

PSYCHOMETRIC PROPERTIES OF THE POLISH VERSION OF THE *GENERALIZED ANXIETY DISORDER* 7-ITEM SCALE (GAD-7) IN A NON-CLINICAL SAMPLE OF EMPLOYEES DURING PANDEMIC CRISIS

BEATA ALEKSANDRA BASIŃSKA¹ and ZUZANNA KWISSA-GAJEWSKA²

¹ Gdańsk University of Technology, Gdańsk, Poland

Faculty of Management and Economics, Department of Management

² SWPS University of Social Sciences and Humanities, Warsaw, Poland

Faculty of Psychology, Department of Health Psychology

Abstract

Objectives: The COVID-19 outbreak is an example of a crisis that triggered an increase in generalized anxiety disorder. The study aims to validate the Polish version of the *Generalized Anxiety Disorder 7-item scale (GAD-7)* by Spitzer et al. among a non-clinical sample of employees and examine the invariance depending on the gender and age of working adults. **Material and Methods:** For assessing factor structure of the Polish version of the GAD-7, the data were collected from a sample of 821 adults employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic in Poland (April 10–May 24, 2020). Due to differences in the severity of GAD symptoms across gender and age groups, the measurement invariance in these groups was tested. **Results:** The results of a series of confirmatory factor analyses confirmed the unidimensionality of the GAD-7. The values of the composite reliability index and Cronbach's α showed that it is a reliable tool. The GAD levels demonstrated strong relationships with professional burnout, psychological distress, and psychological complaints. These relationships were stronger than the relationships between these factors and job satisfaction. Construct, metric and scalar invariance across gender and age groups were documented. Women experienced more severe symptoms of generalized anxiety disorder than men. Generalized anxiety disorder affected 28% of respondents. **Conclusions:** This study contributes evidence of the validation of the GAD among employees and also confirms the invariance depending on gender and age. The Polish version of the GAD-7 has good psychometric properties in a group of professionals and can be recommended for research and to be used in an occupational medicine practice, especially during crisis periods associated with the risk of developing a generalized anxiety disorder. *Int J Occup Med Environ Health.* 2023;36(4):493–504

Key words:

anxiety, measurement invariance, pandemics, *Generalized Anxiety Disorder 7-item scale*, multigroup confirmatory factor analysis, employee wellbeing

Funding: this study was supported by the National Science Centre, Poland (grant No. UMO-2017/26/M/HS6/00451 entitled “Job burnout: new conceptualization in a longitudinal multilevel approach,” grant manager: Beata Aleksandra Basińska).

Received: November 24, 2022. Accepted: July 7, 2023.

Corresponding author: Beata Aleksandra Basińska, Gdańsk University of Technology, Faculty of Management and Economics, Department of Management, Narutowicza 11/12, 80-233 Gdańsk, Poland (e-mail: beata.basinska@pg.edu.pl).

INTRODUCTION

The initial phase of the COVID-19 pandemic in Poland, which started in March 2020, had a few characteristic features: lack of medical preparedness (lack of proper medicines or vaccines) [1], lack of technical preparedness (no personal protective equipment) [2], and first and foremost – lack of credible information [3]. Such uncertainty, ambiguity and complexity brought to the community increased anxiety [3,4], including generalized anxiety disorder (GAD) [5,6]. This type of anxiety disorder, characterized by uncontrolled, excessive anxiety and pathological worrying, was mainly a response to the daily updates on COVID-19 infection and death rates and mobility restrictions [4]. However, the pandemic also hit the labour market, changing work practices in both a quantitative and qualitative way. While some professionals experienced a sudden influx of excessive work, such as those in the IT sector, others had to completely and rapidly change their working methods, such as teachers. In contrast, employees in the hospitality sector struggled with work restrictions. These changes disrupted the work-life balance of these employees and led to increased job insecurity which, in turn, contributed to mental health problems [7].

Anxiety disorders may be one of the consequential costs to pay for the COVID-19 pandemic, as they already ranked among the top 25 causes of the global burden of disease in the pre-epidemic period [8]. However, the pandemic is an example of a crisis situation. It is a difficult time for individuals currently, with societies facing multiple crises (e.g., geopolitical, economic, and climate crises). These highly stressful situations [1], given their widespread and global health, social, and economic impacts [3], are likely to activate the psychological mechanisms of GAD. The GAD increases the risk of depression [9], professional burnout [10], absenteeism, and job quitting [11]. Thus, identifying validated screening instruments for GAD has the potential to improve detection and facilitate

treatment [12] as well as maintain the ability to work and the wellbeing of employees.

In response to this gap, this study contributes evidence regarding the psychometric properties of the GAD in a heterogeneous non-clinical sample of employees from various Polish organisations. To authors' best knowledge, this is the first study to focus on the validation of the GAD among the working population and also examines the invariance depending on the gender and age of employees.

Generalized Anxiety Disorder 7-item scale

The most popular and the best-performing tool for assessing the severity of GAD is the 7-item *Generalized Anxiety Disorder* scale (GAD-7) [12,13]. The GAD-7 questionnaire addresses: feelings of nervousness, anxiety or tension (item 1), not being able to control worrying (item 2), excessive worrying about various things (item 3), having trouble relaxing (item 4), restlessness (item 5), irritability (item 6), anxiety as if something awful might happen (item 7). The questionnaire originated from another one consisting of 13 items formulated based on *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM-IV) criteria and other anxiety measuring scales [13]. The content of the GAD-7 was determined based on correlations between these items. The GAD-7 was developed as a module of the *Patient Health Questionnaire* (PHQ), a diagnostic tool used for mental health disorder assessment. Many translations have been developed by the Mapi Research Institute using an internationally accepted translation methodology [14].

Herr et al. [12] conducted a systematic review of screening tools and recommended the GAD-7 for identifying GAD over other measures, such as the *Hamilton Anxiety Rating Scale* (HAM-A), the *State-Trait Anxiety Inventory* (STAI) or the *Hospital Anxiety and Depression Scale* (HADS). The HAM-A is more related to the subclinical expression of anxiety disorders and to the neuroanatomical correlates of anxiety [16]. However, it requires twice as long as



the GAD-7 to complete. The STAI is often used in a psychological context and views anxiety as a facet of certain personality traits. The HADS remains popular, although it is more suitable for measuring psychological distress and has problems with floor effects across its items [17]. The GAD-7 is the best-performing test for GAD, with a positive likelihood ratio of 5.1 and a negative likelihood ratio of 0.13 [12]. Thus, it is feasible for use in primary care as well as in occupational psychology and medicine. The original language version of the GAD-7 has a verified construct, procedural and diagnostic accuracy and good reliability among primary care patients [13]. The theoretical unidimensional model [13] has been validated in the general population [15,18]. In contrast, results from clinical studies [19–21] showed the best fit of the unidimensional model to the data, but with correlated errors for items assessing somatic symptoms (items 4–6). At the same time, other studies conducted in clinical groups [22–24] suggested a 2-factor structure of the GAD-7, consisting of subscales: “somatic symptoms” (items 4–6) and “cognitive and emotional experience of anxiety” (items 1–3 and 7).

Because of its good convergent reliability and accuracy but poor cut-off point specificity and high rate of false-positive diagnoses for all anxiety disorders, the GAD-7 scale is recommended as a general scale for measuring anxiety symptom severity rather than a specific screening tool for assessing GAD [20–22]. With the original assumption, the cut-off point above 10 scores indicates the presence of GAD, such as moderate and severe levels of anxiety symptoms [13]. However, screening the well-being of employees and identifying mild levels of anxiety symptoms is important also due to their negative consequences on the ability to work and carry out the work safely. Thus, preventive measures should be directed especially into those employees.

It is worth emphasizing that GAD levels may differ depending on gender and age. The GAD is usually more preva-

lent among women and middle-aged and older individuals [4,9]. However, during the period of tightened restrictions due to the COVID-19 pandemic, women and younger individuals experienced a higher level of anxiety [6,8,25]. So far, the Polish version of the GAD-7 has not been validated. The authors who used it mainly for research during the COVID-19 pandemic did not publish any psychometric properties [26] or reported reliability measures solely [5,27,28]. Moreover, these studies omitted data regarding the professional activity of respondents.

The current study

In light of the above results, the present study aims to assess the psychometric properties of the Polish version of the GAD-7 [13,14] among a non-clinical sample of employees. Firstly, the structure of the dimensionality of the GAD-7 was verified, as well as its convergent and divergent validity. Subsequently, due to possible differences in the severity of GAD symptoms across genders and ages [9], it was decided to test measurement invariance across these groups.

MATERIAL AND METHODS

Participants

An online survey of 821 adults (485 women – 59.1% of the total sample) employed in 4 economic sectors (health care, education, IT, public administration) filled out the GAD-7 between April 10–May 24, 2020. This was an unusual period in Poland, as the first wave of the COVID-19 pandemic had begun. This aroused great emotion in society and introduced sudden changes in daily and professional lives. The study was performed in line with the principles of the Declaration of Helsinki. All data were collected using anonymous online surveys. All participants were informed of the nature of the current study and gave their informed consent to participate.

Participants were aged 23–66 years ($M \pm SD$ 43 \pm 10.2 years). They had an average job tenure of 19.7 years ($SD = 10.8$ years, range 2–45 years) and average job tenure in their cur-



Table 1. Sociodemographic characteristics of the study sample of adults employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic, April 10–May 24, 2020, Poland

| Variable | Participants (N = 821) | | | | |
|--|---------------------------|--------------------|------------------|----------------------|--------------------|
| | total | gender | | age | |
| | | women (N = 485) | men (N = 336) | younger (N = 435) | older (N = 368) |
| Age [years] (M±SD) | 41.98±10.18 | 44.68±9.70 | 41.98±10.18 | 33.91±5.39 | 51.08±5.62 |
| Tenure [years] (M±SD) | | | | | |
| job | 18.72±10.81 | 20.53±10.75 | 16.12±10.38 | 10.38±5.30 | 28.13±7.07 |
| in current organization | 12.42±9.88 | 13.97±10.19 | 10.18±8.98 | 6.99±5.31 | 18.53±10.26 |
| Gender (women) [n (%)] | 485 (59.1) | – | – | 214 (49.2) | 271 (70.2) |
| Marital status (married/in a relationship) [n (%)] | 629 (76.6) | 364 (75.1) | 265 (78.9) | 317 (72.9) | 312 (80.8) |
| Dependent minors (yes) [n (%)] | 452 (55.1) | 266 (54.8) | 186 (55.4) | 231 (53.1) | 221 (57.3) |
| Employment sector [n (%)] | | | | | |
| healthcare | 202 (24.6) | 191 (94.6) | 11 (5.4) | 66 (32.7) | 136 (67.3) |
| education | 213 (25.9) | 170 (79.8) | 43 (20.2) | 86 (40.4) | 127 (59.6) |
| IT | 202 (24.6) | 20 (9.9) | 182 (90.1) | 167 (82.7) | 35 (17.3) |
| public administration | 204 (24.8) | 104 (51) | 100 (49) | 116 (56.9) | 88 (43.1) |

Younger – 18–42 years; older – 43–65 years.

rent organisation of 12.9 years (SD = 10.1 years, range 0.5–41 years). Most (91.5%) had high levels of education (i.e., bachelor's or master's degree). Approximately 32% of participants were responsible for other staff.

The occupational groups differed in terms of age and gender. For example, IT specialists were often represented by younger (M±SD 35.9±8.2 years) and less experienced (M±SD 12.6±7.8 years) employees, while teachers (M±SD 46.5±8.4 years) and nurses (M±SD 45.7±10.0 years) were older. Nurses and teachers were primarily women (94.6% and 79.8%, respectively), in contrast to IT specialists, who were primarily men (90.1%). Due to these differences, the authors focused on gender and age differences. Using the median (Me = 42 years), the authors divided the total sample into 2 age groups: younger (18–42 years) and older (43–65 years). Table 1 shows the sociodemographic data.

Method

The Polish version of the GAD-7 [14] is a self-report measure of the severity of symptoms of GAD occurring during the last 2 weeks. Employees answer questions on a 4-point Likert scale (0 – “not at all,” 3 – “nearly every day”). The authors used the GAD-7 Polish-translated version from the Mapi Research Institute. The GAD-7 screeners and translations are freely available from the *Patient Health Questionnaire* (PHQ) website [14]. The score is the sum of scores between 0 and 21, with scores ≥5, ≥10, ≥15 indicating mild, moderate and severe levels of anxiety symptoms, respectively [13]. Values above 10 indicate the presence of GAD. To assess the convergent and discriminant validity of the GAD-7, the authors applied constructs related to occupational wellbeing: job satisfaction (a positive indicator of wellbeing) and professional burnout (a negative indicator of wellbeing).

Job satisfaction was measured with 1 item: “To what extent are you satisfied with your job?” [29]. Answers were given on a 5-point scale (1 = “very dissatisfied,” and 5 = “very satisfied”).

Professional burnout was assessed using the Polish version of the *Burnout Assessment Tool* (BAT-23), which comprises 23 statements referring to a work context [30]. Burnout syndrome is defined as a work-related state of exhaustion, mental distancing, and reduced ability to regulate cognitive and emotional processes [31]. An example of a statement included in the BAT-23 is: “I struggle to find any enthusiasm for my work.” Responses were measured on a 5-point scale (1 = “never” and 5 = “always”). The Cronbach’s α for the total sample was 0.95.

Burnout syndrome is accompanied by non-specific secondary symptoms (*Burnout Assessment Tool – Secondary symptoms*, BAT-S), such as psychological distress, which is measured by 5 items (e.g., “I tend to worry”) and psychosomatic complaints, which is also measured by 5 items (e.g., “I suffer from headaches”) [30,31]. Participants responded using a 5-point scale (1 = “never,” and 5 = “always”). In the total sample, the Cronbach’s α for psychological distress and psychosomatic complaints were 0.87 and 0.83, respectively. The results for burnout syndrome, psychological distress, and psychosomatic complaints were calculated by summing the responses and dividing the total by the number of statements.

Data analysis

Data were analysed in 2 stages with SPSS 27 and AMOS 27 software. In the first stage, the authors determined the factor structure of the scale. Confirmatory factor analyses (CFA) applying maximum likelihood estimations (ML) tested the model fit. The following indices were used to evaluate model fit: χ^2 , Tucker-Lewis index (TLI), relative fit index (CFI), root mean square error of approximation (RMSEA), standardized root mean squared residual (SRMR) and Akaike information

criterion (AIC). The authors expected that TLI and CFI would exceed 0.90, RMSEA and SRMR would be <0.08 , and AIC would have the lowest value [32].

Multigroup confirmatory factor analysis (MGCFA) was conducted to confirm measurement invariance of the underlying factor structure across gender and age groups. Metric ($\Delta\text{CFI} \leq -0.005$, $\Delta\text{RMSEA} \leq 0.010$ or $\Delta\text{SRMR} \leq 0.025$) and scalar ($\Delta\text{CFI} \leq -0.005$, $\Delta\text{RMSEA} \leq 0.010$ or $\Delta\text{SRMR} \leq 0.005$) multigroup-invariance were then verified according to decision criteria [33] in both groups.

The convergent accuracy of the final model was assessed by the average variance extracted (AVE) with values >0.50 . The reliability of the measure was determined by the Cronbach’s α internal consistency coefficient and the coefficient of composite reliability (CR) with values >0.70 [34]. The discriminant validity of the scale was evaluated based on its Pearson’s correlations with other constructs. The distribution of scores according to the norms of the original version of the GAD-7 [13] is also presented.

RESULTS

In line with prior literature [13,21–24], the authors tested the goodness-of-fit indices of the single-factor model and the model of 2 correlated latent factors (the first factor includes items 1–4 and the second factor contains items 5–7) in a total sample using CFA. Table 2 below presents detailed results.

The measures of fit of the unidimensional model (model 1), with the same pattern of factor loadings and values >0.70 across both the total sample and groups, indicated an unsatisfactory fit to the data (Table 2). Based on the inspection of the modification indices, correlated errors for items 2–4, 5–7, 5–6, 6–7 were added to the unidimensional model (model 2). These items have a similar scope of content (respectively: items 2–4 “worry and trouble in relaxing,” items 5–7 “anxiety and irritability”) and occur in close proximity. The modified model 2



Table 2. Goodness-of-fit indices: 1-factor model (model 1, model 2) and 2-factor model (model 3) of the *Generalized Anxiety Disorder 7-item scale (GAD-7)*, in adults (N = 821) employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic, April 10–May 24, 2020, Poland

| Model | χ^2 (df) | CFI | TLI | SRMR | RMSEA (90% CI) | AIC |
|--------------|---------------|------|------|------|-------------------|--------|
| Total sample | | | | | | |
| model 1 | 187.21 (14) | 0.97 | 0.99 | 0.03 | 0.12 (0.11–0.14) | 229.63 |
| model 2 | 46.69 (10) | 0.99 | 0.99 | 0.01 | 0.07 (0.05–0.09) | 99.71 |
| model 3 | 93.12 (13) | 0.99 | 0.98 | 0.02 | 0.09 (0.07–0.10) | 123.12 |
| Age | | | | | | |
| younger | | | | | | |
| model 1 | 85.26 (14) | 0.97 | 0.96 | 0.02 | 0.11 (0.09–0.13) | 113.26 |
| model 2 | 23.36 (10) | 0.99 | 0.99 | 0.01 | 0.06 (0.03–0.09) | 59.36 |
| model 3 | 51.48 (13) | 0.99 | 0.98 | 0.02 | 0.08 (0.06–0.11) | 81.48 |
| older | | | | | | |
| model 1 | 115.74 (14) | 0.96 | 0.94 | 0.02 | 0.14 (0.12–0.16) | 213.13 |
| model 2 | 31.39 (10) | 0.99 | 0.98 | 0.02 | 0.08 (0.05–0.11) | 67.39 |
| model 3 | 49.71 (13) | 0.97 | 0.98 | 0.02 | 0.09 (0.06–0.11) | 79.71 |
| Gender | | | | | | |
| women | | | | | | |
| model 1 | 168.65 (14) | 0.95 | 0.93 | 0.02 | 0.15 (0.13–0.17) | 210.65 |
| model 2 | 32.87 (10) | 0.99 | 0.99 | 0.02 | 0.07 (0.04–0.10) | 82.87 |
| model 3 | 63.51 (13) | 0.99 | 0.98 | 0.02 | 0.09 (0.07–0.11) | 93.51 |
| men | | | | | | |
| model 1 | 57.07 (14) | 0.98 | 0.97 | 0.02 | 0.10 (0.07–0.12) | 85.07 |
| model 2 | 40.41 (10) | 0.99 | 0.97 | 0.02 | 0.10 (0.07–0.13) | 76.41 |
| model 3 | 51.43 (13) | 0.98 | 0.97 | 0.02 | 0.094 (0.07–0.12) | 81.43 |

AIC – Akaike information criterion; CFI – comparative fit index; CI – confidence interval; df – degrees of freedom; RMSEA – root mean square error of approximation; SRMR – standardized root mean squared residual; TLI – Tucker-Lewis index.

Model 1 – 1-factor model; model 2 – modified 1-factor model (with correlated error covariances between items 2 and 4; 5, 6 and 7); model 3 – 2-factor model of correlated latent factors (first factor: items 1–4; second factor: items 5–7).

For each model: χ^2 significant at level $p < 0.001$.

achieved satisfactory goodness of fit, excluding the male group (the recommended RMSEA value was exceeded).

In line with previous studies in clinical groups [21–24] and correlated errors in 2 item subgroups, the authors decided to test a model of 2 correlated latent factors (model 3, Table 2). However, model 3 yielded a poor fit to the data. At the same time, the very high correlation between the item “worry and trouble relaxing” and the item “anxiety and irritability” (0.93, $p < 0.001$) may

indicate a lack of discriminative validity between them, confirming the unidimensionality of the scale.

The measurement invariance of the modified unidimensional model (model 2) was then tested by MGCFI in 2 groups by gender and age. The nested model comparison indices are shown in Table 3.

The modified unidimensional model obtained metric invariance in both groups, i.e., by age and gender. This result indicates the equivalence of factor loadings across



Table 3. Measures of goodness-of-fit of models testing *Generalized Anxiety Disorder 7-item scale (GAD-7)* measurement invariance by gender and age in adults (N = 821) employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic, April 10–May 24, 2020, Poland

| Level of measurement equivalence | Modified univariate model (model 2) | | | | | | | | |
|----------------------------------|-------------------------------------|------|------|------------------|------|---------------------|--------------|----------------|---------------|
| | χ^2 (df) | CFI | TLI | RMSEA (90% CI) | SRMR | $\Delta\chi^2$ (df) | Δ CFI | Δ RMSEA | Δ SRMR |
| Age | | | | | | | | | |
| construct | 54.74 (20) | 0.99 | 0.99 | 0.05 (0.03–0.06) | 0.01 | – | – | – | – |
| metric | 62.15 (26) | 0.99 | 0.99 | 0.04 (0.03–0.05) | 0.01 | 7.41 (6) | –0.001 | –0.005 | 0.001 |
| scalar | 74.90 (33) | 0.99 | 0.99 | 0.04 (0.03–0.05) | 0.01 | 12.75 (7) | –0.001 | –0.002 | <0.001 |
| Gender | | | | | | | | | |
| construct | 73.0 (14) | 0.99 | 0.98 | 0.06 (0.04–0.07) | 0.01 | – | – | – | – |
| metric | 79.63 (27) | 0.99 | 0.99 | 0.05 (0.04–0.06) | 0.01 | 6.63 (13) | <0.001 | –0.008 | <0.001 |
| scalar | 94.42 (32) | 0.99 | 0.99 | 0.05 (0.04–0.06) | 0.02 | 14.79 (5) | –0.001 | <0.001 | 0.002 |

CFI – comparative fit index; df – degrees of freedom; RMSEA – root mean square error of approximation; SRMR – standardized root mean squared residual; TLI – Tucker-Lewis index.

groups. Also, scalar invariance was confirmed, which allowed to compare results between groups.

Comparing the mean subgroup scores demonstrated that, during the first wave of COVID-19, women experienced higher levels of GAD than men ($t_{(819)} = 3.86$, $p < 0.001$). However, there was no difference in GAD levels between younger and older employees ($t_{(819)} = 0.092$, $p = 0.927$).

Descriptive statistics of the GAD-7, relevance and reliability indices are presented in Table 4. Convergent validity was confirmed (AVE values >0.50). Regarding reliability, the modified unidimensional model showed good internal consistency (Cronbach's $\alpha = 0.83$, CR = 0.95) (Table 4).

The relationships between GAD levels and occupational wellbeing indicators were closely related (Table 5). More specifically, secondary symptoms of professional burnout, namely psychological distress and psychosomatic complaints, were moderately correlated with GAD levels. A similar pattern was observed with the core symptoms of professional burnout. These negative indicators of wellbeing were more strongly associated with GAD levels than job satisfaction, which is a positive indicator of job-related wellbeing. The distribution severity of

GAD symptoms was tested. The authors used the optimal cut-offs recommended by the authors of the original GAD-7. The GAD, moderate to severe, was present in 28% of the total sample and women, almost 20% of men, and 25% of younger and older employees (Table 6).

DISCUSSION

The main aim of this study was to investigate the psychometric properties, including the assessment of validity and reliability of the Polish version of the GAD-7 scale [13,14] among professionals. A series of exploratory and confirmatory analyses indicated that the modified unidimensional model achieved satisfactory goodness of fit, which supports previous findings, also obtained in non-clinical groups [15,18].

The final model, characterized by good internal consistency, included covariances between item errors for “worry and trouble relaxing” (items 2 and 4) and “anxiety and irritability” (items 5–7), which are similar in content and occur in close proximity to each other. However, the pattern of error covariances obtained in the present study differed from that observed in other



Table 4. Descriptive statistics of the *Generalized Anxiety Disorder 7-item scale (GAD-7)* in adults (N = 821) employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic, April 10–May 24, 2020, Poland

| Measures | GAD-7 | | | | | | | | | | | | |
|----------------------------|--------------|-------------|------|---------|-----------|------|----------|--------------|-----------|-----------|-----------|-------|--|
| | total sample | factor load | | | | | | total sample | | | M±SD | | |
| | | gender | | age | | M±SD | skewness | kurtosis | gender | | age | | |
| | | women | men | younger | older | | | | women | men | younger | older | |
| GAD-7 total | | | | | 7.18±5.74 | 0.83 | -0.11 | 7.82±5.87 | 6.26±5.44 | 7.20±5.66 | 7.16±5.84 | | |
| item 1 | 0.87 | 0.88 | 0.87 | 0.86 | 1.22±0.03 | 0.56 | -0.38 | 1.34±0.93 | 1.04±0.85 | 1.21±0.88 | 1.22±0.93 | | |
| item 2 | 0.94 | 0.96 | 0.92 | 0.94 | 1.02±0.03 | 0.67 | -0.48 | 1.13±0.98 | 0.85±0.90 | 1.00±0.94 | 1.03±0.97 | | |
| item 3 | 0.89 | 0.91 | 0.87 | 0.87 | 1.18±0.03 | 0.53 | -0.50 | 1.26±0.95 | 1.05±0.88 | 1.17±0.92 | 1.18±0.94 | | |
| item 4 | 0.89 | 0.90 | 0.86 | 0.90 | 1.15±0.03 | 0.50 | -0.67 | 1.21±0.95 | 1.05±0.96 | 1.12±0.93 | 1.17±0.98 | | |
| item 5 | 0.81 | 0.79 | 0.83 | 0.82 | 0.74±0.03 | 1.06 | 0.16 | 0.81±0.94 | 0.62±0.85 | 0.74±0.92 | 0.73±0.90 | | |
| item 6 | 0.79 | 0.81 | 0.78 | 0.77 | 1.04±0.03 | 0.67 | -0.25 | 1.10±0.92 | 0.95±0.89 | 1.09±0.90 | 0.98±0.91 | | |
| item 7 | 0.77 | 0.74 | 0.80 | 0.78 | 0.86±0.03 | 0.88 | -0.33 | 0.96±0.99 | 0.70±0.92 | 0.86±0.97 | 0.84±0.98 | | |
| Cronbach's α | 0.95 | 0.95 | 0.95 | 0.95 | | | | | | | | | |
| Average variance extracted | 0.73 | 0.73 | 0.72 | 0.72 | | | | | | | | | |
| Composite reliability | 0.95 | 0.95 | 0.95 | 0.95 | | | | | | | | | |

Younger – 18–42 years; older – 43–65 years.

Table 5. Correlations between *Generalized Anxiety Disorder* 7-item scale (GAD-7) levels and positive and negative occupational wellbeing indicators in adults (N = 821) employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic, April 10–May 24, 2020, Poland

| Occupational wellbeing | M | SD | Skewness | Kurtosis | Cronbach's α | Pearson's r |
|---------------------------------|------|------|----------|----------|---------------------|-------------|
| Job satisfaction | 3.70 | 0.76 | −0.93 | 1.79 | – | −0.38*** |
| Professional burnout (BAT-23) | 2.31 | 0.60 | 0.33 | 0.03 | 0.95 | 0.54*** |
| Psychological distress (BAT-5) | 2.66 | 0.88 | 0.37 | −0.37 | 0.87 | 0.65*** |
| Psychosomatic complains (BAT-5) | 2.31 | 0.77 | 0.34 | −0.43 | 0.83 | 0.56*** |

BAT-23 – *Burnout Assessment Tool* – 23 items; BAT-5 – *Burnout Assessment Tool* – secondary symptoms.

Pearson's r – coefficient between GAD-7 and others variables.

*** $p < 0.001$.

Table 6. Distribution of the severity of *Generalized Anxiety Disorder* 7-item scale (GAD-7) in adults (N = 821) employed in 4 economic sectors (health care, education, IT, public administration) during the initial phase of the COVID-19 pandemic, April 10–May 24, 2020, Poland

| GAD-7 severity | Participants (N = 821) [n (%)] | | | | |
|--------------------------------|--------------------------------------|--------------------|------------------|----------------------|--------------------|
| | total | gender | | age | |
| | | women (N = 485) | men (N = 336) | younger (N = 435) | older (N = 368) |
| Lack of anxiety (≤ 4) | 371 (45.2) | 193 (39.8) | 178 (53) | 197 (45.3) | 174 (45.1) |
| Mild anxiety (≥ 5) | 220 (26.8) | 155 (32) | 91 (27.1) | 129 (29.7) | 117 (30.3) |
| Moderate anxiety (≥ 10) | 125 (15.2) | 79 (16.3) | 43 (12.8) | 68 (15.6) | 54 (14) |
| Severe anxiety (≥ 15) | 105 (12.8) | 58 (12) | 24 (7.1) | 41 (9.4) | 41 (10.6) |

Younger – 18–42 years; older – 43–65 years.

language versions of the GAD-7. They were mainly studies involving clinical samples with a distinct “somatic” component [19–21]. In addition, the present study tested a 2-factor model of correlated latent factors reported in the literature [22–24]. However, it did not meet the criteria of goodness-of-fit indices, and the very high correlation between factors indicated the adoption of a unidimensional model. Thus, the 2-factor model may be applicable for screening in heterogeneous psychiatric samples [35]. While the unidimensional factor structure, obtained in the Polish version of the scale, is applicable in working population studies to determine the severity of GAD.

The construct, metric and scalar measurement invariance in groups of employees distinguished by gender and age

has been confirmed, which allows to compare the severity of GAD in these samples [9]. This finding is particularly important in monitoring the psychological functioning of a working population and is characterised by diverse gender and age distributions, experiencing multiple crises associated with health, socio-economic and geopolitical developments. At the same time, working adults are not exposed to extreme economic stress and social exclusion as some clinical groups in which the tool was validated. The GAD severity was closely related to negative occupational wellbeing indicators, such as professional burnout, psychological distress, and psychosomatic complaints. These findings were consistent with prior literature [9–11] and demonstrated that GAD caused by

deteriorating employee occupational health could result in significant organizational costs.

The results of the study indicate that just >25% of professionals showed symptoms of GAD. It is twice less than in other Polish studies conducted at the beginning of the pandemic among adult population [5], which mainly included female respondents (82%; own study – 59.1%), and, unlike this study, did not provide any information on the employment status of participants. Results of this study are consistent with international indications on the prevalence of anxiety during pandemics [25]. They also show an increase in GAD among Poles compared to the pre-pandemic state (about 1% of the population) [36].

Furthermore, the results clearly and consistently confirm that women generally experience higher levels of GAD compared to men, both in times of relative stability [9,36] and during the pandemic crisis [5,27]. It can be explained by the fact that women are at risk for mood disorders due to the burden of social roles, both in their private and professional lives [36]. In the present study, the severity of GAD did not depend on age of employees.

The study has several limitations that stem from the fact that it did not include the perceived threat of COVID-19, the possibility of contact with the SARS-CoV-2 virus and personality factors, such as neuroticism. Moreover, most studies used cut-offs, which the authors of the scale considered optimal. However, to test the diagnostic accuracy of the Polish version of GAD-7, it is important to compile results from other validation studies in both clinical and non-clinical trials with recommended cut-offs. This, however, goes beyond the scope of the current study.

CONCLUSIONS

This article is the first to present the psychometric properties of the Polish version of the GAD-7 in a non-clinical sample of working adults. The results revealed metric and scalar invariance across gender and age groups. It can be recommended for research and in occupational medi-

cine practice, especially during crisis periods related to the prolonged pandemic and geopolitical events that involve the risk of developing GAD.

Author contributions

Research concept: Beata Aleksandra Basińska

Research methodology: Beata Aleksandra Basińska, Zuzanna Kwissa-Gajewska

Collecting material: Beata Aleksandra Basińska

Statistical analysis: Beata Aleksandra Basińska, Zuzanna Kwissa-Gajewska

Interpretation of results: Beata Aleksandra Basińska, Zuzanna Kwissa-Gajewska

References: Beata Aleksandra Basińska, Zuzanna Kwissa-Gajewska

REFERENCES

1. Horesh D, Brown AD. Traumatic stress in the age of COVID-19: A call to close critical gaps and adapt to new realities. *Psychol Trauma*. 2020;12(4):331-5. <https://doi.org/10.1037/tra0000592>.
2. World Health Organization [Internet]. Geneva: The Organization; 2020 [cited 2020 Mar 3]. Shortage of personal protective equipment endangering health workers worldwide. Available from <https://www.who.int/news/item/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide>.
3. Salari N, Hosseinian-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health*. 2020;16(1):57. <https://doi.org/10.1186/s12992-020-00589-w>.
4. COVID-19 Mental Disorders Collaborators. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *Lancet*. 2021;398(10312):1700-12. [https://doi.org/10.1016/S0140-6736\(21\)02143-7](https://doi.org/10.1016/S0140-6736(21)02143-7).



5. Babicki M, Mastalerz-Migas A. The occurrence of anxiety disorders among Poles during the COVID-19 pandemic. Występowanie zaburzeń lękowych wśród Polaków w dobie pandemii COVID-19. *Psychiatr Pol.* 2021;55(3):497-509. <https://doi.org/10.12740/PP/OnlineFirst/126230>.
6. Bäuerle A, Teufel M, Musche V, Weismüller B, Kohler H, Hetkamp M, et al. Increased generalized anxiety, depression and distress during the COVID-19 pandemic: a cross-sectional study in Germany. *J Public Health (Oxf).* 2020; 42(4):672-8. <https://doi.org/10.1093/pubmed/fdaa106>.
7. Antino M, Ruiz-Zorrilla P, Sanz-Vergel AI, Leon-Perrez JM, Rodriguez-Muñoz A. The role of job insecurity and work-family conflict on mental health evolution during COVID-19 lockdown. *Europ J Work Organ Psychol.* 2022; 31(5):667-84. <https://doi.org/10.1080/1359432X.2022.2049251>.
8. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet.* 2020;396(10258): 1204-22. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9).
9. Wittchen HU. Generalized anxiety disorder: prevalence, burden, and cost to society. *Depress Anxiety.* 2002;16(4): 162-71. <https://doi.org/10.1002/da.10065>.
10. Koutsimani P, Montgomery A, Georganta K. The Relationship Between Burnout, Depression, and Anxiety: A Systematic Review and Meta-Analysis. *Front Psychol.* 2019;10:284. <https://doi.org/10.3389/fpsyg.2019.00284>.
11. Jones-Rincon A, Howard K. An occupational health evaluation of the impact of Anxiety Disorder for public school teachers. *J App Biobeh Res.* 2018;24(1):1-12. <https://doi.org/10.1111/jabr.12133>.
12. Herr NR, Williams JW, Benjamin S, McDuffie J. Does this patient have generalized anxiety or panic disorder?: The Rational Clinical Examination systematic review. *JAMA* 2014; 312:78-84. <https://doi.org/10.1001/jama.2014.5950>.
13. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med.* 2006;166(10):1092-7. <https://doi.org/10.1001/archinte.166.10.1092>.
14. Spitzer RL, Williams JBW, Kroenke K et al. GAD-7. Polish for Poland. An educational grant from Pfizer Inc. GAD-7. Available from: https://www.phqscreeners.com/images/sites/g/files/g10060481/f/201412/GAD7_Polish%20for%20Poland.pdf.
15. Hinz A, Klein AM, Brähler E, Glaesmer H, Luck T, Riedel-Heller SG, et al. Psychometric evaluation of the Generalized Anxiety Disorder Screener GAD-7, based on a large German general population sample. *J Affect Disord.* 2017;210(1):338-44. <https://doi.org/10.1016/j.jad.2016.12.012>.
16. Donzuso G, Cerasa A, Gioia MC, Caracciolo M, Quattrone A. The neuroanatomical correlates of anxiety in a healthy population: differences between the State-Trait Anxiety Inventory and the Hamilton Anxiety Rating Scale. *Brain Behav.* 2014;4(4):504-514.
17. Coyne JC, van Sonderen E. The Hospital Anxiety and Depression Scale (HADS) is dead, but like Elvis, there will still be citations. *J Psychosom Res.* 2012;73(1):77-78.
18. Löwe B, Decker O, Müller S, Brähler E, Schellberg D, Herzog W, et al. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care.* 2008;46(3):266-74. <https://doi.org/10.1097/MLR.0b013e318160d093>.
19. Johnson SU, Ulvenes PG, Øktedalen T, Hoffart A. Psychometric Properties of the General Anxiety Disorder 7-Item (GAD-7) Scale in a Heterogeneous Psychiatric Sample. *Front Psychol.* 2019;10:1713. <https://doi.org/10.3389/fpsyg.2019.01713>.
20. Kertz S, Bigda-Peyton J, Bjorgvinsson T. Validity of the Generalized Anxiety Disorder-7 scale in an acute psychiatric sample. *Clin Psychol Psychother.* 2013;20(5):456-64. <https://doi.org/10.1002/cpp.1802>.
21. Rutter LA, Brown TA. Psychometric Properties of the Generalized Anxiety Disorder Scale-7 (GAD-7) in Outpatients with Anxiety and Mood Disorders. *J Psychopathol Behav Assess.* 2017;39(1):140-6. <https://doi.org/10.1007/s10862-016-9571-9>.

22. Beard C, Björgvinsson T. Beyond generalized anxiety disorder: psychometric properties of the GAD-7 in a heterogeneous psychiatric sample. *J Anxiety Disord.* 2014;28(6):547-52. <https://doi.org/10.1016/j.janxdis.2014.06.002>.
23. Moreno E, Muñoz-Navarro R, Medrano LA, González-Blanch C, Ruiz-Rodríguez P, Limonero JT, et al. Factorial invariance of a computerized version of the GAD-7 across various demographic groups and over time in primary care patients. *J Affect Disord.* 2019;252:114-21. <https://doi.org/10.1016/j.jad.2019.04.032>.
24. Ong CW, Pierce BG, Klein KP, Hudson CC, Beard C, Björgvinsson T. Longitudinal Measurement Invariance of the PHQ-9 and GAD-7. *Assessment.* 2021;10731911211035833. <https://doi.org/10.1177/10731911211035833>.
25. Santabárbara J, Lasheras I, Lipnicki DM, Bueno-Notivol J, Pérez-Moreno M, López-Antón R, et al. Prevalence of anxiety in the COVID-19 pandemic: An updated meta-analysis of community-based studies. *Prog. Neuropsychopharmacol Biol Psychiatry.* 2021;109:110207. <https://doi.org/10.1016/j.pnpbp.2020.110207>.
26. Czenczek-Lewandowska E, Leszczak J, Wyszynska J, Baran J, Weres A, Lewandowski B. The Role of Physical Activity in the Reduction of Generalised Anxiety Disorder in Young Adults in the Context of COVID-19 Pandemic. *Int J Environ Res Public Health.* 2022;19(17):11086. <https://doi.org/10.3390/ijerph191711086>.
27. Rogowska AM, Ochnik D, Kuśnierz C, Chilicka K, Jakubiak M, Paradowska M, et al. Changes in mental health during three waves of the COVID-19 pandemic: a repeated cross-sectional study among Polish university students. *BMC Psychiatry.* 2021;21(1):627. <https://doi.org/10.1186/s12888-021-03615-2>.
28. Gambin M, Sękowski M, Woźniak-Prus M, Wnuk A, Oleksy T, Cudo A, et al. Generalized anxiety and depressive symptoms in various age groups during the COVID-19 lockdown in Poland. Specific predictors and differences in symptoms severity. *Compr Psychiatry.* 2021;105:152222. <https://doi.org/10.1016/j.comppsy.2020.152222>.
29. Wanous JP, Hudy MJ. Single-item reliability: A replication and extension. *Organ Res Methods.* 2001;4(4), 361-375. <https://doi.org/10.1177/109442810144003>.
30. Basińska BA, Gruszczyńska E, Schaufeli W. The Polish adaptation of the Burnout Assessment Tool (BAT-PL) by Schaufeli et al. *Psychiatr Pol.* 2023;57(1):223-235. <https://doi.org/10.12740/PP/OnlineFirst/141563>.
31. Schaufeli WB, Desart S, De Witte H. Burnout Assessment Tool (BAT) – Development, Validity, and Reliability. *Int J Env Res Pub He.* 2020;17(24):9495. <https://doi.org/10.3390/ijerph17249495>.
32. Hooper D, Coughlan J, Mullen M. Structural equation modelling: Guidelines for determining model fit. *Elec J Bus Res Meth.* 2008;6:53-60. <https://doi.org/10.21427/D7CF7R>.
33. Chen FF. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Modeling.* 2007;14:464-504. <https://doi.org/10.1080/10705510701301834>.
34. Hair J, Hult GTM, Ringle C, Sarstedt M. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Los Angeles: SAGE Publications, Incorporated; 2014. <https://doi.org/10.1007/978-3-030-80519-7>.
35. Bártolo A, Monteiro S, Pereira A. Factor structure and construct validity of the Generalized Anxiety Disorder 7-item (GAD-7) among Portuguese college students. *Cad Saude Publica.* 2017;33(9). <https://doi.org/10.1590/0102-311X00212716>.
36. Thibaut F, van Wijngaarden-Cremers PJM. Women's Mental Health in the Time of Covid-19 Pandemic. *Front. Glob. Womens Health.* 2020;1:588372. <https://doi.org/10.3389/fgwh.2020.588372>.

This work is available in Open Access model and licensed under a Creative Commons Attribution-NonCommercial 3.0 Poland License – <http://creativecommons.org/licenses/by-nc/3.0/pl/deed.en>.