BELIEFS IN CONSPIRACY THEORIES AND MENTAL HEALTH IN THE STUDENT COMMUNITY OF LATVIA DURING THE COVID-19 OUTBREAK

Julija Vorobjova[1], Sindija Mairita Pilaga[2], Madara Mikelsone[3], Elmars Rancans[1], Daria Smirnova[4], Konstantinos N. Fountoulakis[5,6] & Jelena Vrublevska[1]

[1]*Riga Stradins University, Department of Psychiatry and Narcology, Riga, Latvia*
[2]*Riga Stradins University, Department of Psychosomatic Medicine and Psychotherapy, Riga, Latvia*
[3]*Riga Stradins University, Statistics Unit, Riga, Latvia*
[4]*International Centre for Education and Research in Neuropsychiatry (ICERN) Samara State Medical University, Samara, Russia*
[5]*3rd Department of Psychiatry, School of Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece*
[6]*Mental Health Section, Research Institute, Panhellenic Medical Association, Thessaloniki, Greece*

SUMMARY

Background: The objective of this study was to investigate self-reported changes in mental health and their association with various sociodemographic factors and beliefs in conspiracy theories among university and college students in Latvia during the second state of emergency caused by COVID-19.

Subjects and methods: This cross-sectional study was conducted as part of an international research project, where university and college students were anonymously asked to complete an online self-report questionnaire. Changes in anxiety and depression were assessed using self-rated questions. Statistical analysis involved Pearson's chi-square test and univariate binary logistic regression.ression.

Results: The study comprised 1047 students, with 828 females (79.08% aged 21.71±0.09). Worsening in self-reported anxiety was more prevalent among females (69.3%, p<0.001), unemployed respondents (70.0%, p=0.003), individuals who were were not working during the lockdown (70.3%, p<0.001), those experiencing deterioration in general health condition (93.0%, p<0.001), and those belonging to or having knowledge of someone in a vulnerable group (69.5%, p=0.004). Worsening self-reported depression was more prevalent in respondents who did not work during the lockdown (63.9%, p=0.014) and those with deteriorating general health conditions (93.0%, p<0.001). Increased odds ratios (OR) for experiencing changes in anxiety and depression were associated with beliefs in the following conspiracy theories: 'Recommended measures are an attempt to restrict human rights' (OR=1.49, p=0.019 and OR=2.40, p<0.001, respectively). Furthermore, increased OR for experiencing changes in depression were associated with beliefs in the following conspiracy theories: 'The COVID-19 vaccine was ready before the virus spread' (OR=3.11, p=0.007), 'COVID-19 has a lower mortality rate" (OR=1.85, p<0.001)', 'Recommended measures are an attempt to restrict human rights' (OR=2.40, p<0.001), and 'The COVID-19 outbreak is the creation of world leaders' (OR=2.17, p=0.003).

Conclusions: Self-reported changes in depression and anxiety were associated with certain beliefs in specific conspiracy theories.

Key words: COVID-19 - conspiracy theories – students – depression - anxiety

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INTRODUCTION

During the year 2020 Coronavirus disease 2019 (COVID-19) had spread across the world leading to an outbreak as pandemic that was declared on March 2020 by the World Health Organization (WHO 2023). In Latvia, the Latvian Ministry of Health confirmed the first case of COVID-19 disease on 2 March 2020 (Veselības ministrija 2023). During the first state of emergency period infection rates were low (ECDC 2023). The second wave of COVID-19 disease began in September 2020 leading to the second state of emergency from 9 November 2020 to 6 April 2021 (MK 2020). During the research COVID-19 cases per week varied from 4338 to 7071 and deaths per week were reported from 63 till 189 depending on each week. Comparing the second to first pandemic wave in Latvia, the COVID-19 cases and deaths had increased dramatically (ECDC 2023).

The COVID-19 pandemic has left an important effect on mental health, through a variety of forms and intensity of government strict measures of isolation and social distancing throughout the world. Statistics show evidence in efficacious of these measures by restricting pandemic extension, at the same time reflecting possible adverse effects on mental health (Fountoulakis et al. 2020, 2022a,b). The latest research reports the responses to the COVID-19 outbreak that cause feelings such as fear, worry, anxiety and stress, leading to the fact that more than 40% of the population might have increased levels of distress, anxiety, or depression (Fullana et al. 2020, 2021, Fountoulakis et al. 2022c, Vinkers et al. 2020). A meta-analysis study conducted in the student population that included 104 studies reports the prevalence of depression 36%, anxiety 27% and stress 19% was higher among females (Fang et al. 2022). University students are considered a vulnerable society group therefore being a special interest of mental health

researchers (Kaparounaki et al. 2020). A recent meta-analysis research done in the student population showed that remote learning during the COVID-19 pandemic has affected mental health by increasing the prevalence of stress, anxiety, and depression (Xu et al. 2023).

Conspiracy theories have tendency to explain or assume that crucial, important social, political, public events are in secret organized by powerful and malicious organizations actively cooperating (Allington et al. 2021). Recent research shows that believing in conspiracy theories is widespread and rates are high. (Ahmed et al. 2020, Leibovitz et al. 2021, Salali et al. 2022). Overall, these theories can be classified into two groups - 'reassuring' or "threatening" being as a protective or harmful. In definite phases conspiracy theories demonstrates a complex behavior leading to a protective effect in general population (Fountoulakis et al. 2022c). Conspiracy has an important influence on health behavior and adherence to measures both protective and preventive against the pandemic (Allington et al. 2021).

Female gender is a factor related to believing more in conspiracy theories in general and in student populations (Fountoulakis et al. 2022c, Patsali et al. 2020). A study done in the general population shows that people with depression are more likely to believe in conspiracy theories; however, it is also a protective factor for them. People with a history of psychotic disorders such as bipolar disorder and psychosis, self-harm, and suicide tend to believe more in conspiracy theories than those with non-psychotic disorders, for example anxiety or depression. (Fountoulakis et al. 2022c). A study conducted in the UK shows that younger people more often believes in conspiracy theories relating it to more frequent use of social networks (Allington et al. 2021). Research done in Greece indicates that students in art, literature, education, related sciences demonstrate higher rates regarding belief in conspiracy theories (Patsali et al. 2020).

There are only few studies conducted around the world researching anxiety and depression changes regarding conspiracy theories. Therefore, this study aims to investigate the change in self-reported changes in mental health and their association with various sociodemographic data and beliefs in conspiracy theories of the university and college student population of Latvia during the second state of emergency. There has been only few data and research in the student population on belief in conspiracy theories.

SUBJECTS AND METHODS

The survey

This cross-sectional study is based on a questionnaire developed as part of larger international research in collaboration with the Aristotle University of Thessaloniki, Greece with the World Psychiatric Association (Patsali et al. 2020). Eleven countries around the world participated in the study (Bulgaria, Croatia, Georgia, Greece, Hungary, India, Latvia, Lithuania, Malaysia, Nigeria and Russia). The survey was translated from English into Latvian by authors. The translated survey was studied and checked by a Latvian speaking focus group for verification.

Data Collection

This study was carried out from 8 December 2020 to 23 February 2021 during the second COVID-19 pandemic wave in Latvia. University and college students were asked to fill out the self-report questionnaire. Data were collected anonymously and online. Each survey item was assigned an ID code, and the data were collected anonymously online. The first page of the online questionnaire included the declaration of voluntarily consent for participation. This study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Riga Stradins University, Riga, Latvia (Nr. 6-1/12/46 from 26 November 2020). Informed consent was obtained from all subjects involved in the study. Electronic recorded consent has been obtained from the respondents.

Measures

Sociodemographic Determinants

To verify the association between self reported changes in mental health, change in anxiety, change in depression, and the sociodemographic characteristics - sex, urbanization, marital status, residents in house, family status (divorced, living with someone without an official relationship, married, other, single, widower), employment status, and work during lockdown were recorded.

Determinants related to health

Participants' general health was assessed using the question 'In general, how do you describe your health during the last month?' The responses were answered on a five-point scale. Furthermore, a question was included: 'Do you suffer from any chronic medical somatic diseases?' Participants were also asked if they are a close relative or caretaker of a person who is at high risk of contracting COVID-19.

Anxiety change

Changes in anxiety were assessed using self-rated responses to the question: "How much has your emotional state changed in relation to the appearance of anxiety and insecurity compared to before the COVID-19 pandemic?" The responses used in this research were scored into two answers (not changed or little bit or much better), (worse or much worse).

Depression change

Participants' changes in depression were assessed using self-rated responses to the question: 'How much has your emotional state related to experience of joy or melancholy change compared to before the COVID-19 pandemic?" The responses used in this research were scored into two answers (Neither better or worse, improved a bit or a lot), (It got a little or a lot worse).

Conspiracy theories

The beliefs in conspiracy theories were determined by asking 21 questions about opinions about the origin of the epidemic and other health and public issues. The responses were scored on a three-point scale (I don't believe it at all; A little bit or maybe; Much or very much).

Statistical Analysis

The data were analyzed using SPSS version 27.0 and Microsoft Excel. The qualitative data are given as absolute and relative frequency. The association between various demographic, conspiracy theories variables and changes in mental health was tested using Chi-square test. Those conspiracy theory variables that were statistically significantly associated with changes in mental health were further included in binary logistic regression to examine their role. The unadjusted odd-ratios and 95% confidence interval are reported.

RESULTS

Sociodemographic characteristics

Table 1 displays the sociodemographic characteristics of the sample. The study consisted of 1047 students, with 828 females (79.08%, aged 21.71±0.09) and 212 males (20.25%, aged 21.67±0.18), and 7 participants who opted not to disclose their sex (0.67%, aged 20.43±0.48).

Change in anxiety according to sociodemographic characteristics

In terms of changes in anxiety, a higher percentage of females (69.3%) reported that their anxiety worsened or significantly worsened compared to males (52.4%) (χ^2=22.869, p<0.001). Among the respondents, those who were not employed (70.0%) had a higher proportion of anxiety worsening or significant worsening compared to those who were employed (61.2%) (χ^2=8.954, p=0.003). Individuals who were not working during lockdown (70.3%) reported a higher rate of anxiety worsening or significant worsening compared to those continued working (59.0%) (χ^2=13.832, p<0.001). Individuals with a general health condition below moderate (93.0%) were more likely to experience anxiety worsening or significant worsening compared to those with moderate health conditions (86.2%) and those with

above moderate health conditions (57.7%) (χ^2=83.139, p<0.001). Respondents who were close relatives or caretakers of individuals at high risk of contracting COVID-19 (69.5%) reported a higher rates of anxiety worsening compared to respondents who did not belong to this group (61.0%) (χ^2=8.119, p=0.004).

Change in depression according to sociodemographic characteristics

Among those who did not work during lockdown, 63.9% reported a worsening or significant worsening of depression symptoms, compared to 56.3% of those who continued working (χ^2=6.092, p=0.014). Individuals with health conditions below moderate (93.0%) were more likely to experience a worsening or significant worsening of depression symptoms compared to those with moderate health conditions (75.9%) and those with above moderate health conditions (54.2%) (χ^2=56.749, p<0.001).

Self-reported changes in anxiety and depression according to belief in conspiracy theories

Association of self-reported changes in anxiety and beliefs in conspiracy theories

Among respondents who had a belief, even if a "little" or "maybe", in the conspiracy theory suggesting that the recommended measures were an attempt to restrict human rights and led to some kind of dictatorship rather than prioritized public safety from COVID-19 ('Do you think the recommended measures are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer from COVID-19?'), 72.0% reported that their anxiety worsened or significantly worsened, compared to 63.3% of those who did not believe in it at all (χ^2= 8.81, p=0.012). Of the respondents who have a belief, even if a "little" or "maybe", in the conspiracy theory that suggests it is possible for the Earth to be flat rather than spherical', 80.9% reported that their anxiety worsened or significantly worsened, compared to 64.8% of those who do not believe in it at all (χ^2=9.929, p=0.007) (Table 2).

Association of self-reported changes in depression and beliefs in conspiracy theories

Among respondents who believed much or very much in the theory that suggests COVID-19 has a significantly lower mortality rate but is surrounded by misinformation and fear-inducing propaganda ('Do you believe that COVID-19 has much lower mortality rate but there is misinformation and terror-inducing propaganda?'), 69.7% reported a worsening or significant worsening of depression, compared to 55.5% of those who do not believe in it at all (χ^2=12.986, p=0.002). Of the respondents who believed much or very much in the theory that posits the recommended measures are an attempt

Table 1. Sociodemographic characteristics of the study sample (n=1047)

Variables	All respondents Count	Anxiety change Not changed/little bit or much better Count (%)	Anxiety change Worse or much worse Count (%)	χ^2	P-value	Depression change Neither better or worse/ improved a bit or a lot Count (%)	Depression change It got a little or a lot worse Count (%)	χ^2	P-value
Sex									
Female	828	254 (30.7%)	574 (69.3%)	22.869	<0.001	316 (38.2%)	512 (61.8%)	3.413	0.181
Male	212	101 (47.6%)	111 (52.4%)			91 (42.9%)	121 (57.0%)		
Other/I do not wish to define	7	1 (14.3%)	6 (85.7%)			1 (14.3%)	6 (85.7%)		
Residence									
Other city or town	363	133 (36.6%)	230 (63.4%)	5.613	0.06	139 (38.3%)	224 (61.7%)	0.316	0.854
Rural area	154	40 (26.0%)	114 (74.0%)			63 (40.9%)	91 (59.1%)		
Capital city	530	183 (34.5%)	347 (65.5%)			206 (38.9%)	324 (61.1%)		
Marital status									
Single	490	175 (35.7%)	315 (64.3%)	1.646	0.439	186 (38.0%)	304 (62.0%)	1.768	0.413
In a relationship (married, living with someone)	421	140 (33.3%)	281 (66.7%)			162 (38.5%)	259 (61.5%)		
Other (divorced, widower, other)	136	41 (30.1%)	95 (69.9%)			60 (44.1%)	76 (55.9%)		
People in house									
1 (I live alone)	89	25 (28.1%)	64 (71.9%)	3.933	0.415	27 (30.3%)	62 (69.7%)	9.001	0.061
2	361	129 (35.7%)	232 (64.3%)			144 (39.9%)	217 (60.1%)		
3	239	89 (37.2%)	150 (62.8%)			102 (42.7%)	137 (57.3%)		
4	181	57 (31.5%)	124 (68.5%)			78 (43.1%)	103 (56.9%)		
≥5	177	56 (31.6%)	121 (68.4%)			57 (32.2%)	120 (67.8%)		
Children									
0	1015	344 (33.9%)	671 (66.1%)	0.329	0.849	393 (38.7%)	622 (61.3%)	0.876	0.645
1	30	11 (36.7%)	19 (63.3%)			14 (46.7%)	16 (53.3%)		
2	0	0 (0.0%)	0 (0.0%)			0 (0.0%)	0 (0.0%)		
≥3	2	1 (50.0%)	1 (50.0%)			1 (50.0%)	1 (50.0%)		
Employment									
I am not working	573	172 (30.0%)	401 (70.0%)	8.954	0.003	208 (36.3%)	365 (63.7%)	3.789	0.052
I am working	474	184 (38.8%)	290 (61.2%)			200 (42.2%)	274 (57.8%)		
Work while lockdown									
No	649	193 (29.7%)	456 (70.3%)	13.832	<0.001	234 (36.1%)	415 (63.9%)	6.092	0.014
Yes	398	163 (41.0%)	235 (59.0%)			174 (43.7%)	224 (56.3%)		
Health condition									
Below moderate	43	3 (7.0%)	40 (93.0%)	83.139	<0.001	3 (7.0%)	40 (93.0%)	56.749	<0.001
Moderate	253	35 (13.8%)	218 (86.2%)			61 (24.1%)	192 (75.9%)		
Above moderate	751	318 (42.3%)	433 (57.7%)			344 (45.8%)	407 (54.2%)		
Chronic medical condition									
No	925	318 (34.4%)	607 (65.6%)	0.501	0.479	362 (39.1%)	563 (60.9%)	0.093	0.761
Yes	122	38 (31.1%)	84 (68.9%)			46 (37.7%)	76 (62.3%)		
Vulnerable group									
No	428	167 (39.0%)	261 (61.0%)	8.119	0.004	172 (40.2%)	256 (59.8%)	0.452	0.501
Yes	619	189 (30.5%)	430 (69.5%)			236 (38.1%)	383 (61.9%)		
Study group									
A - Health and biological sciences	386	136 (35.2%)	250 (64.8%)	0.629	0.730	161 (41.7%)	225 (58.3%)	2.232	0.328
B - Technical sciences	328	112 (34.1%)	216 (65.9%)			126 (38.4%)	202 (61.6%)		
C - Arts. literature. education. and related sciences	333	108 (32.4%)	225 (67.6%)			121 (36.3%)	212 (63.7%)		

Table 2. Changes in anxiety and depression according to belief in conspiracy theories

Variables	All respondents Count	Anxiety change				Depression change			
		Not changed/little bit or much better Count (%)	Worse or much worse Count (%)	χ^2	P-value	Neither better or worse/ improved a bit or a lot Count (%)	It got a little or a lot worse Count (%)	χ^2	P-value
Do you believe that the COVID-19 vaccine was ready even before the virus broke out and they conceal it from us for the benefit of pharmaceutical companies?									
I don't believe it at all	752	255 (33.9%)	497 (66.1%)			299 (39.8%)	453 (60.2%)		
A little bit or maybe	255	93 (36.5%)	162 (63.5%)	4.190	0.123	102 (40.0%)	153 (60.0%)	8.064	0.018
Much or very much	40	8 (20.0%)	32 (80.0%)			7 (17.5%)	33 (82.5%)		
Do you believe that COVID-19 was created in a laboratory?									
I don't believe it at all	372	128 (34.4%)	244 (65.6%)			145 (39.0%)	227 (61.0%)		
A little bit or maybe	506	160 (31.6%)	346 (68.4%)	4.234	0.120	200 (39.5%)	306 (60.5%)	0.269	0.874
Much or very much	169	68 (40.2%)	101 (59.8%)			63 (37.3%)	106 (62.7%)		
Do you think that COVID-19 was created to be used as a biochemical weapon for the extermination of the human population?									
I don't believe it at all	511	176 (34.4%)	335 (65.6%)			200 (39.1%)	311 (60.9%)		
A little bit or maybe	404	133 (32.9%)	271 (67.1%)	0.406	0.816	166 (41.1%)	238 (58.9%)	3.608	0.165
Much or very much	132	47 (35.6%)	85 (64.4%)			42 (31.8%)	90 (68.2%)		
Do you believe that COVID-19 is related to the 5G technology antenna?									
I don't believe it at all	964	334 (34.6%)	630 (65.4%)			385 (39.9%)	579 (60.1%)		
A little bit or maybe	71	17 (23.9%)	54 (76.1%)	3.694	0.158	20 (28.2%)	51 (71.8%)	4.847	0.089
Much or very much	12	5 (41.7%)	7 (58.3%)			3 (25.0%)	9 (75.0%)		
Do you believe that COVID-19 appeared accidentally from human contact with animals and it was something that generally happens and was generally expected?									
I don't believe it at all	189	70 (37.0%)	119 (63.0%)			68 (36.0%)	121 (64.0%)		
A little bit or maybe	516	169 (32.8%)	347 (67.2%)	1.142	0.565	199 (38.6%)	317 (61.4%)	1.480	0.477
Much or very much	342	117 (34.2%)	225 (65.8%)			141 (41.2%)	201 (58.8%)		
Do you believe that COVID-19 has much lower mortality rate but there is misinformation and terror-inducing propaganda?									
I don't believe it at all	411	143 (34.8%)	268 (65.2%)			183 (44.5%)	228 (55.5%)		
A little bit or maybe	398	133 (33.4%)	265 (66.6%)	0.191	0.909	153 (38.4%)	245 (61.6%)	12.986	0.002
Much or very much	238	80 (33.6%)	158 (66.4%)			72 (30.3%)	166 (69.7%)		
Do you think the recommended measures (e.g. wearing face masks, avoid gatherings, stay at home etc.) are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer from COVID-19?									
I don't believe it at all	746	274 (36.7%)	472 (63.3%)			312 (41.8%)	434 (58.2%)		
A little bit or maybe	214	60 (28.0%)	154 (72.0%)	8.810	0.012	76 (35.5%)	138 (64.5%)	12.971	0.002
Much or very much	87	22 (25.3%)	65 (74.7%)			20 (23.0%)	67 (77.0%)		
Do you believe that COVID-19 outbreak is a deliberate creation of the world's powerful leaders to create a global economic crisis?									
I don't believe it at all	660	225 (34.1%)	435 (65.9%)			277 (42.0%)	383 (58.0%)		
A little bit or maybe	299	103 (34.4%)	196 (65.6%)	0.216	0.898	109 (36.5%)	190 (63.5%)	10.514	0.005
Much or very much	88	28 (31.8%)	60 (68.2%)			22 (25.0%)	66 (75.0%)		
Do you believe that COVID-19 is a sign of divine power to destroy our planet?									
I don't believe it at all	928	317 (34.2%)	611 (65.8%)			356 (38.4%)	572 (61.6%)		
A little bit or maybe	112	37 (33.0%)	75 (67.0%)	0.149	0.928	50 (44.6%)	62 (55.4%)	1.978	0.372
Much or very much	7	2 (28.6%)	5 (71.4%)			2 (28.6%)	5 (71.4%)		

Table 2. Continues

Variables	All respondents Count	Anxiety change				Depression change			
		Not changed/little bit or much better Count (%)	Worse or much worse Count (%)	χ^2	P-value	Neither better or worse/ improved a bit or a lot Count (%)	It got a little or a lot worse Count (%)	χ^2	P-value
Do you believe that airplanes secretly spray people with various chemicals?									
I don't believe it at all	921	308 (33.4%)	613 (66.6%)			358 (38.9%)	563 (61.1%)		
A little bit or maybe	117	42 (35.9%)	75 (64.1%)	4.595	0.100	45 (38.5%)	72 (61.5%)	1.057	0.589
Much or very much	9	6 (66.7%)	3 (33.3%)			5 (55.6%)	4 (44.4%)		
Do you think that vaccines in general are dangerous and should be avoided?									
I don't believe it at all	678	242 (35.7%)	436 (64.3%)			279 (41.2%)	399 (58.8%)		
A little bit or maybe	297	94 (31.6%)	203 (68.4%)	2.839	0.242	105 (35.4%)	192 (64.6%)	3.950	0.139
Much or very much	72	20 (27.8%)	52 (72.2%)			24 (33.3%)	48 (66.7%)		
The government is secretly involved in the murder of innocent citizens and/or well-known public figures.									
I don't believe it at all	728	255 (35.0%)	473 (65.0%)			291 (40.0%)	437 (60.0%)		
A little bit or maybe	269	81 (30.1%)	188 (69.9%)	2.957	0.228	100 (37.2%)	169 (62.8%)	1.191	0.551
Much or very much	50	20 (40.0%)	30 (60.0%)			17 (34.0%)	33 (66.0%)		
Global warming and climate change is a greatly exaggerated myth to serve various political and financial interests.									
I don't believe it at all	857	280 (32.7%)	577 (67.3%)			328 (38.3%)	529 (61.7%)		
A little bit or maybe	155	62 (40.0%)	93 (60.0%)	3.721	0.156	67 (43.2%)	88 (56.8%)	1.405	0.495
Much or very much	35	14 (40.0%)	21 (60.0%)			13 (37.1%)	22 (62.9%)		
The power held by the heads of state is smaller than that of small unknown groups that really control the world of politics.									
I don't believe it at all	485	159 (32.8%)	326 (67.2%)			191 (39.4%)	294 (60.6%)		
A little bit or maybe	442	145 (32.8%)	297 (67.2%)	5.259	0.072	173 (39.1%)	269 (60.9%)	0.308	0.857
Much or very much	120	52 (43.3%)	68 (56.7%)			44 (36.7%)	76 (63.3%)		
Secret organizations are communicating with aliens, but they hide it from the public.									
I don't believe it at all	908	304 (33.5%)	604 (66.5%)			348 (38.3%)	560 (61.7%)		
A little bit or maybe	114	40 (35.1%)	74 (64.9%)	2.353	0.308	45 (39.5%)	69 (60.5%)	4.819	0.090
Much or very much	25	12 (48.0%)	13 (52.0%)			15 (60.0%)	10 (40.0%)		
Groups of scientists manipulate, invent or conceal evidence to deceive the public.									
I don't believe it at all	647	226 (34.9%)	421 (65.1%)			261 (40.3%)	386 (59.7%)		
A little bit or maybe	349	112 (32.1%)	237 (67.9%)	0.854	0.652	131 (37.5%)	218 (62.5%)	2.050	0.359
Much or very much	51	18 (35.3%)	33 (64.7%)			16 (31.4%)	35 (68.6%)		
The government allows or commits acts of terrorism on its territory, disguising its involvement as if someone else is responsible.									
I don't believe it at all	727	252 (34.7%)	475 (65.3%)			291 (40.0%)	436 (60.0%)		
A little bit or maybe	282	89 (31.6%)	193 (68.4%)	1.398	0.497	106 (37.6%)	176 (62.4%)	2.173	0.337
Much or very much	38	15 (39.5%)	23 (60.5%)			11 (28.9%)	27 (71.1%)		
Do you believe that secretly a chip will be included in the COVID-19 vaccine in order to mark people?									
I don't believe it at all	854	291 (34.1%)	563 (65.9%)			337 (39.5%)	517 (60.5%)		
A little bit or maybe	161	55 (34.2%)	106 (65.8%)	0.112	0.946	55 (34.2%)	106 (65.8%)	3.289	0.193
Much or very much	32	10 (31.3%)	22 (68.8%)			16 (50.0%)	16 (50.0%)		

Table 2. Continues

Variables	All respondents Count	Anxiety change				Depression change			
		Not changed/little bit or much better Count (%)	Worse or much worse Count (%)	χ^2	P-value	Neither better or worse/ improved a bit or a lot Count (%)	It got a little or a lot worse Count (%)	χ^2	P-value
A small, secret group of people is responsible for taking all the important decisions, such as starting wars, in a planned way and the reasons are the group's secret interests.									
I don't believe it at all	659	218 (33.1%)	441 (66.9%)			261 (39.6%)	398 (60.4%)		
A little bit or maybe	341	122 (35.8%)	219 (64.2%)	0.728	0.695	135 (39.6%)	206 (60.4%)	3.736	0.154
Much or very much	47	16 (34.0%)	31 (66.0%)			12 (25.5%)	35 (74.5%)		
Technology and devices for mind control are used on people without their knowledge.									
I don't believe it at all	638	213 (33.4%)	425 (66.6%)			242 (37.9%)	396 (62.1%)		
A little bit or maybe	331	117 (35.3%)	214 (64.7%)	0.391	0.823	139 (42.0%)	192 (58.0%)	2.184	0.336
Much or very much	78	26 (33.3%)	52 (66.7%)			27 (34.6%)	51 (65.4%)		
New and advanced technology that will make the existing industry obsolete is being suppressed in a malicious and violent way.									
I don't believe it at all	707	244 (34.5%)	463 (65.5%)			281 (39.7%)	426 (60.3%)		
A little bit or maybe	300	97 (32.3%)	203 (67.7%)	0.672	0.715	115 (38.3%)	185 (61.7%)	1.583	0.453
Much or very much	40	15 (37.5%)	25 (62.5%)			12 (30.0%)	28 (70.0%)		
Some important events happen due to the activity of a small group who secretly manipulate world events.									
I don't believe it at all	639	210 (32.9%)	429 (67.1%)			247 (38.7%)	392 (61.3%)		
A little bit or maybe	372	133 (35.8%)	239 (64.2%)	0.948	0.622	153 (41.1%)	219 (58.9%)	5.002	0.082
Much or very much	36	13 (36.1%)	23 (63.9%)			8 (22.2%)	28 (77.8%)		
Experiments involving new drugs or technologies are performed systematically on humans in a secret way and without their knowledge or consent.									
I don't believe it at all	660	212 (32.1%)	448 (67.9%)			255 (38.6%)	405 (61.4%)		
A little bit or maybe	344	126 (36.6%)	218 (63.4%)	3.281	0.194	136 (39.5%)	208 (60.5%)	0.083	0.959
Much or very much	43	18 (41.9%)	25 (58.1%)			17 (39.5%)	26 (60.5%)		
Many important pieces of information are deliberately hidden from the public for reasons of interest.									
I don't believe it at all	262	96 (36.6%)	166 (63.4%)			102 (38.9%)	160 (61.1%)		
A little bit or maybe	527	182 (34.5%)	345 (65.5%)	2.514	0.285	218 (41.4%)	309 (58.6%)	3.836	0.147
Much or very much	258	78 (30.2%)	180 (69.8%)			88 (34.1%)	170 (65.9%)		
The spread of certain viruses and/or diseases is the result of deliberate, covert actions of an organization or government.									
I don't believe it at all	667	228 (34.2%)	439 (65.8%)			273 (40.9%)	394 (59.1%)		
A little bit or maybe	306	102 (33.3%)	204 (66.7%)	0.113	0.945	113 (36.9%)	193 (63.1%)	4.270	0.118
Much or very much	74	26 (35.1%)	48 (64.9%)			22 (29.7%)	52 (70.3%)		
It is possible that the earth is flat rather than a spherical.									
I don't believe it at all	974	343 (35.2%)	631 (64.8%)			386 (39.6%)	588 (60.4%)		
A little bit or maybe	68	13 (19.1%)	55 (80.9%)	9.929	0.007	21 (30.9%)	47 (69.1%)	2.805	0.246
Much or very much	5	0 (0.0%)	5 (100.0%)			1 (20.0%)	4 (80.0%)		

Table 3. Predictor factors for anxiety change

Variables		Anxiety change	
		OR (95%CI)	P-value
Do you think the recommended measures (e.g. wearing face masks. avoid gatherings. stay at home etc.) are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer from COVID-19?	I don' t believe it at all (reference group)	-	-
	A little bit or maybe	1.490 (1.07-2.08)	0.019
	Much or very much	1.715 (1.03-2.84)	0.037
It is possible that the earth is flat rather than a spherical.	I don' t believe it at all (reference group)	-	-
	A little bit or maybe	2.300 (1.24-4.27)	0.008
	Much or very much	-	-

Table 4. Predictor factors for depression change

Variables		Depression change	
		OR (95%CI)	P-value
Do you believe that the COVID-19 vaccine was ready even before the virus broke out and they conceal it from us for the benefit of pharmaceutical companies?	I don' t believe it at all (reference group)	-	-
	A little bit or maybe	0.990 (0.74-1.32)	0.946
	Much or very much	3.112 (1.36-7.13)	0.007
Do you believe that COVID-19 has much lower mortality rate but there is misinformation and terror-inducing propaganda?	I don' t believe it at all (reference group)	-	-
	A little bit or maybe	1.285 (0.97-1.70)	0.079
	Much or very much	1.851 (1.32-2.60)	<0.001
Do you think the recommended measures (e.g. wearing face masks, avoid gatherings. stay at home etc.) are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer from COVID-19?	I don' t believe it at all (reference group)	-	-
	A little bit or maybe	1.305 (0.95-1.79)	0.098
	Much or very much	2.408 (1.43-4.05)	<0.001
Do you believe that COVID-19 outbreak is a deliberate creation of the world's powerful leaders to create a global economic crisis?	I don' t believe it at all (reference group)	-	-
	A little bit or maybe	1.261 (0.95-1.67)	0.107
	Much or very much	2.170 (1.31-3.60)	0.003

to restrict human rights and establish a dictatorship rather than prioritize public safety from COVID-19 ('Do you think the recommended measures are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer from COVID-19?'), 77.0% reported a worsening or significant worsening of depression, compared to 58.2% of those who do not believe in it at all (χ^2=12.971, p=0.002). Among respondents who believed much or very much in the theory that suggests the deliberate creation of the COVID-19 outbreak by the world's powerful leaders to induce a global economic crisis ('Do you believe that COVID-19 outbreak is a deliberate creation of the world's powerful leaders to create a global economic crisis?'), 75.0% reported a worsening or significant worsening of depression, compared to 58.0% of those who do not believe in it at all (χ^2=10.514, p=0.005).

Conspiracy theory beliefs as predictors of self-reported changes in anxiety and depression.

Logistic regression analysis revealed significant predictor variables for changes in anxiety, specifically related to the following conspiracy theories:

- 'Do you think the recommended measures are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer from COVID-19?' Those who reported believing in this theory even a little bit or maybe had an OR of 1.49 (95% CI 1.07-2.08, p=0.019) and those who believed much or very much had an OR of 1.72 (95% CI 1.03-2.84, p=0.037) for changes in anxiety.

- 'It is possible that the earth is flat rather than a spherical'. Those who reported believing in this conspiracy theory even a little bit or maybe had an OR of 2.30 (95% CI 1.24-4.27, p=0.008) for anxiety change.

Additionally, significant predictors for changes in depression, specifically associated with the following conspiracy theories were detected:

- 'Do you believe that COVID-19 has a much lower mortality rate, but there is misinformation and terror-inducing propaganda?' Those who believed much or very much in this theory had OR of 1.85 (95% CI 1.32-2.60, p<0.001) for changes in depression.

- 'Do you think the recommended measures are an attempt to restrict human rights and lead to some kind of dictatorship rather than to keep the population safer

from COVID-19?' Those who believed in this theory much or very much had an OR of 2.41 (95% CI 1.43-4.05, p<0.001) for changes in depression.

- 'Do you believe that the COVID-19 outbreak is a deliberate creation of the world's powerful leaders to create a global economic crisis?' Those who believed in this theory much or very much had an OR of 2.17 (95% CI 1.31-3.60, p=0.003).

- 'Do you believe that the COVID-19 vaccine was ready even before the virus broke out, and they conceal it from us for the benefit of pharmaceutical companies?' Those who believed much or very much in this theory had an OR of 3.11 (95% CI 1.36-7.13, p=0.007).

Beliefs in conspiracy theories as predictors for changes in anxiety and depression are presented un Table 3 and Table 4, accordingly.

DISCUSSION

This study examined the relationship between students' belief in conspiracy theories and self-reported changes in depression and anxiety during the second COVID-19 outbreak. While the SARS-CoV-2 virus rapidly spread globally, it was accompanied by the proliferation of false information and conspiracy theories that gained traction. However, there is a dearth of data on the prevalence of different conspiracy theories and their association with self-reported changes in depression and anxiety among the student population, including Latvia.

The data analysis revealed that change in anxiety among females is much higher than among males (69.3% vs. 52.4%, respectively). This finding reinforces data from the systematic review and meta-analysis that indicate that females are at a higher risk of anxiety disorders (Wang et al. 2020). Our results showed that students who were not working had higher anxiety worsening compared to students who worked (70.0% vs 61.2%, respectively). According to these data, those respondents who were not working during lockdown had worsening in anxiety compared to those who were employed (70.3% vs 59.0%, respectively). Similar trends have been reported in a Canadian study which showed that it was job precarity resulting from the COVID-19 pandemic, rather than employment status itself, leading to an elevated anxious feeling among respondents (Lin et al. 2020). The data analysis showed that respondents who worked during lockdown had lower depression symptoms compared to respondents who did not work (56.3% vs 63.9%, respectively). Our results are consistent with Latvian general population findings that unemployed respondents were more likely to have worse depression symptoms compared to those who continued to work during the state of emergency (Vrublevska et al. 2021). The fact that the respondent's close relatives belong to a vulnerable group was not

associated with subjective changes in anxiety (69.5% vs 61.0%, respectively). Contrary to a study conducted in China showing that people with psychosocial and health-related risk factors were at the highest risk of experiencing moderate or severe depressive symptoms during the COVID-19 pandemic (Iob et al. 2020).

Most of the conspiracy beliefs that were statistically significant were associated with government and restrictions made to limit the spread of the virus. Respondents who tend to believe these theories were more likely to experience a subjective change in depressive symptoms and anxiety compared to before the state of an emergency. Certain conspiracy beliefs were associated with self-reported worsening in relation to the appearance of depression. Respondents who believed that the recommended COVID-19 safety measures are an attempt to restrict human rights and lead to some kind of dictatorship much or very much (OR=2.41). Respondents who believe that COVID-19 has much lower mortality rate but there is misinformation and terror-inducing propaganda (OR=1.85) and believe that COVID-19 outbreak is a deliberate creation of the world's powerful leaders (OR=2.17). Change in depressive symptoms also were associated with the belief that a small, secret group of people is responsible for taking all the important decisions. such as starting wars (OR=2.15). The results are in agreement with international study that higher feelings of depression are associated with greater conspiracy and misinformation beliefs (De Coninck et al. 2021). The belief that the recommended COVID-19 safety measures are an attempt to restrict human rights and lead to some kind of dictatorship increases the odds of worsening of depression and anxiety (OR=1.72 and OR=2.41, respectively). Respondents who tend to believe that the earth is flat rather than spherical a little or maybe had increased odds of having worse or much worse anxiety (OR=2.30). These results are in line with systematic review which showed that COVID-19 conspiracy belief was associated with lower psychological well-being (higher levels of anxiety, depression, feelings of powerlessness. or uncertainty) (Van Mulukom et al. 2022). A study carried out in Israel found that disbelief in the authorities negatively predicts psychological coping during COVID-19 (Eshel et al. 2022). This is in line with our study that respondents who believed some general conspiracy theories and conspiracy theories about COVID-19 have higher odds of anxiety and depression.

Meta-analysis on the role of conspiracy beliefs in COVID-19 health responses suggests that the negative effects of conspiracy beliefs are the strongest for vaccination and social distancing, measures that in combination are highly effective in reducing the spread of the virus, and that rely heavily on the compliance of all (Bierwiaczonek et al. 2022). Our study showed similar features: the negative effects of conspiracy beliefs was the strongest for COVID-19 safety measures made by the

government and thoughts that safety measures was a restriction of human rights rather than keeping population safe from COVID-19 and social distancing. Interestingly, our data was collected during the COVID-19 spread second wave, when the daily new infection rate was higher than in the first wave (Reuters 2023).

One of the strengths of the paper includes the large number of respondents who filled the questionnaire, as well there is only one published study about Latvian students' population. The major limitation of this study was that the data were obtained online. Due to self-selection bias among the respondents, it should be noted that the samples obtained may not fully represent the entire student population in Latvia. Another significant limitation that could have impacted the results is the potential for response bias, as the opinions of respondents who chose not to complete the questionnaire may differ from those who participated. This study specifically focused on Latvian students, thus the findings and conclusions are applicable solely to this particular student population in Latvia. Foreign students were not included in this study, and it is plausible that the anxiety and depression scores of foreign students might differ from those of Latvian students. Furthermore, it is important to note that this study had an under-representation of male respondents. Therefore, the generalizability of the findings to the entire student population may be limited. Additionally, considering the long-term impact of COVID-19 on student mental health, further research is warranted.

CONCLUSIONS

The data was obtained during the second wave of the COVID-19 pandemic, when the spread of the virus increased significantly in Latvia. Also, the society had been living in a pandemic for several months. In conclusion, our study examined several risk factors for self-reported changes in anxiety, depression, and connection to belief of conspiracy theories in students' sample of Latvia. Several socio demographic factors such as female sex, unemployment, health condition, belonging to a vulnerable group were associated with worsening of depression and anxiety symptoms. In general, these results indicate that there are conspiracy beliefs associated with higher odds of self-reported worsening of distress and depression in the Latvian student population. Based on the results of our research, the following measures can be implemented: raising awareness of anxiety and depression among students, general practitioners, universities and student associations. To contribute to the collaboration between specialists such as psychiatrists, psychotherapists, psychologists, student unions and policy-makers on the media and media sources providing scientifically proven information on COVID-19 and teaching more effective coping skills.

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Correspondence:

Julija Vorobjova, MD
Riga Stradins University, Department of Psychiatry and Narcology
Tvaika street 2, 1005.Riga, Latvia
E-mail: juulija.vorobjova@gmail.com