Generalized anxiety in healthcare workers during the coronavirus pandemic

Tsvetelina Mihaylova, Anton Koychev, Stanislava Stoyanova, Tsvetomir Dimitrov, Desislava Todorova and Nikolay Ivantchev

Introduction

COVID-19 is not only a disease, but also an event that changed the traditional social order [1], affected work, family and school life, and challenged the economy and the health care system [2]. During the coronavirus pandemic, the measures taken to stop the spread of the coronavirus, such as social distancing and isolation, closure of shops, businesses, schools, cities, etc., the travel restrictions and insecurity, lead to increased anxiety [3–8]. Over time, the spread of coronavirus increases the anxiety experienced [2, 7, 9–11], as people are concerned about their safety [12]. Anxiety is generally the most common mental health problem worldwide [13], which is particularly relevant during the coronavirus pandemic. In late March and early April 2020, according to research, more than a third of people were affected by generalized anxiety disorder [7]. During the coronavirus pandemic, about one in four in Bulgaria was characterized by high generalized anxiety according to data from November-December 2020 [14].

Essence of generalized anxiety

Generalized anxiety involves experiencing symptoms of anxiety as a constant and strong concern that does not relate only to a specific object or specific situation [15]; worry [13, 15] to the extent that one cannot sit still [13]; irritability, irascibility; muscle tension [13, 15]; avoiding situations in which a negative outcome may occur, delaying action due to worries [13]; feeling under pressure, easy fatigue, difficulty concentrating, sleep disturbances such as difficulty falling asleep, frequent waking at night, restless and insufficient sleep [15].

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Generalized anxiety includes excessive anxiety [13, 15] and excessive worry [13, 15] on most days for three or more months [13], and according to other authors for at least a 6-month period [15], as the symptoms of generalized anxiety cause disturbances in social, labour and other areas of functioning [15], in at least two or more of the areas of activity - difficulties in family, health, finances, learning, work [13]. The disorder is not due to the physiological effects of a medication or other medical illness, and another mental illness cannot better explain this disorder [15].

Differences in anxiety by social categories

The scientific literature has identified some differences in anxiety by social categories such as gender [16–18], age [19] and belonging to vulnerable groups in society, including healthcare professionals [10, 16, 20, 21]. Women are more anxious than men [18]. This is also true during the coronavirus pandemic, as in women interacting with coronavirus patients, the anxiety is also higher [16]. In Bulgaria, however, no statistically significant differences were found between men and women working in different occupational fields, in their generalized anxiety during the coronavirus pandemic, but still, the average values of women in generalized anxiety were higher than the average values of men [14]. A study in China in February 2020 among nurses found that the anxiety they experienced did not differ in socio-demographic indicators [10], but according to another study, the anxiety experienced during the coronavirus pandemic diminished with age advance [16]. There are some discrepancies between the data from numerous studies, which require further verification of whether there are some socio-demographic differences among healthcare workers on their generalized anxiety.

Anxiety in workers in the healthcare field

COVID-19 is a source of stress and anxiety for everyone, but especially for healthcare professionals [10, 20], particularly those caring for patients with COVID-19 [12, 16, 21, 22], as well as for the families of medical staff [12, 16]. In Oman, about 66% of households of health workers experienced mild, moderate or high anxiety, while in China about 45% of families of health workers experienced mild, moderate or high anxiety and the families of health workers compared to other areas experienced more worry [16].

An international survey of health workers during the COVID-19 pandemic found that about 9% had moderate or high anxiety, and a survey among nurses in China in February 2020 found that about 41% experienced anxiety, of which 12% - moderate and severe [10]. Doctors and nurses in Oman had a high level of anxiety, especially when caring for patients diagnosed with COVID-19, and there were no statistically significant differences between doctors and nurses in Oman in the anxiety they experienced [16]. Additionally, lifestyle changes, such as the postponement of practical training for medical students during a coronavirus pandemic, made them anxious [23].

The present study aimed to determine the level of generalized anxiety in healthcare professionals, if the generalized anxiety they experienced was related to the perceived threat of coronavirus disease, their health status, their level of religiosity, and difficulties in work, household and relationships, as well as whether their generalized anxiety was differentiated by some socio-demographic factors such as gender, age and marital status.

Hypotheses

It was assumed that generalized anxiety was mild in the majority of healthcare workers, as the perceived threat of coronavirus infection increased the experienced anxiety, but a previous study found that during the coronavirus pandemic, Bulgarians with minimal generalized anxiety predominated (about one third), followed by those with mild generalized anxiety (also about one third), and approximately one in four Bulgarians was characterized by high generalized anxiety [14].

It was supposed that the generalized anxiety of health professionals was differentiated by gender, age and marital status.

It was assumed also that the generalized anxiety of healthcare workers was related to their health status, the degree of the perceived threat of coronavirus, the degree of religiosity, difficulties in work, household and getting along well with other people.

Subjects and methods

Ethics statement

All surveyed persons participated voluntarily. The study conformed to the general ethical principles outlined in the Declaration of Helsinki [24].

Research design

A cross-sectional study was performed, i.e. each subject took part in the study only once. Data were collected during the coronavirus pandemic in November-December 2020 and January-February 2021, both online and
through direct contacts between the researcher and the subjects. The selection criterion was to be adult Bulgarians working in the field of healthcare.

Subjects
During the coronavirus pandemic, 296 healthcare workers aged 23 to 60 years were studied (mean age 33.8 years, standard deviation 10.8 years). A detailed description of the sample is presented in Table 1. The surveyed women with an intimate partner predominated. The subjects had different professions - doctors, dentists, nurses, pharmacists, orderly, psychotherapists, physiotherapists and speech therapists.

Instruments

Questionnaire for generalized anxiety
The Generalized Anxiety Disorder-7 (GAD-7) questionnaire consists of 7 items [4, 10, 16, 25, 26], based on the criteria of the International Classification of Diseases - 4th revision, for generalized anxiety disorder [10]. It measures the frequency of anxiety symptoms such as nervousness, excessive anxiety, difficulty resting, irritability, fear that something bad might happen [25]. Subjects answered by retrospective self-assessment how often they experienced some anxiety symptoms in the last 2 weeks on a scale from 0 (not at all), to 3 (almost every day) [10, 16, 25, 26, 27] published the Bulgarian version of GAD-7. It was further specified whether the subjects had some difficulties doing their work, in the household and getting along well with other people on a 4-point scale [26], but these results were not included in the calculation of the overall generalized anxiety score.

The overall score ranges from 0 to 21, and a higher score means more anxiety [4, 16, 26]. A GAD-7 score of 5 is a threshold value for mild anxiety [4, 16, 26], and lower scores indicate minimal anxiety [16]. A score of 10 is a threshold for moderate anxiety and a score of 15 on the questionnaire GAD-7 is a threshold for severe anxiety [4, 16, 26].

The internal consistency coefficient of Cronbach’s alpha of generalized anxiety questionnaire (GAD-7) in a sample of Bulgarian medical students was 0.87 [25]. In a Bulgarian sample of workers in various professional fields, including healthcare, the internal consistency coefficient of Cronbach’s alpha of the generalized anxiety questionnaire was 0.898, and the value of the McDonald’s coefficient ω as a measure of the internal consistency of the generalized anxiety questionnaire was 0.900 [14].

In the present study, the internal consistency coefficient of Cronbach’s alpha of the GAD-7 questionnaire was 0.895, i.e. good internal consistency [28, 29] or very good internal consistency [30, 31] recommended reporting 95% confidence interval for Cronbach’s alpha, which ranged from 0.875 to 0.912 for the GAD-7 questionnaire. There was no item that, if removed from the scale, would increase its internal consistency. The value of the McDonald’s coefficient ω as a measure of the internal consistency of the generalized anxiety questionnaire was 0.897, which value exceeded the recommended value of 0.75 by [32]. The mean inter-item correlation as a measure of homogeneity [33] of the generalized anxiety questionnaire was 0.550 and it was above the minimum acceptable value of the average inter-item correlation of 0.3 [34] so that the obtained mean inter-item correlation of the generalized anxiety questionnaire indicated high homogeneity of the items. The correlation between each item and the total score on the GAD-7 varied from 0.629 to 0.819, which was above the required minimum correlation coefficient of 0.3 indicating a well-contributing item for the homogeneity of the scale [35].

Instruments for self-assessment of own mental and physical health, and the degree of perceived threat of coronavirus

Subjects assessed their physical health at the time of the study on a scale from 0 - very poor to 10 - very good.

Subjects assessed their mental health status at the time of the study on a scale from 0 - very poor to 10 - very good.

During the coronavirus pandemic, subjects assessed the extent to which they perceived the coronavirus as a threat to themselves, to their relatives and friends, to other people - known and unknown, on a scale of 0 - not a threat at all to 6 - a major threat.

Some socio-demographic data from the participants in the study were also collected. They rated the degree of their religiosity on a scale from 0 - I am not religious at all to 10 - I am very religious.

Table 1. Frequency distribution by gender, marital status and coronavirus disease of the surveyed healthcare workers.

| Social categories          | Number | Percentage |
|---------------------------|--------|------------|
| Gender                    |        |            |
| Men                       | 56     | 18.3       |
| Women                     | 240    | 81.1       |
| Marital status            |        |            |
| Without intimate partner  | 132    | 44.6       |
| With intimate partner     | 164    | 55.4       |
| Having been diagnosed with COVID-19 |        |            |
| Yes                       | 84     | 28.4       |
| No                        | 212    | 71.6       |
**Data processing methods**

Data were analyzed statistically by means of descriptive statistics, check of normality of the distribution by Shapiro–Wilk coefficient, correlation analysis by Spearman correlation coefficient, non-parametric Mann–Whitney test, non-parametric Kruskal–Wallis test, and chi-square analysis. Statistical processing was performed using JASP 0.14 software [36]. Data are available in Mendeley Data Repository [37].

**Results**

**Levels of generalized anxiety in healthcare professionals**

The scores obtained on all scales (age, GAD-7 questionnaire, physical health, mental health, degree of religiosity, perception of coronavirus as a threat) were not normally distributed (the level of significance of the Shapiro-Wilk coefficient was below 0.001), therefore data were processed with non-parametric statistical methods of analysis.

In the last two weeks before the study, about a quarter of healthcare workers had some problems with relaxation, and about a fifth of them had experienced excessive anxiety about various things, as well as easily had reached a state of anger or irritability (Table 2).

The studied health professionals with minimal or mild generalized anxiety predominated, but about one-fifth of the participating healthcare workers experienced moderate or severe symptoms of anxiety (Table 3). The average score on the GAD-7 questionnaire was 6.3 and the standard deviation was 5.1, which means high variability in individual scores, most often from minimal through mild to moderate anxiety.

**Relationships between generalized anxiety, perception of the coronavirus as a threat, degree of religiosity, physical and mental health, age and difficulties at work, in the household and relationships among health professionals**

The participants in the study self-assessed their physical health with an average score of 7.4, and a standard deviation of 2.3. The subjects self-assessed their mental health with a mean score of 7.0, and a standard deviation of 2.4. They perceived the coronavirus as a threat with a mean score of 2.5, and a standard deviation of 1.5. Regarding their religiosity, the average score was 4.8 and the standard deviation was 2.9.

With age advance, the physical health deteriorated, religiosity increased slightly, and generalized anxiety in the surveyed healthcare workers decreased slightly (Table 4).

As generalized anxiety increased, physical and mental health deteriorated slightly (subjectively estimated by the participants), the degree of religiosity decreased slightly, and the perception of the coronavirus as a threat by healthcare workers increased slightly (Table 4). People were experiencing additional concerns about the possibility of contracting COVID-19 [38].

With the improvement of physical health, mental health also improved (according to the subjects’ judgments), but the generalized anxiety in healthcare workers decreased slightly (Table 4). With the improvement of mental health, the level of religiosity slightly increased, but the generalized anxiety in healthcare workers decreased slightly (Table 4). As religiosity increased, generalized anxiety decreased slightly, but the perception of the coronavirus as a threat by healthcare workers increased (Table 4).

At higher levels of generalized anxiety, healthcare workers were more likely to have difficulty doing their

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### Table 2. Percentage distribution of answers to the question "Over the last two weeks, how often have you been bothered by the following problems?"

| Problem Description | Not at all | Several days | More than half the days | Nearly every day |
|---------------------|-----------|--------------|-------------------------|-----------------|
| Feeling nervous, anxious, or on edge | 39.2% | 41.9% | 13.5% | 5.4% |
| Not being able to stop or control worrying | 51.3% | 35.1% | 6.8% | 6.8% |
| Worrying too much about different things | 33.8% | 41.9% | 10.8% | 16.2% |
| Trouble relaxing | 37.8% | 39.2% | 9.5% | 10.8% |
| Being so restless that it is hard to sit still | 47.3% | 37.8% | 2.7% | 12.2% |
| Becoming easily annoyed or irritable | 21.6% | 58.1% | 6.8% | 13.5% |
| Feeling afraid, as if something awful might happen | 44.6% | 40.5% | 2.7% | 12.2% |
| Difficulties in doing your work | 37.8% | 44.6% | 10.8% | 6.8% |
| Difficulties in taking care of things at home | 55.4% | 32.4% | 6.8% | 5.4% |
| Difficulties in getting along with other people | 36.5% | 47.3% | 10.8% | 5.4% |

### Table 3. Level of generalized anxiety among healthcare workers.

| Levels of generalized anxiety measured with the GAD-7 questionnaire | Number | Percentage |
|---------------------------------------------------------------|--------|------------|
| Minimal generalized anxiety | 132 | 44.6 |
| Mild generalized anxiety | 104 | 35.1 |
| Moderate generalized anxiety | 32 | 10.8 |
| Severe generalized anxiety | 28 | 9.5 |
| Minimal and mild symptoms of anxiety | 236 | 79.7 |
| Moderate and severe symptoms of anxiety | 60 | 20.3 |
jobs (Table 5; \( \chi^2 = 89.388; \text{df} = 9; p < 0.001; \) Likelihood ratio = 98.153; \( p < 0.001; N = 296; \) Cramer’s \( V = 0.317, \) i.e. average effect size according to Goev [39] and according to IBM Knowledge Center [40].

At the highest level of generalized anxiety, healthcare workers were more likely to have difficulties in housework (Table 6; \( \chi^2 = 168.187; \text{df} = 9; p < 0.001; \) Likelihood ratio = 123.137; \( p < .001; N = 296; \) Cramer’s \( V = 0.435, \) i.e. average effect size according to Goev [39] and according to IBM Knowledge Center [40].

At the highest level of generalized anxiety, healthcare workers were more likely to have problems with getting along with other people (Table 7; \( \chi^2 = 154.110; \) \text{df} = 9; \( p < 0.001; \) Likelihood ratio = 120.696; \( p < 0.001; N = 296, \) Cramer’s \( V = 0.417, \) i.e. average effect size according to Goev [39] and according to the IBM Knowledge Center [40].

With the increase in the perception of the coronavirus as a threat, the difficulties in the household slightly increased (Spearman’s \( \rho = 0.202; p < 0.001; N = 296 \)) and the problematic relationships with other people weakened slightly (Spearman’s \( \rho = 0.122; p = 0.036; N = 296 \)), but the degree of perception of the coronavirus as a threat was not statistically significantly associated with any difficulties in the work of health professionals (Spearman’s \( \rho = 0.074; p = 0.204; N = 296 \)).

With deteriorating physical health, difficulties in doing work (Spearman’s \( \rho = −0.260; p < 0.001; N = 296 \)) and problems in relationships with others (Spearman’s \( \rho = −0.130; p = 0.025; N = 296 \)) increased slightly, and difficulties in housework increased more (Spearman’s \( \rho = −0.488; p < 0.001; N = 296 \)).

With deteriorating mental health, difficulties in doing work (Spearman’s \( \rho = −0.354; p < 0.001; N = 296 \)), difficulties in housework (Spearman’s \( \rho = −0.398; p < 0.001; N = 296 \)) and problems in relationships with others increased slightly (Spearman’s \( \rho = −0.149; p = 0.010; N = 296 \)).

Greater difficulties in doing the work were accompanied by greater difficulties in housework (Spearman’s

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**Table 4.** Spearman correlation coefficients between generalized anxiety, mental health, physical health, age, degree of religiosity, perception of coronavirus as a threat in healthcare workers (\( N = 296 \)).

|                        | Spearman rho | \( p \) | A lower limit of 95% confidence interval | Upper limit of 95% confidence interval |
|------------------------|--------------|--------|------------------------------------------|----------------------------------------|
| Age                    | Score on the GAD-7 questionnaire | –0.128 | 0.028 | –0.238 | –0.014 |
| Age                    | Physical health | –0.407 | <0.001 | –0.498 | –0.307 |
| Age                    | Mental health | –0.087 | 0.138 | –0.199 | 0.028 |
| Age                    | Religiosity | 0.209 | <0.001 | 0.097 | 0.315 |
| Age                    | Score on the perception of the coronavirus as a threat | –0.043 | 0.464 | –0.156 | 0.072 |
| Score on the GAD-7 questionnaire | Physical health | –0.239 | <0.001 | –0.344 | –0.129 |
| Score on the GAD-7 questionnaire | Mental health | –0.266 | <0.001 | –0.369 | –0.157 |
| Score on the GAD-7 questionnaire | Religiosity | –0.121 | 0.038 | –0.231 | –0.007 |
| Score on the GAD-7 questionnaire | Score on the perception of the coronavirus as a threat | 0.203 | <0.001 | 0.091 | 0.310 |
| Physical health | Mental health | 0.676 | <0.001 | 0.608 | 0.733 |
| Physical health | Religiosity | 0.033 | 0.567 | –0.081 | 0.147 |
| Physical health | Score on the perception of the coronavirus as a threat | –0.080 | 0.172 | –0.192 | 0.035 |
| Mental health | Religiosity | 0.137 | 0.018 | 0.024 | 0.247 |
| Mental health | Score on the perception of the coronavirus as a threat | –0.078 | 0.180 | –0.190 | 0.036 |
| Religiosity | Score on the perception of the coronavirus as a threat | 0.319 | <0.001 | 0.213 | 0.418 |

**Table 5.** Compared frequency distributions of anxiety levels and difficulties in doing work in the last two weeks before conducting the study among healthcare workers.

| Level of generalized anxiety | Frequencies | Not at all | Several days | More than half the days | Nearly every day |
|-----------------------------|-------------|------------|--------------|-------------------------|-----------------|
| Minimal generalized anxiety | Observed frequencies | 64.000 | 60.000 | 4.000 | 4.000 |
|                            | Expected frequencies | 49.946 | 58.865 | 14.270 | 8.919 |
|                            | % of minimum anxiety | 48.485 | 45.455 | 3.030 | 3.030 |
| Mild generalized anxiety   | Observed frequencies | 20.000 | 68.000 | 8.000 | 8.000 |
|                            | Expected frequencies | 39.351 | 46.378 | 11.243 | 7.027 |
|                            | % of mild anxiety | 19.231 | 65.385 | 7.692 | 7.692 |
| Moderate generalized anxiety | Observed frequencies | 16.000 | 0.000 | 12.000 | 4.000 |
|                            | Expected frequencies | 50.000 | 0.000 | 37.500 | 12.500 |
|                            | % of moderate anxiety | 50.000 | 0.000 | 37.500 | 12.500 |
| Severe generalized anxiety  | Observed frequencies | 12.000 | 4.000 | 8.000 | 4.000 |
|                            | Expected frequencies | 42.857 | 14.286 | 3.166 | 4.000 |
|                            | % of severe anxiety | 42.857 | 14.286 | 3.166 | 4.000 |

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With deteriorating mental health, difficulties in doing work (Spearman’s \( \rho = −0.260; p < 0.001; N = 296 \)) and problems in relationships with others (Spearman’s \( \rho = −0.130; p = 0.025; N = 296 \)) increased slightly, and difficulties in housework increased more (Spearman’s \( \rho = −0.488; p < 0.001; N = 296 \)).

Greater difficulties in doing the work were accompanied by greater difficulties in housework (Spearman’s
rho = 0.415; p < 0.001; N = 296), and greater difficulties in housework accompanied problematic relationships with others (Spearman’s rho = 0.484; p < 0.001; N = 296) in health professionals.

**Socio-demographic differences in generalized anxiety in health professionals**

The studied healthcare workers who had been diagnosed with coronavirus had poorer mental health (small effect size, according to Lenhard and Lenhard [41]) and higher generalized anxiety (medium effect size, according to Lenhard and Lenhard [41]) compared to healthcare professionals who were not diagnosed with coronavirus (Table 8).

The participating women working in the healthcare system perceived the coronavirus as a threat to a greater extent (large effect size, according to Lenhard and Lenhard [41]), but self-assessed that they were in better physical health (small effect size, according to Lenhard and Lenhard [41]), compared with men (Table 9). According to another study, Bulgarian men also perceived the coronavirus as a threat to a lesser extent than women during the coronavirus pandemic [14].

Another study also did not find any statistically significant differences between Bulgarians with and without pre-existing generalized anxiety [41].

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**Table 6.** Compared frequency distributions of anxiety levels and the presence of difficulties in household care in the last two weeks before conducting the study among healthcare workers.

| Level of generalized anxiety | Frequencies | Difficulties in housework in the last two weeks |
|-------------------------------|-------------|-----------------------------------------------|
|                               | Observed frequencies | Not at all | Several days | More than half the days | Nearly every day |
| Minimal generalized anxiety   | 96.000       | 32.000     | 0.000        | 4.000                  |
| Mild generalized anxiety      | 73.135       | 42.811     | 8.919        | 7.135                  |
| Moderate generalized anxiety  | 48.000       | 48.000     | 8.000        | 0.000                  |
| Severe generalized anxiety    | 57.622       | 33.730     | 7.027        | 5.622                  |
|                               | % of minimum  | 72.727%    | 24.242%      | 0.000%                 |
|                               | % of mild anxiety | 46.154%    | 46.154%      | 7.692%                 |
|                               | % of moderate anxiety | 50.000%    | 12.500%      | 37.500%                |
|                               | % of severe anxiety | 14.286%    | 42.857%      | 0.000%                 |

**Table 7.** Compared frequency distributions of anxiety levels and the presence of problems with getting along with other people in the last two weeks before conducting the study among healthcare workers.

| Level of generalized anxiety | Frequencies | Problems understanding with others in the last two weeks |
|-------------------------------|-------------|-----------------------------------------------|
|                               | Observed frequencies | Not at all | Several days | More than half the days | Nearly every day |
| Minimal generalized anxiety   | 76.000       | 48.000     | 4.000        | 4.000                  |
| Mild generalized anxiety      | 48.162       | 62.432     | 14.270       | 7.135                  |
| Moderate generalized anxiety  | 24.000       | 68.000     | 12.000       | 0.000                  |
| Severe generalized anxiety    | 37.946       | 49.189     | 11.243       | 5.622                  |
|                               | % of minimum  | 57.576%    | 36.364%      | 3.030%                 |
|                               | % of mild anxiety | 23.077%    | 65.385%      | 11.538%                |
|                               | % of moderate anxiety | 25.000%    | 37.500%      | 37.500%                |
|                               | % of severe anxiety | 0.000%     | 42.857%      | 0.000%                 |

**Table 8.** Differences between subjects who had been diagnosed with coronavirus and those who had not, in the degree to which they perceived coronavirus as a threat, their generalized anxiety, and self-assessment of their physical and mental health.

| Diagnosed with COVID19 | Number | Mean   | S.D. | Mann-Whitney U | Level of significance | Effect size r |
|------------------------|--------|--------|------|----------------|-----------------------|---------------|
| Score on the perception of the coronavirus as a threat | No | 212 | 2.491 | 1.565 | 8704 | 0.755 | −0.022 |
|                         | Yes | 84   | 2.524 | 1.266 |            |               |               |
| Mental health           | No   | 212 | 7.170 | 2.285 | 10456 | 0.018 | 0.174 |
|                         | Yes  | 84  | 6.429 | 2.514 |            |               |               |
| Physical health         | No   | 212 | 7.434 | 2.349 | 9200  | 0.649 | 0.033 |
|                         | Yes  | 84  | 7.381 | 2.270 |            |               |               |
| Score on GAD-7 questionnaire | No | 212 | 5.585 | 4.905 | 6136  | <0.001 | −0.311 |
|                         | Yes  | 84  | 8.143 | 5.299 |            |               |               |

Note: S.D. means standard deviation.
without an intimate partner on the extent to which they perceived the coronavirus as a threat [14]. The studied healthcare workers who did not have an intimate partner had lower generalized anxiety (small effect size, according to Lenhard and Lenhard [41]) and were in better physical health (medium effect size, according to Lenhard and Lenhard [41]) compared to healthcare workers who had an intimate partner (Table 10). These results may be because people worry about the health of their intimate partner during the coronavirus pandemic. Besides, those who did not co-exist with their intimate partner were limited in opportunities to meet and contact him/her due to social isolation.

**Discussion**

Concerning the hypotheses, it was found that the studied health professionals with minimal generalized anxiety (about two-fifths) and mild generalized anxiety (about one-third) prevailed. About one-fifth of the participating healthcare workers experienced moderate or severe symptoms of anxiety. The perceived threat of coronavirus infection was associated with increased anxiety experienced by the participants. A previous study also found that during the coronavirus pandemic, Bulgarians with minimal generalized anxiety predominated, followed by those with mild generalized anxiety [14]. Some other studies also found predominance of healthcare specialists with minimal or mild generalized anxiety during the COVID-19 pandemic: about 94% in Ethiopia [42], about 85% in Finland [43], about 80% across 21 countries [44], approximately 75% in Russia [45], Saudi Arabia [46, 47] and in other countries, as a meta-analysis of 110 studies found [48] and as a systematic review of 29 studies found [49]. Probably the predominance of minimal and mild anxiety in the majority of health professionals may be due to their sense of empowerment acquired through knowledge and training [50], awareness for best practices, achieved success [22], confidence in their ability to care for patients [10]; perception of the profession as a vocation [51] that gives meaning to life and sets a goal for existence; the support received through personal protective equipment provided, protective clothing [10, 52], financial support [52], supporting managers [12], etc.

Health professionals with the highest generalized anxiety were younger, with deteriorated physical and mental health (not only according to own subjective estimation, but also objectively diagnosed health workers with coronavirus), less religious, with an intimate partner, for whom they also worried about possibly contracting the coronavirus. Some other studies confirmed that the anxiety experienced by healthcare workers during the coronavirus pandemic decreased with age - in Finland [43], in Oman [16], and in Russia [45]. In our study the generalized anxiety of health workers

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**Table 9.** Differences between the studied men and women in the degree to which they perceived the coronavirus as a threat, their generalized anxiety and self-assessment of their physical and mental health.

| Score on the perception of the coronavirus as a threat | Gender | Number | Mean | S.D. | Mann-Whitney U | Level of significance | Effect size | r |
|-------------------------------------------------------|--------|--------|------|------|----------------|----------------------|------------|---|
| Score on the perception of the coronavirus as a threat | Men    | 56     | 1.571| 1.559| 3608           | <0.001               | −0.463     |   |
| Score on the perception of the coronavirus as a threat | Women  | 240    | 2.717| 1.382|                |                      |            |   |
| Mental health                                         | Men    | 56     | 6.786| 2.262| 6280           | 0.440                | −0.065     |   |
| Mental health                                         | Women  | 240    | 7.000| 2.399|                |                      |            |   |
| Physical health                                       | Men    | 56     | 6.643| 2.686| 5160           | 0.006                | −0.232     |   |
| Physical health                                       | Women  | 240    | 7.600| 2.197|                |                      |            |   |
| Score on GAD-7 questionnaire                          | Men    | 56     | 5.929| 4.504| 6544           | 0.760                | −0.026     |   |
| Score on GAD-7 questionnaire                          | Women  | 240    | 6.400| 5.284|                |                      |            |   |

*Note: S.D. means standard deviation.*

**Table 10.** Differences between the studied healthcare workers with and without an intimate partner in the degree to which they perceived the coronavirus as a threat, their generalized anxiety, and their self-assessment of their physical and mental health.

| Score on the perception of the coronavirus as a threat | Presence or absence of an intimate partner | Number | Mean | S.D. | Mann-Whitney U | Level of significance | Effect size | r |
|-------------------------------------------------------|-------------------------------------------|--------|------|------|----------------|----------------------|------------|---|
| Score on the perception of the coronavirus as a threat | without an intimate partner               | 132    | 2.394| 1.184| 10360          | 0.510                | −0.043     |   |
| Score on the perception of the coronavirus as a threat | presence of an intimate partner            | 164    | 2.585| 1.687|                |                      |            |   |
| Mental health                                         | without an intimate partner               | 132    | 6.848| 2.593| 10360          | 0.521                | −0.043     |   |
| Mental health                                         | presence of an intimate partner            | 164    | 7.049| 2.181|                |                      |            |   |
| Physical health                                       | without an intimate partner               | 132    | 7.818| 2.667| 13912          | <0.001               | 0.285      |   |
| Physical health                                       | presence of an intimate partner            | 164    | 7.098| 1.954|                |                      |            |   |
| Score on GAD-7 questionnaire                          | without an intimate partner               | 132    | 5.667| 5.164| 8992           | 0.012                | −0.169     |   |
| Score on GAD-7 questionnaire                          | presence of an intimate partner            | 164    | 6.829| 5.080|                |                      |            |   |

*Note: S.D. means Standard deviation.*
was differentiated by age and marital status, but not by gender. Another study among Bulgarian professionals from various occupational fields also found no statistically significant differences between men and women in their generalized anxiety during the coronavirus pandemic [14]. However, similar to the present study, it found a trend for the female average scores on generalized anxiety to be higher than the male ones.

As already mentioned, the generalized anxiety of healthcare workers was related to the degree of the perceived threat of coronavirus and the degree of religiosity. Higher levels of generalized anxiety among healthcare workers in Ethiopia [42] and in Finland [43] were also accompanied with worries related to perceived threat of COVID-19 [42]. In a similar way, another study established that the married healthcare workers in Ethiopia perceiving COVID-19 as a threat for their family members had higher generalized anxiety [53].

In addition, the results showed that generalized anxiety of healthcare workers was related to their health status: in case of deteriorating health, generalized anxiety was higher. This is natural, as generalized anxiety is a diagnostic category for health disorders, according to the 11th revision of the International Classification of Diseases [54]. In the International Classification of Diseases, generalized anxiety disorder is described by code 6800 (Generalized anxiety disorder) and is characterized by overt symptoms of anxiety that last for at least several months and occur on most days during that time, such as anxious anticipation and excessive anxiety at many daily events, most often about family, health, finances, learning or work, additional symptoms such as muscle tension, motor restlessness, overactivity of the sympathetic and autonomic nervous systems, subjective experience of nervousness, difficulties in maintaining concentration, irritability or sleep disorders that impair functioning in areas such as family, education, work, social communication, etc., but the symptoms are not a manifestation of another disease and are not due to medication [54]. Anxiety is affected by mental health [55], which means that they are closely related, as found in the present study. Similar results were found in Ethiopia: the healthcare workers with chronic illness had higher generalized anxiety [53].

Generalized anxiety of health care workers was also associated with some difficulties in working, housekeeping and getting along with other people, and at a higher level of generalized anxiety, healthcare workers were more likely to have some difficulties doing their job, and even more difficulties in housework and even more problems with getting along with other people. Similar to our findings, healthcare workers in Finland who were more prone to generalized anxiety were those having problems with getting along with their colleagues and having heavy workload [43]. Higher levels of generalized anxiety in Ethiopia were accompanied with some difficulties to cope with work and family tasks [42]. The observation that high generalized anxiety was accompanied by difficulties in doing work, in the household and getting along with people may be attributed to high anxiety disrupting the performance of the activity, as established by various authors [17, 56]. The inability to control anxiety impairs the ability to concentrate and to process information, to successfully perform various activities, to build satisfactory social relationships [15].

Besides, the link between high generalized anxiety and more difficulties at the workplace or household and in relationships may be mediated by other variables such as perceived coronavirus threat, physical and mental health. The reason for this is that the present study found that the perception of the coronavirus as a greater threat increased the generalized anxiety, but also increased the difficulties in the household and aggravated pre-existing relationship problems. It was also found that deteriorated physical and mental health increased generalized anxiety, but also increased the difficulties in doing work, the problems in the relationships with others, difficulties in housework. Also, forced separation and limited social interactions due to social isolation during the pandemic destroys relationships [11], leading to household problems, financial losses, and job losses [7]. Difficulties in one area of life can provoke difficulties in another. For example, greater difficulties in doing work were accompanied by greater difficulties in housework, and greater difficulties in housework accompanied problematic relationships with other people in health professionals. Anxiety can be an expression of dissatisfaction with relationships [57].

It is important to be taken some measures for reducing anxiety, because lower anxiety is accompanied with higher mental resilience among healthcare workers [58]. Diminishing workload and providing social support (material and emotional) for healthcare workers may permit them to better balance their work and personal life, to take more care of themselves and their family, to get more informed about COVID-19, to perceive themselves as handling their tasks successfully and to reduce the anxiety levels.

The present study has its limitations related to the representativeness of the sample, the self-assessment methods used and the possible social desirability in answering (the degree of sincerity in answering, according to the desire for the answers to be approved by other people). Although the sample was not representative for all health specialities, it met the
requirement to include at least 200 people, which was considered sufficient for models of phenomena consisting of up to 15 indicators [59]. The sample also met the criterion for a ratio of at least ten subjects per item from a questionnaire to which they respond, i.e. the proportion of subjects to variables should be at least ten to one [60, 61].

There is also the opinion that social desirability should not be used to validate scales, i.e. to check whether what was intended to be measured was really measured, as social desirability characterizes each person as a component of personality, uniting the five personality factors (more pronounced extraversion, emotional stability, conscientiousness, agreeableness, and openness to experience) in a higher-order factor - social desirability [62]. Instead of checking for social desirability, information about the sincerity of the participants could be obtained from the conformity of the results with the findings so far in the scientific literature and with theoretical models of the studied phenomena.

Conclusions

This study was the first that identified the level of generalized anxiety in healthcare workers in Bulgaria and linked it to the perceived threat of coronavirus, physical and mental health, religiosity, age, gender and marital status, and difficulties in functioning at work, in the household and relationships. These results reveal the great importance of anxiety for the functioning of the individual and the organizations in which he/she works and the social networks in which people interact. Future research may compare the anxiety experienced by health professionals with a variety of specialties, different work experience and in different types of health facilities and healthcare sectors, as well as cross-culturally.

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