle-Wittenberg, n (%)	2168 (30.1)

Notes: *Range 8–40, higher scores indicating lower satisfaction. **Range 0–24, higher scores indicating higher frequency of depressive symptoms. ***Range 0–6, higher scores indicating higher frequency of depressive symptoms. ****Range 0–6, higher scores indicating higher frequency of anxiety symptoms.

their monthly costs before the pandemic, versus 13.5% during the first wave and 13.9% during the fourth wave of the pandemic. The mean CES-D 8 score was 9.4 (SD: 4.9), the mean PHQ-2 score was 2.0 (SD: 1.6), and the mean GAD-2 score was 2.0 (SD: 1.7). The majority of the participants were enrolled at the Martin Luther University Halle-Wittenberg (30.1%), about a quarter at the University of Bremen (25.3%), about a fifth at the University of Siegen (21.7%), 15.7% at the Charité – Universitätsmedizin Berlin and 7.2% at the Heinrich-Heine-University Duesseldorf. Almost a third (28.2%) reported a worsened financial situation compared to pre-pandemic times, with 6.1% indicating an improved financial situation. Comparing the first and fourth pandemic wave, a slightly changed picture emerged (Figure 1).

Association Between Change in Financial Situation and Depressive and Anxiety Symptoms

A worsened financial situation at the time of the survey as compared to prior to the pandemic was associated with higher levels in all three depression and anxiety scales (CES-D 8, PHQ-2 scale and GAD-2) (Table 2). An improved financial situation was also positively related to higher levels in all scales, albeit less pronounced. Similarly, a worsened current financial situation as compared to in the first wave of the pandemic was also associated with higher levels in CES-D 8, PHQ-2 and GAD-2. An improved financial situation was associated with higher scores as well. When comparing the financial situation at the time of the survey with the situation before the pandemic, the proposed effects were consistently smaller across all three scales, but very similar after adjustment for other covariates. In contrast, when comparing the financial situation at the time of the survey with the situation during the first wave of the pandemic, there was almost no difference between crude and adjusted estimates.

Regarding the R^2 of the three models of change 1 (comparison current financial situation and before the pandemic), the adjusted CES-D 8 model had a value of 0.22, the adjusted PHQ-2 model a value of 0.17, and the adjusted GAD-2 model a value of 0.14. The R^2 values were essentially unchanged for the second comparison (change 2).

Characteristics Associated with Worse and Better Financial Situation Compared to Before COVID-19

In the multinomial logistic regression, factors associated with higher odds for having a worsened financial situation were migration background, both parents not being academics, students who paid tuition themselves, with a loan, and a combination vs tuition paid by another person and not being able to borrow money from at least one person. Factors

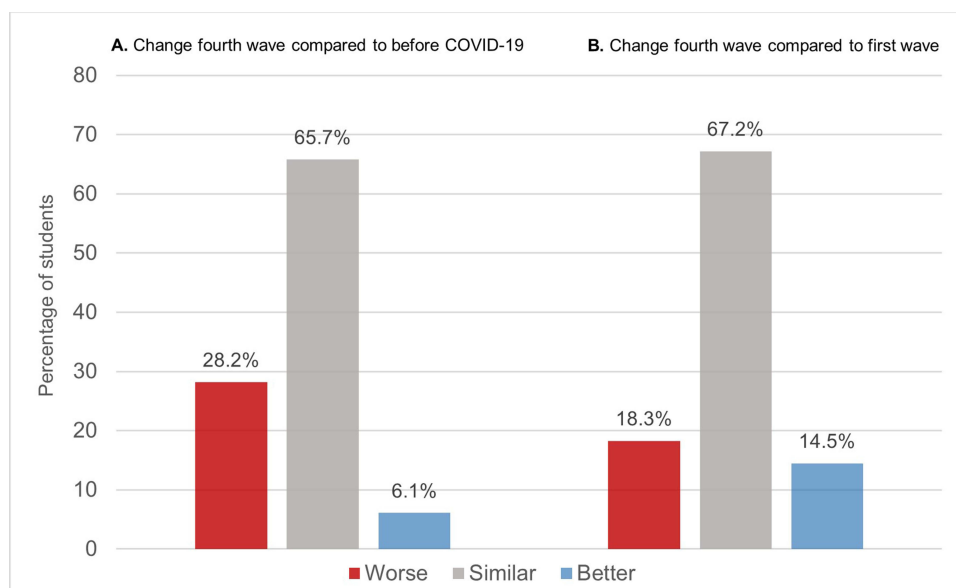


Figure 1 Change in financial resources during the fourth wave compared to before the COVID-19 pandemic (N = 7167) and during the first wave (N = 7170).

Table 2 Association Between Change in Financial Situation and Anxiety and Depressive Symptoms

		Depressive Symptoms (CES-D 8 score)		Depressive Symptoms (PHQ-2 score)		Anxiety (GAD-2)	
		N= 6823		N= 6893		N= 6893	
		β	(95% CI)	β	(95% CI)	β	(95% CI)
Change 1: Comparison current** financial situation with prior to pandemic	Worse financial situation (crude)	2.26	(2.00; 2.51)	0.62	(0.54; 0.70)	0.63	(0.54; 0.72)
	Better financial situation (crude)	1.58	(1.10; 2.06)	0.36	(0.21; 0.51)	0.41	(0.24; 0.58)
		N=5126		N= 5176		N= 5177	
	Worse financial situation*	1.42	(1.15; 1.69)	0.36	(0.27; 0.45)	0.44	(0.34; 0.54)
	Better financial situation*	1.07	(0.57; 1.57)	0.18	(0.02; 0.35)	0.31	(0.12; 0.49)
		N=6826		N= 6896		N= 6896	
Change 2: Comparison current** financial situation with during the first wave of pandemic	Worse financial situation (crude)	1.68	(1.38; 1.98)	0.49	(0.40; 0.59)	0.50	(0.39; 0.60)
	Better financial situation (crude)	1.86	(1.53; 2.19)	0.50	(0.40; 0.61)	0.47	(0.36; 0.59)
		N= 5127		N= 5177		N= 5178	
	Worse financial situation*	1.05	(0.73; 1.36)	0.32	(0.21; 0.42)	0.34	(0.22; 0.46)
	Better financial situation*	1.14	(0.79; 1.49)	0.30	(0.19; 0.42)	0.31	(0.18; 0.43)

Notes: Reference category: no change in financial situation. *Adjusted for age, gender, relationship status, migration background, educational level of parents (at least one academic vs both no academics), living situation, field of study (health vs other), perception of academic frustrations, study program, no person to discuss intimate and personal matters with. CES-D 8 score: 0–24; PHQ-2 score: 0–6; GAD-2 score: 0–6, higher scores indicating more severe symptoms. **Current: at the time of the survey. **Abbreviation:** CI, confidence interval.

associated with lower odds of having a worsened financial situation were being single, studying a health-related field, and being enrolled in Master’s program, state exam and Doctoral/Ph.D. program vs Bachelor program (Table 3).

As for factors associated with a better financial situation, being single, being enrolled in Doctoral/Ph.D. vs Bachelor program, publicly funded tuition/tuition fee paid with scholarship and a combination vs tuition fee paid by another person, and work were associated with higher odds for having a better financial situation. Factors associated with lower odds of having a better financial situation were older age and not being able to borrow money from at least one person.

The Pseudo R² of the model presented in Table 3 had a value of 0.12.

Table 3 Factors Associated with Changed Financial Situation*, (n = 5743)

		Worse current financial situation compared to before COVID-19*	Better current financial situation compared to before COVID-19*
		OR (95% CI)	OR (95% CI)
Socio-demographic characteristics	Age , per year	1.00 (0.98; 1.01)	0.94 (0.91; 0.97)
	Gender		
	Female	Reference	Reference
	Male	0.97 (0.85; 1.00)	0.98 (0.74; 1.30)
	Diverse	1.12 (0.63; 1.97)	0.82 (0.25; 2.64)

(Continued)

Table 3 (Continued).

		Worse current financial situation compared to before COVID-19*	Better current financial situation compared to before COVID-19*
		OR (95% CI)	OR (95% CI)
	Relationship status		
	In a relationship	Reference	Reference
	Single	0.82 (0.72; 0.93)	1.34 (1.02; 1.76)
	It is complicated	1.24 (0.93; 1.66)	1.77 (0.98; 3.21)
	Migration background		
	No migration background	Reference	Reference
	Migration background	1.56 (1.35; 1.80)	1.18 (0.87; 1.59)
	Education of parents		
	At least one parent with academic education	Reference	Reference
	Both parents not academics	1.16 (1.01; 1.33)	0.97 (0.73; 1.29)
	Living situation		
	Living with someone	Reference	Reference
	Living alone	1.14 (0.99; 1.33)	0.89 (0.64; 1.24)
Study-related characteristics	Field of study		
	Not health related field of study	Reference	Reference
	Health-related field of study	0.75 (0.63; 0.90)	0.90 (0.60; 1.34)
	Study program		
	Bachelor	Reference	Reference
	Master	0.82 (0.69; 0.96)	1.01 (0.70; 1.46)
	State exam (eg, law, medicine)	0.71 (0.60; 0.85)	0.93 (0.63; 1.37)
	Doctoral, PhD	0.29 (0.17; 0.52)	3.22 (1.55; 6.69)
Other (eg, Diploma)	1.13 (0.44; 2.90)	0.00 (-)	
Financial indicators	Work		
	No	Reference	Reference
	Yes	0.98 (0.87; 1.11)	2.06 (1.53; 2.77)
	Payment of tuition fee		
	Tuition fee paid by other person	Reference	Reference
	Tuition fee publicly funded, scholarship	1.19 (0.96; 1.47)	1.72 (1.09; 2.72)
	Tuition fee paid by student	1.34 (1.45; 1.57)	1.25 (0.90; 1.75)

(Continued)

Table 3 (Continued).

		Worse current financial situation compared to before COVID-19*	Better current financial situation compared to before COVID-19*
		OR (95% CI)	OR (95% CI)
	Tuition fee paid with loan	2.78 (1.94; 3.99)	1.34 (0.64; 2.82)
	Combination of above or other	1.51 (1.26; 1.80)	1.64 (1.13; 2.40)
	Ability to borrow money from at least one person		
	Yes	Reference	Reference
	No	2.11 (1.60; 2.78)	0.56 (0.32; 0.97)

Notes: *Adjusted for financial situation before COVID-19.

Abbreviations: OR, odds ratios; CI, confidence interval.

Discussion

When comparing students' financial situation later on in the pandemic to their situation at the beginning, we found that a similar proportion reported both, a worse and a better financial situation. However, compared to the time prior to the pandemic, approximately one third experienced a worsened financial situation and only a very small proportion an improvement. Further, our results indicated that both a worsening and an improving of the financial situation was associated with higher levels of anxiety and depressive symptoms (in comparison to no change). Our study also showed that certain factors, such as having a migration background, parents not being academics, and not being able to borrow money from at least one person were associated with higher odds for having a worsened financial situation, whereas, for example, being single and work were associated with higher odds for having a better financial situation.

Changes in Students' Financial Situation Over the Course of the Pandemic

Economic difficulties due to the COVID-19 pandemic are one of the secondary effects of the pandemic that disproportionately affected vulnerable groups, including university students. Our findings indicate that a small proportion of students (14.5%) seemed to recover financially as they reported an improved financial situation later on in the pandemic compared to during the early pandemic. Previous evidence suggests that the restart of the economy after the long second lockdown in the summer of 2021 increased labor demand, which provided students with potential income opportunities.⁶³ For example, a study conducted in Germany investigating the financial situation of students during different phases of the COVID-19 pandemic, and identified a strong reduction of job income during the first lockdown but only half this effect during the second lockdown.⁶³ The authors assumed that the students' ability to adapt to the dynamic job market and relaxing restrictions after the second lockdown could be potential explanations for this development.⁶³ When comparing students' financial situation later on in the pandemic to that prior to the pandemic, our findings demonstrated, however, that approximately one third of students (28.2%) experienced a worsened financial situation. This corroborates findings from many previous studies.^{1,45,64} In a study conducted early on in the pandemic, students also reported to experience financial constraints as a result of the pandemic.¹

Relationship Between Change in Financial Situation and Anxiety and Depressive Symptoms

This study confirms the relationship between financial constraints and mental health problems, which has extensively been demonstrated in the general and student populations.^{8,18,41,48} We found that a worsened financial situation in the fourth wave, as well as in the first wave, compared to prior to the pandemic was associated with higher depression and anxiety scores. Empirical studies indicate elevated levels of mental health problems in the student population, prior to the

pandemic,²⁰ whereby financial strain associated with student life can have a significant long-term impact on their mental health.⁸ Data from a longitudinal study among British students found that financial difficulties predicted poor mental health, which, in turn, predicted a worsened financial situation suggesting a vicious cycle between financial and mental health issues.⁸

In line with Buffel et al's analysis,⁶⁵ we found that an improved financial situation was also associated with higher levels of anxiety and depressive symptoms compared with not experiencing any changes. Less spending on social activities that were mostly restricted during the pandemic, interim financial aid opportunities from the government, whilst having more time to spend on paid jobs may have resulted in greater savings for certain groups of students.^{64,65} However, previous research has shown that other factors beyond financial status influence students' mental health,⁶⁶ particularly participating in social activities.^{37,60} Van de Velde et al who used data from university students across 26 countries revealed that not the pandemic itself, but rather the secondary effects of the pandemic, including increased levels of financial worries and social isolation, were related to students' mental health. They emphasized the need to mitigate these secondary effects within the student population.¹⁸ Along the same line, Gewalt et al suggested that students' financial hardship and economic uncertainty were linked with poor mental health outcomes during the early pandemic phase.¹

Another important finding of our study is that we found a similar mean CES-D 8 score in the present sample than in the German sample of the ISWS study that was conducted at the beginning of the pandemic (9.4 SD = 4.9 vs 9.2 SD = 4.7).⁴⁵ Because the samples are from the same universities and therefore to some extent comparable, we can conclude that the level of depressive symptoms was somewhat steady between early and later phases of the pandemic.

Factors Associated with Changed Financial Situation

Our study identified migration background, both parents not being academics, students who paid tuition fees themselves, with a loan, and a combination, and no access to ad-hoc financial support as predictors for experiencing a worsened financial situation. This is in line with a growing body of literature that has found notable effect heterogeneity among different student groups, whereby students from non-academic backgrounds, with low social support, and those in a difficult socio-economic situation suffered particularly from the pandemic, further widening pre-existing financial inequalities.^{15,40,47,63} Coulaud et al suggested that the pandemic seemed to have had an increasing effect on social inequalities, with the most economically vulnerable subpopulations of students facing detrimental consequences for their mental health,⁴⁷ such as increased anxiety regarding financial uncertainty.⁴⁰ As a result, existing educational inequalities across different socio-economic groups might grow in the future.^{63,67} In contrast to previous research,¹ in our study, no evidence of gender-related differences regarding students' financial situation was detected.

In line with previous research,⁴⁵ our study identified factors that seemed to have a protective effect on a worsened of financial situation, such as studying a health-related field, and being enrolled in Master's program, state exam and Doctoral/Ph.D. program. Similarly, our findings showed that students who worked during the pandemic had higher chances of having a better financial situation as compared to those who did not. This finding seems contrary to that of Gewalt et al who investigated the effect of students working part-time before the pandemic and found that working part-time was associated with a higher probability of increased financial limitations, as well as with a higher financial distress compared to not part-time working.¹ In our study, working during the pandemic seemed to have contributed to an improved financial situation. In terms of the effect on students' mental health, earlier findings pointed at the challenges that students face when working and studying simultaneously, including higher stress levels compared to their non-working peers,⁶⁸⁻⁷⁰ which may lead to low academic performance and even students dropping out of their studies.^{68,71}

Our results point to the need for a health-promoting settings approach to foster students' mental health, because the recovery from the pandemic is largely determined by characteristics of the settings in which they live.⁷² During the pandemic, "Health Promoting Universities" were reaffirmed as highly suitable for promoting their students' resilience and mental health, whereby a special focus should lie on student groups at high risk as social inequalities might have increased during the pandemic.⁶⁷ Further research should also develop tailored online platforms and tools in line with students' needs and practices.⁶⁷ Similarly, a recent umbrella review of seven studies points to the effectiveness of digital mental health interventions in alleviating depression, anxiety, stress, and eating disorder symptoms in university students.⁷³ In addition, longitudinal studies that continuously investigate the secondary effects of the pandemic, such

as financial worries and social isolation, are necessary to assess the long-term impact of the pandemic on students' mental health. These studies should be set out with a representative sample of students in terms of gender, socio-economic background, and field of study.

Strengths and Limitations

Our multi-center study had some limitations that should be considered when interpreting the results. First, because the data on the financial situation of two time points (prior to the pandemic and during the first wave) was collected retrospectively, an information bias needs to be taken into account. Second, due to the cross-sectional study design, causality of the associations cannot be inferred, nor can the degree be assessed to which anxiety and depressive symptoms have changed. Consequently, elevated levels of anxiety and depressive symptoms may have already been present prior to the pandemic. Third, the way of operationalization changes in the financial situation may have induced floor/ceiling effects. This means, in case of a floor effect, that students who were already facing severe financial difficulties before the COVID-19 pandemic, could not, or only to a very limited extent, perceive a worsening of their financial situation. Similarly, students without any financial problems could not improve (ceiling effect). Finally, a convenience sample was used in this study; thus, our sample is not representative of the German university student population in general. Our sampling method does not allow for a generalization of our results. Moreover, selection bias cannot be ruled out, as students who experienced stress due to the COVID-19 pandemic may have been more likely to participate in a survey on student well-being. Due to its reliance on self-reported data, our study could be subject to under- or reporting bias or social desirability bias. Especially information in regard to mental health might be affected. However, data was collected via a confidential online survey, which reduced a possible distortion.

Conclusion

Our study revealed that a significant proportion of university students experienced a worsened financial situation during a later phase of the COVID-19 pandemic and that a change in financial situation was associated with higher levels of anxiety and depressive symptoms. These findings suggest that students are in need of mental and financial support, which may help protect their mental health during times of crisis. Early screening programs, financial aid schemes, as well as financial counselling, are warranted to alleviate distress and avoid financial problems compounding to financial hardship. In addition, digital mental health counseling addressing students' needs and well-being should be made available, as they are evidence-based and acceptable for the university student population. Future research is needed to gain more insights into potential long-term effects of the pandemic on students' mental health.

Ethics Approval and Informed Consent

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of the University of Bremen (protocol code 2021-28-EIL), the Heinrich-Heine-University Duesseldorf (protocol code 2020-958_1), the Martin Luther University Halle-Wittenberg (protocol code 2020-066), the Charité – Universitätsmedizin Berlin and the University of Siegen have accepted the ethic vote of the University of Bremen. The participants provided their written informed consent to participate in this study.

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Disclosure

The authors report no conflicts of interest in this work.

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