Development and Validation of Anxiety Due to Nuclear War Threat Scale

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Abstract

Anxiety is a common reaction to the threat of nuclear war, and there is a need for a reliable and valid measure to assess it. Existing questionnaires on the specific anxiety due to the danger of nuclear war only measure some of the four clusters of anxiety symptoms (cognitive, emotional, somatic, behavioural), or they measure coping strategies or attitudes toward nuclear weapons. Therefore, the main aim was to develop a new Anxiety due to the Nuclear War Threat Scale (ANWTS) and to determine its psychometric characteristics. In a cross-sectional online study, 287 participants from a community setting (64.8% women) filled out the ANWTS, Depression, Anxiety, and Stress Scale (DASS-21), the Nuclear War Anxiety Questionnaire, and the Nuclear Coping Strategies scale. Exploratory factor analysis showed a two-factor structure with Cognitive and Emotional Symptoms Subscale (11 items, $\omega = .96$) and Somatic Symptoms Subscale (6 items, $\omega = .93$). High convergent and divergent validity was demonstrated. Known-group differences validity showed that women reported higher anxiety symptoms on both subscales and total scale than men. A new 17-item ANWTS is reliable and valid in measuring cognitive, emotional, and somatic anxiety symptoms due to possible nuclear war threats.

Keywords: anxiety, nuclear war, war, questionnaire, validity, reliability

Introduction

The continuous development of nuclear technology, along with the corresponding political tensions, presents an increasing threat to the usage of such technology. People are exposed to various information about the possibility of

nuclear war across the media, which can cause diverse psychological consequences, including anxiety. Anxiety can often be a product of an external threat, especially a personal one, over which a person believes they have little or no control. Moreover, people with anxiety tend to persistently focus on threatening events and commonly evaluate elevated perceived risk (Eysenck, 1992). Thus, today's abundance of information can contribute to an overwhelming sensation and elevated anxiety.

First, it is important to note that anxiety is a complex construct due to multiple conceptualisations and operationalisations. The multidimensional interactive model of stress, anxiety, and coping (Endler, 1997) conceptualises anxiety through trait and state concepts. In this model, person variables presented by trait anxiety, or one's predisposition to feel anxious in various types of stressful situations, interact with situation variables, leading to a perception of threat. This perception of threat leads to changes in state anxiety which leads to reactions such as coping reactions, defences, illness, behavioural, and biological reactions (Endler & Kocovski, 2001).

State anxiety manifestations can be operationalised differently. According to the American Psychological Association (APA, 2018), anxiety is an emotion described by feelings of tension, worried thoughts, and physical changes such as increased heartbeat. This definition, therefore, encompasses somatic and emotional symptoms of anxiety. Somatic symptoms of anxiety are those symptoms of sympathetic nervous system arousal, such as sweaty palms, rapid heart rate, difficulty breathing, and dry mouth (Endler et al., 1989). The next approach operationalises anxiety as worried thoughts, implying cognitive aspects of anxiety. For example, Borkovec and Inz (1990) suggest that worry primarily involves thought activity, which is potentially crucial to some anxiety maintenance and modification theories. Moreover, Wells and Papageorgiou (1998) emphasise that worry, a cognitive phenomenon associated with significant distress, is often a characteristic of particular emotional disorders such as anxiety disorder. Finally, in addition to somatic and cognitive symptoms, Lehrer and Woolfolk (1982) also found behavioural symptoms in anxiety presentation, such as social avoidance. Therefore, it can be summarised that anxiety manifests with four clusters of symptoms: somatic, emotional, cognitive and behavioural.

Furthermore, the recent build-up in tensions between nuclear-powered nations is reminiscent of the time of the Cold War when the possibility of all-out nuclear warfare was high. At that time, the continuous rise in fear and worry among the people led to a more thorough examination of the relationship between anxiety and the ongoing nuclear threat. The psychological implications of the threat of nuclear war have mostly been studied in the 1980s. Research by Newcomb (1986) showed a connection between the potential threat of nuclear war and psychological distress in people. Also, a study by Hollin (1991) indicates a connection between high levels of general anxiety and excessive worry due to the threat of nuclear war.

Given the new threats of wars and nuclear wars in contemporary times, there is a need to reevaluate the existing instruments for measurement of specific anxiety due to nuclear war threats. Three such instruments can be found in the literature (Table

1). The first, the Nuclear Attitudes Questionnaire (Newcomb, 1986), measures four latent factors: nuclear concern, nuclear support, fear of the future, and nuclear denial. The second, the Nuclear Anxiety Inventory (Hanley & Christie, 1988), was validated in adolescents and obtained three factors: fear, futurelessness, and powerlessness. Finally, the third, Nuclear War Anxiety Questionnaire (Chandler, 1991) measures attitudes toward nuclear war with three subscales: Despair, Urgency, and Denial. However, in addition to assessing anxiety symptoms, the latter Nuclear War Anxiety Questionnaire also measures the existence of some coping mechanisms through its Denial scale.

Furthermore, there is a specific questionnaire to measure strategies for coping with nuclear war, called Nuclear Coping Strategies (Stone & Neale, 1984; adapted by Hamilton et al., 1989), but it does not measure anxiety. In addition, the Nuclear War Questionnaire (Hamilton et al., 1987) examines attitudes toward nuclear weapons and the specifics of the danger of nuclear war. It has four subscales: Opposition to Weapons, Focus of Attention, Personal Efficacy, and Nuclear Survival, of which only four items measure concerns about the threat of nuclear war and time spent thinking about nuclear war (i.e., *cognitive symptoms*).

There are other instruments assessing death anxiety or anxiety due to war in general. For example, the Death Anxiety Scale (DAS; Templer, 1970) measures emotional and cognitive symptoms of anxiety when thinking about death. It consists of 15 items, but only one item refers to the fear of the thought of a new world war. Some more recent questionnaires were developed to measure anxiety symptoms due to the threat of war. The War Anxiety Questionnaire (Surzykiewicz et al., 2022) measures *somatic* anxiety symptoms due to the threat of war, while Persistent Thinking about War measures *cognitive* anxiety symptoms and negative persistence and rumination in thinking about war. Similarly, the Fear of War Scale (Kalcza-Janosi et al., 2022) measures *somatic* and *emotional* symptoms. It can measure fear as a state or, in the case of repeated use, fear fluctuations in wartime circumstances.

Furthermore, an anxiety scale should be able to discriminate between some known groups. Prior research, such as Newcomb (1989) and Riad et al. (2023), suggests that reports of anxiety, including anxiety related to nuclear war, are more pronounced in women versus men. On the other hand, age was not found to be a discriminative factor in the experience of anxiety due to nuclear war threats (Newcomb, 1988). Discrimination between higher and lower levels of education can be expected in a way where highly educated people report less anxiety versus lower educated people (Bjelland et al., 2008). Another known difference in distress levels can be found in comparisons between parents and people without children, where parents generally report higher levels of anxiety and stress (Bird, 1997; Nomaguchi et al., 2005). The number of children was also found to be a factor that contributes to higher levels of fear for the future and more nuclear concern (Newcomb, 1988).

This review shows that existing questionnaires mostly explore the attitudes towards nuclear weapons and strategies for facing the possibility of nuclear war. Those questionnaires that measure anxiety symptoms examine only one or two out

of four anxiety symptom clusters. Given that there is no satisfactory measuring instrument for specific anxiety due to the threat of nuclear war covering all four clusters of anxiety, it was necessary to develop a new, valid and reliable measuring instrument. Most modern studies only focus on anxiety related to general warfare (Skwirczyńska et al., 2022; Xu et al., 2023). The importance of this study lies in its aim to create an instrument that measures anxiety specifically related to the threat of nuclear war. The need for such a study is evermore greater due to the significant increase in the affirmation of nuclear war as a factor of human destruction, from 14% to 75% in the course of 20 years (Rendall, 2022). One of the reasons for such an increase, according to Miller (2020), is the growth of international conflicts, which include countries equipped with nuclear arms (modern examples being the Russian-Ukrainian war, the Israel-Palestinian conflict).

Table 1

Overview of the Questionnaires and Scales on Anxiety Due to War Threat

Authors	Measure	Number of Items	Subscales
Anxiety due to nuclear war threat			
Chandler (1991)	The Nuclear War Anxiety Questionnaire (NWAQ)	37	(1) Despair (2) Urgency (3) Denial
Hamilton et al. (1987)	Nuclear War Questionnaire (NWQ)	16	/
Hanley & Christie (1988)	Nuclear Anxiety Inventory (NAI)		(1) Fear (2) Futurelessness (3) Powerlessness
Other constructs related to nuclear war			
Newcomb (1986)	The Nuclear Attitudes Questionnaire (NAQ)	15	(1) Nuclear concern (2) Nuclear support (3) Fear of the future (4) Nuclear denial
Stone and Neale (1984)	Nuclear Coping Strategies (NCS)	8	/
Anxiety due to war threat			
Kalcza-Janosi et al. (2022)	Fear of War Scale (FWS)	13	(1) Experiential dimension of fear (2) Physiological dimension of fear
Surzykiewicz et al. (2022)	War Anxiety Scale (WAS)	7	/
Surzykiewicz et al. (2022)	War Persistent Thinking Scale (WPTS)	7	/
Templer (1970)	Death Anxiety Scale (DAS)	15	/

Therefore, the main aim of the research was to develop and validate a new instrument for assessing anxiety due to the threat of nuclear war covering somatic, emotional, cognitive and behavioural symptoms and to determine its psychometric characteristics. We hypothesised that we would develop a reliable and valid measurement for examining nuclear threat anxiety in the general adult population. More specifically, we expected to obtain a four-factor structure according to the four clusters of anxiety symptoms (APA, 2023; Endler et al., 1989; Lehrer & Woolfolk, 1982; Wells & Papageorgiou, 1998), covering somatic, emotional, cognitive, and behavioural symptoms of anxiety. Also, we expected that the new measure would exhibit moderate to high positive correlations with other scales of nuclear war-related anxiety (convergent validity) and low to moderate correlations with stress and depression measures (divergent validity). Finally, we expected that the scale would be able to discriminate between some known groups, i.e., that higher levels of nuclear anxiety would be reported by women, less educated individuals, and individuals with children, while we did not expect differences with respect to different age groups.

Method

Development of Anxiety Due to Nuclear War Threat Scale

A new Anxiety due to the Nuclear War Threat Scale (ANWTS) was developed to cover four clusters of anxiety symptoms according to DSM-5-TR (American Psychiatric Association, 2022), including somatic, emotional, cognitive, and behavioural symptoms. Master-level psychology students at the Catholic University of Croatia who were enrolled in the "Theory of Psychological Testing" course utilised their theoretical knowledge in four anxiety domains to create items that span various clusters. They generated 72 items, which were then rated on a 5-point scale (1 = *not at all like me* to 5 = *completely like me*).

A preliminary analysis in the same sample of 50 students was conducted. The sample size was not determined a priori because it consisted of a fixed number of students enrolled in the course. However, we used this sample only for item analysis and basic descriptive analysis at this stage to reduce the large number of items, some of which partially overlapped in content. The analysis consisted of descriptive statistics, including total range analysis and skewness and kurtosis indices. In analysing skewness and kurtosis, a stricter criterion was used in the comparison to the one proposed by West et al. (1995) for smaller sample sizes to help ensure that significant deviations were identified. By applying a more stringent criterion, items with skewness above 3 and kurtosis above 10 were excluded from further analysis.

Furthermore, reliability analysis was conducted by examining Cronbach α and the item-total correlation, where items that disrupted validity were excluded. Overall, 72 items were reduced to 40 items with high item-total corrected correlation and showed high reliability (Cronbach's α = .96). This version was further validated in the main study.

Validation of the ANWTS

Participants

The sample consisted of the adult general population ($N = 287$), with an average age of 27.9 years ($SD = 10.7$, total range 18–72). For the statistical analysis of validity, participants were divided into groups of 168 younger (18–24), 78 middle (25–40) and 41 older (41–72) participants. The majority of the participants were women (64.8%). Concerning education, 49.9% graduated from secondary school and 47.7% from college or university level. Most participants lived in urban areas (72.5%), and 18.1% of the participants were parents. Regarding mental health problems, 5.9% reported previous and 7.7% reported currently having psychological problems or mental disorders (Table 2).

Table 2

Sociodemographic Data of the Participants (n = 287)

	n (%)
Gender	
Male	101 (35.2)
Female	186 (64.8)
Age	
18–24 years	168 (58.5)
25–40 years	78 (27.2)
41–72 years	41 (14.3)
Highest level of completed education	
Primary school	7 (2.4)
Secondary school	143 (49.9)
College or university	137 (47.7)
Being a parent	
Yes	52 (18.1)
No	235 (81.9)
Place of living	
Cities	208 (72.5)
Suburbs	50 (17.4)
Villages	29 (10.1)
Mental health problems	
Previously diagnosed	17 (5.9)[a]
Currently having	22 (7.7)[a]

Note. [a]Answer "yes".

Instruments

Anxiety due to the Nuclear War Threat Scale (ANWTS), the initial version, consisted of 40 items covering four clusters, i.e., somatic, emotional, cognitive, and behavioural symptoms. Participants rated items on a 5-point scale (1 = *not at all like me* to 5 = *completely like me*), where a higher score indicates a higher level of anxiety due to the nuclear war threat. Some items in the initial version were reversely coded.

Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995; Croatian translation Reić Ercegovac & Penezić, 2012) was used to test convergent and divergent validity of our instrument. DASS-21 consists of three subscales: the Depression, Anxiety, and Stress scales. Every subscale consists of seven items, and each item is rated on a 4-point scale (0 = *did not apply to me at all* to 3 = *applied to me very much or most of the time*). The final result of each subscale is multiplied by two to be comparable to the full scale; therefore, results range from 0 to 42. The higher result indicates a higher level of depression, anxiety, and stress. Cronbach's α was .88, .81, and .84 for depression, anxiety, and stress subscales, respectively (Lan et al., 2020). In the current study, McDonald's ω of .88, .88, and .90 were obtained for depression, anxiety, and stress subscales, respectively.

Nuclear War Anxiety (NWA; Chandler, 1991) consists of 21 items and measures attitudes toward nuclear war on three subscales (Despair, Urgency, and Denial) and in this research it was used to test convergent validity. The higher result indicates a higher level of Despair, Urgency, and Denial. The result can be calculated as a total score or separately for each subscale. The possible range of results is from 21 to 147. Cronbach's α was previously calculated as .84 for the entire scale (Prazeres et al., 2023). In the current study, McDonald's ω was .91, .86, .61, and .92 for Despair, Urgency, Denial, and total scale, respectively.

Nuclear Coping Strategies (Stone & Neale, 1984; adaptation by Hamilton et al., 1989), chosen for testing divergent validity, consists of eight descriptions of coping strategies that measure nuclear-coping strategies. Each description is rated by a 2-point scale (1 = *no*, 2 = *yes*), indicating whether the participant uses a particular coping strategy. The result is calculated as an average of eight items. The total result range is from 8 to 16. In the current study, the McDonald's ω coefficient was .83.

The General Data Questionnaire collected participants' demographic data on gender, age, place of residence, highest level of acquired education, work status, household income, having a child(ren) or not, and previous or current diagnosed psychological problems or mental disorders.

Procedure

A cross-sectional study was conducted online from February to April 2023 using Google Forms in Croatian language. Participants were recruited online through various social media (Facebook, LinkedIn, etc.), student groups, mailing lists, and by

word of mouth from 24 February 2023, one year after the start of the war in Ukraine, when additional news was dedicated to the topic of war. Ethical permission was obtained from the Ethics Committee of the Catholic University of Croatia. Participation in the study was voluntary and anonymous, and participants could withdraw from the study at any time. Participants read and approved the informed consent before entering the study.

Statistical Analyses

The sample size was determined based on a guideline of at least five participants per item (Bentler & Chou, 1987). This calculation required a minimum of 200 participants for the factor analysis. We conducted exploratory factor analysis via Principal Axis Factoring (PAF) with Varimax rotation. To develop a comprehensive yet concise scale, we applied stricter criteria for factor loadings, based on Hair et al. (2010), who suggest a range between .60 and .70. For greater precision, we set our cut-off at .65, retaining items with factor loadings of .65 or above for further analysis. Although most rules for factor loadings apply for the highest loading on a single factor (e.g., Tabachnick & Fidell, 2019), there is a lack of recommendations for the maximum loading on the second factor to avoid cross-loadings. Still, a difference of more than .20 is proposed as sufficient (Howard, 2016), especially for larger samples (Brooks et al., 2023), such as in the current study.

We examined the internal consistency with Cronbach's α and McDonald's ω coefficients. We used Pearson's correlation coefficient to test convergent validity (via correlations with the Nuclear War Anxiety scale (NWA) and DASS-21 Anxiety subscale) and divergent validity (via correlations with DASS-21 Depression and Stress subscales and the Nuclear Coping Strategies scale). Finally, to test known-group differences between gender, age, and education we used *t*-test and ANOVA. Due to online collection, there was no missing data. Analyses were performed in IBM SPSS Statistics version 23 and JASP. The *p*-value criterion for all statistical analysis used in the research was < .05.

Results

Item Analysis

To determine the appropriateness of the items included, we started by examining the range for each of the 40 items. All items, except for item 6, ranged from 1 to 5. Item 6 had a different range, from 1 to 4, and was therefore excluded from further analysis to maintain consistency across the dataset. Next, we analysed the distribution characteristics of the remaining items. This analysis included assessing the skewness and kurtosis indices. The indices for all items indicated that the distributions were within acceptable limits, showing no significant irregularities.

Inter-Item Correlation Analysis

We examined the relationships between items by Pearson's correlation coefficient. All items that had low correlations with other items ($r < .30$) or were in high correlation with any other item ($r > .80$), thus indicating high multicollinearity, were excluded from further analysis (Field, 2009). Based on these criteria, 13 items were excluded (2, 4, 18, 23, 24, 26, 28, 29, 34, 36, 37, 38, 40).

Exploratory Factor Analysis

The remaining 26 items were analysed using exploratory factor analysis employing Principal Axis Factoring (PAF) with Varimax rotation. Three factors were extracted based on the eigenvalue above 1 and the inflection point on the scree plot.

Since the third factor (behavioural symptoms) comprised only two items with a satisfactory factor loading above .65, we repeated the PAF on 26 items and fixed the number of factors to two (Table 3). This revealed that seven items had a factor loading of less than .65 and were excluded from further analysis (9, 11, 15, 22, 31, 33, 39). Items 10 and 25 had factor loading above .65 on Factor 1 but had a high factor loading on Factor 2 with a difference of less than .20 (Brooks et al., 2023; Howard, 2016). Therefore, due to unclear loading to the specific factor, these two items were excluded from further analysis.

Table 3.

Factor Loadings of Anxiety Due to Nuclear War Threat Scale (ANWTS) by Exploratory Factor Analysis (N = 287)

ANWTS items	Item description	Factor 1	Factor 2	u²
ANWTS 1*	When I think about nuclear war, I feel my heart beating fast.	.418	**.708**	.324
ANWTS 3*	The thought of nuclear war makes me sick.	.335	**.762**	.308
ANWTS 5*	I feel a tightness in my chest when I think about nuclear war.	.308	**.820**	.233
ANWTS 7*	I get dizzy when I think of nuclear war.		**.822**	.274
ANWTS 8*	Imagining nuclear war makes me unable to sleep normally.		**.703**	.441
ANWTS 9	When I think about nuclear war, I feel anxiety.	.584	.560	.345
ANWTS 10	I feel anxious when I listen to the news about nuclear war.	**.675**	.477	.316
ANWTS 11	The possibility of nuclear war causes emotional distress for me.	.548	.592	.349
ANWTS 12*	When I think about the possible outcomes of nuclear war, I feel helpless.	**.736**		.384
ANWTS 13*	Due to the current situation in the world, I am overwhelmed with fear for my life and that of my friends.	**.751**	.384	.289
ANWTS 14*	When I get information about the possibilities of nuclear war, I feel as if I have no control over my destiny.	**.740**	.359	.323
ANWTS 15	I feel nervous when I listen to or read the news about wars in the world.	.646	.466	.366
ANWTS 16*	I feel worried because I believe there is a possibility of a nuclear war onset.	**.773**	.440	.209
ANWTS 17*	When I think about nuclear war, I start to panic.	.509	**.720**	.222
ANWTS 19*	I feel helpless for myself or my family when I consider the possibility of a nuclear war.	**.816**		.254
ANWTS 20*	I fear that nuclear war will affect the area where I live.	**.764**	.378	.274
ANWTS 21*	I am worried about my family's well-being if a nuclear war starts.	**.812**		.312
ANWTS 22	I think about what I would do if there were a nuclear war.	.547	.448	.500
ANWTS 25	I worry about my life when exposed to bad news about war.	**.674**	.495	.300
ANWTS 27*	I am worried when I think about the start of a nuclear war.	**.724**	.429	.292
ANWTS 30*	When I watch the news, I imagine the possibility of war in my country.	**.672**	.400	.389
ANWTS 31	I find myself thinking about the war spreading to the country where I live.	.570	.460	.464
ANWTS 32*	When I think about the war, I worry about the possibility of not seeing my family and friends in the future.	**.682**	.376	.393
ANWTS 33	I often think about what might happen if nuclear weapons were used.	.509	.491	.500
ANWTS 35*	I am concerned about the consequences that a nuclear war may bring.	**.772**	.320	.302
ANWTS 39	I follow the possibility of nuclear war in the media.	.417	.371	.689
Trace		1.47	1.03	2.51
% of variance		38.3	26.9	65.2

Note. A rotated factor matrix is presented. Factor loadings higher than > .30 are presented and loading higher than > .65 are bolded.
*Item retained in the final version.

Finally, 17 items were retained, all with factor loadings above .65 on a single factor, and with a difference between factor loadings on a second factor above .20 to obtain the simple structure (Table 4).

Table 4

Factor Loadings of the Final Version of Anxiety Due to the Nuclear War Threat Scale (ANWTS) by Exploratory Factor Analysis (N = 287)

ANWTS items	Item description	Factor 1	Factor 2	u^2
ANWTS 1	When I think about nuclear war, I feel my heart beating fast.		.708	.327
ANWTS 3	The thought of nuclear war makes me sick.		.779	.279
ANWTS 5	I feel a tightness in my chest when I think about nuclear war.		.824	.233
ANWTS 7	I get dizzy when I think of nuclear war.		.835	.251
ANWTS 8	Imagining nuclear war makes me unable to sleep normally.		.692	.453
ANWTS 12	When I think about the possible outcomes of nuclear war, I feel helpless.	.749		.365
ANWTS 13	Due to the current situation in the world, I am overwhelmed with fear for my life and that of my friends.	.757		.274
ANWTS 14	When I get information about the possibilities of nuclear war, I feel as if I have no control over my destiny.	.752		.300
ANWTS 16	I feel worried because I believe there is a possibility of a nuclear war onset.	.763		.229
ANWTS 17	When I think about nuclear war, I start to panic.		.709	.242
ANWTS 19	I feel helpless for myself or my family when I consider the possibility of a nuclear war.	.836		.216
ANWTS 20	I fear that nuclear war will affect the area where I live.	.769		.264
ANWTS 21	I am worried about my family's well-being if a nuclear war starts.	.820		.297
ANWTS 27	I am worried when I think about the start of a nuclear war.	.710		.318
ANWTS 30	When I watch the news, I imagine the possibility of war in my country.	.648		.428
ANWTS 32	When I think about the war, I worry about the possibility of not seeing my family and friends in the future.	.678		.401
ANWTS 35	I am concerned about the consequences that a nuclear war may bring.	.765		.316
Trace		2.42	1.66	4.09
% of variance		41.2	28.3	69.5

Note. A rotated factor matrix is presented. Factor loadings higher than > .65 are presented.

These 17 items were saturated with two factors explaining 69.5% of the items' variance. Factor 1, named *Cognitive and Emotional Symptoms*, explained 41.2% of the ANWTS score variance and was saturated with 11 items (12, 13, 14, 16, 19, 20, 21, 27, 30, 32, 35). Factor 2, *Somatic Symptoms*, explained 28.3% of the ANWTS score variance and was saturated with six items (1, 3, 5, 7, 8, 17). The two factors positively correlated moderately ($r = .72$, $p < .01$). The final scale is available in the Appendix.

Reliability

The analysis of internal consistency revealed high Cronbach's α for Cognitive and Emotional Symptoms (α = .96), Somatic Symptoms (α = .93), and full scale (α = .96). Furthermore, "Cronbach's α if item deleted" indicator showed that none of the items decreased the internal consistency; therefore, all items were retained.

We also checked reliability using the McDonald's ω coefficient, and high reliability was confirmed for both subscales (Cognitive and Emotional Symptoms ω = .96, Somatic Symptoms ω = .93) and the total scale (ω = .97).

Convergent and Divergent Validity

The convergent validity of the ANWTS was tested via correlations with the Nuclear War Anxiety scale (NWA) and DASS-21 Anxiety subscale (Table 5). The ANWTS total score had a significantly moderate positive correlation with the NWA ($r = .73$, $p < .01$), indicating that these measures share 53.3% of the variance. Also, both ANWTS subscales had a moderate positive correlation with the NWA. Furthermore, regarding the NWA subscales, Despair correlated highly with ANWTS - Somatic Symptoms ($r = .85$, $p < .01$), Urgency correlated moderately with Somatic ($r = .45$, $p < .01$). and Cognitive and Emotional Symptoms ($r = .60$, $p < .01$), but Denial had low correlations with both ANWTS subscales and total scale.

Regarding correlations with DASS-21 Anxiety, the ANWTS total score was moderately positively correlated with Anxiety subscale ($r = .41$, $p < .01$), indicating that these measures share 16.8% of the variance. Of the ANWTS subscales, the Cognitive and Emotional Symptoms subscale had a significantly low positive correlation with the Anxiety subscale, while the Somatic Symptoms subscale had a significantly moderate correlation.

The divergent validity of the ANWTS was tested via correlations with the DASS-21 Depression and Stress subscales and with the Nuclear Coping Strategies scale (NCS) (Table 5). The full scale and subscales of the ANWTS had low to moderate correlations with Depression and Stress. As for the NCS scale, the obtained correlations were significantly moderate and positive with the full ANWTS scale, as well as with the Cognitive and Emotional Symptoms and Somatic symptoms.

Table 5

Correlations of the Full Scale and the Subscale Score Anxiety Due to Nuclear War Threat Scale With Depression, Anxiety, Stress, Nuclear-Coping Strategies and Nuclear War Anxiety

	M (SD)	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. ANWTS Cognitive and Emotional	28.8 (12.72)	.72**	.98**	.67**	.60**	.30**	.70**	.27**	.34**	.35**	.54**
2. ANWTS Somatic	10.14 (5.23)	-	.85**	.85**	.45**	.25**	.64**	.41**	.49**	.38**	.57**
3. ANWTS Full scale	38.93 (16.87)		-	.71**	.59**	.30**	.73**	.34**	.41**	.39**	.59**
4. NWA Despair	31.99 (10.46)			-	.61**	.23**	.95**	.46**	.49**	.46**	.55**
5. NWA Urgency	16.65 (5.33)				-	.46**	.78**	.17**	.25**	.23**	.54**
6. NWA Denial	9.20 (3.37)					-	.24**	.02	.05	.03	.45**
7. NWA Full scale	56.61 (14.11)						-	.42**	.47**	.42**	.58**
8. DASS Depression	7.12 (8.04)							-	.79**	.77**	.24**
9. DASS Anxiety	6.20 (7.91)								-	.81**	.31**
10. DASS Stress	10.05 (9.21)									-	.31**
11. NCS average	2.26 (0.84)										-

Note. ANWTS = Anxiety due to Nuclear War Threat Scale; NWA = Nuclear War Anxiety; DASS = Depression, Anxiety and Stress Scale; NCS = Nuclear Coping Strategies.
**$p < .01$.

Known-Groups Validity

To further analyse the construct validity, the known-groups validation method was applied. The scores on the ANWTS total scale and subscales were examined concerning gender, age, and education (Table 6). Regarding gender, women scored significantly higher on the ANWTS total scale and its subscales than men. Regarding age, participants were distributed into three groups of younger (18–24), middle (25–40), and older (41–72) participants. However, results showed no difference in the ANWTS total or the subscale scores between these three age groups. Likewise, there were no significant differences in the ANWTS total or the subscale scores regarding participants' education (low, middle, and high education qualification) and no significant differences regarding being a parent or not.

Table 6

Differences in Anxiety Due to the Nuclear War Threat Scale (ANWTS) and Subscales Between Known Groups (N = 287)

Groups	Somatic M (SD)	Cognitive-Emotional M (SD)	Total M (SD)
Gender			
Female	10.69 (5.43)	30.73 (12.86)	41.42 (17.1)
Male	9.13 (4.69)	25.22 (11.70)	34.35 (15.51)
	t (285) = - 3.15	t (285) = 3.58	t (285) = 3.46
	p = .002	p = .000	p = .001
Age			
18–24 years	9.85 (4.95)	28.54 (12.99)	38.39 (16.8)
25–40 years	11.14 (5.82)	30.15 (12.76)	41.29 (17.69)
41–72 years	9.41 (5.03)	27.22 (11.51)	36.63 (15.37)
	F (2) = 2.1	F (2) = 0.79	F (2) = 1.23
	p = .125	p = .454	p = .293
Highest level of completed education			
Primary school	8.14 (1.95)	26.43 (9.45)	34.57 (10.18)
Secondary school	9.82 (5.27)	27.78 (13.55)	37.6 (17.73)
College or university	10.58 (5.28)	29.96 (11.9)	40.54 (16.14)
	F (2) = 1.26	F (2) = 1.15	F (2) = 1.30
	p = .285	p = .317	p = .273
Being a parent			
Yes	9.67 (5.31)	27.27 (12.45)	36.94 (16.74)
No	10.24 (5.22)	29.13 (12.78)	39.37 (16.90)
	t (285) = - 0.71	t (285) = - 0.95	t (285) = - 0.94
	p = .48	p = .34	p = .35

Discussion

To date, several measures have been developed with war and anxiety as central themes. However, most of these instruments were created in the 1980s. Some assess attitudes toward nuclear weapons (e.g., Nuclear War Questionnaire) and strategies for dealing with the potential for nuclear war (e.g., Nuclear Coping Strategies), while others measure general war-related anxiety without focusing specifically on nuclear war (e.g., Fear of War Scale, War Anxiety Scale, War Persistent Thinking Scale). Those instruments that address anxiety due to the threat of nuclear war tend to examine only one or two of the four clusters of anxiety symptoms—cognitive, emotional, somatic, and behavioural—but not all four. Therefore, this study aimed to develop and validate a new instrument to examine anxiety due to the threat of nuclear war and determine its psychometric characteristics. Thus, the Anxiety due to the Nuclear War Threat Scale (ANWTS) was developed as a new, valid, and reliable scale comprising 17 items (provided in the Appendix). The scale has a two-factor structure: one subscale encompasses Cognitive and Emotional Symptoms, and the other addresses Somatic Symptoms. The overall scale, along with both subscales, demonstrated very high reliability. The scale also exhibited good validity, which is discussed in further detail below.

Based on previous literature on anxiety symptoms (APA, 2023; Endler et al., 1989; Lehrer & Woolfolk, 1982; Wells & Papageorgiou, 1998), a four-factor structure was expected, encompassing somatic, emotional, cognitive, and behavioural aspects of anxiety. However, the analysis revealed a two-factor structure, with cognitive and emotional symptoms combined into one factor and somatic symptoms forming the second factor. The behavioural aspect of anxiety did not form a distinctive factor and was thus excluded. This combination of cognitive and emotional aspects into one factor has also been observed in other war-related anxiety questionnaires, such as Hanley and Christie's (1988) Nuclear Anxiety Inventory, where emotional and physical fear reactions were grouped into one factor. The current structure of the ANWTS questionnaire offers a broader scope than some previous questionnaires, such as Surzykiewicz's (2022) War Anxiety Questionnaire, which only measures the somatic aspect, or Kalcza-Janosi et al.'s (2022) Fear of War Scale, which includes only the emotional aspect of anxiety. To summarise, ANWTS's comprehensive view of anxiety related to the threat of nuclear war can yield richer insights into the nuances of war-related anxiety. Furthermore, since many existing instruments are outdated, the ANWTS provides a contemporary tool that addresses current contexts and concerns. This relevance is particularly significant in an era where global tensions and nuclear threats are more prominent.

The study provides evidence for both convergent and divergent validity of the new ANWTS scale. It shows alignment with instruments that measure similar concepts, such as the Nuclear War Anxiety scale and the DASS-21 Anxiety subscale. These correlations were moderate to high, indicating convergent validity, except for

low correlations with the Denial subscale of the Nuclear War Anxiety. However, the latter subscale reflects coping strategy, rather than anxiety itself. To assess divergent validity, the ANWTS scale was compared with measurements of distinct constructs, including Nuclear Coping Strategies, Stress, and Depression of DASS-21. The ANWTS had moderate correlations with Nuclear Coping Strategies and low correlations with stress and depression, demonstrating that ANWTS has good divergent validity. The demonstrated reliability and validity are crucial for researchers and clinicians who require trustworthy tools to assess anxiety in this specific context. It ensures that the ANWTS scale can be relied upon to accurately reflect the unique anxiety symptoms related to nuclear war threats.

The analysis of known-group differences in the study found significant gender differences on the ANWTS scale, with women scoring higher on the total scale and its subscales than men. This result aligns with previous research examining gender differences in anxiety, showing that women report higher levels of trait anxiety than men (Costa et al., 2001; Egloff & Schmukle, 2004) and that anxiety disorders are more common in women (Afifi, 2007; Donner & Lowry, 2013; McLean & Anderson, 2009). However, the study did not find significant differences in ANWTS scores concerning age and education levels. The lack of age differences is consistent with previous studies (Diamond & Bachman, 1987; Van Hoorn & French, 1986), but the absence of differences in education levels diverges from past research, which showed an association between lower education and higher anxiety levels (Bjelland et al., 2008) and anxiety disorders (Chazelle et al., 2011; Tambs et al., 2011). The study's education group could explain this inconsistency, as only 2.4% of participants had only primary school, and nearly half had secondary education, with some still being university students. Despite the lack of age and education differences, the gender difference indicates that the ANWTS scale is sensitive enough to detect group differences, contributing to its validity. Furthermore, several factors could explain the lack of differences in anxiety between parents and non-parents. First, the study sample might lack diversity, not adequately capturing variations between groups if participants come from similar backgrounds or share common experiences and demographics. Additionally, anxiety related to nuclear war could be a universal concern that affects people regardless of whether they have children. This pervasive fear might obscure specific differences, making it challenging to discern variations in anxiety between parents and non-parents.

The limitations of the research should also be mentioned. First, participants were recruited through online channels, which can lead to a self-selection bias. Those who choose to participate in online studies may differ from those who do not, potentially limiting the representativeness of the sample. This bias can result in a sample that does not accurately represent the broader population, impacting the generalizability of the results. Given that this study was online with predominantly younger participants, future studies should benefit from paper-and-pen studies trying to recruit people of different ages. Secondly, the study did not use clinical interviews

to establish a cut-off score for the ANWTS scale and to test incremental validity in addition to other instruments with having or not a diagnosis of anxiety disorder as a criterion. This limitation can affect the interpretation of results, as it may be unclear whether high scores represent typical anxiety levels or clinical cases. Related to this, it would be useful to include clinical samples of people with anxiety disorders in future research which could provide a deeper understanding of the scale's effectiveness and its utility in identifying clinically relevant levels of anxiety. Also, the research was conducted in a single country, limiting its applicability to broader contexts, so it would be helpful to conduct research in other regions, particularly those with higher perceived threats of nuclear conflict. This could also help capture participants with potentially higher scores on the ANWTS scale. Finally, we did not examine test-retest reliability, an aspect that shows the scale's reliability over time, so future studies could apply longitudinal design with several time points and assessments on changes in the war threat in that region.

In conclusion, the Anxiety due to the Nuclear War Threat Scale (ANWTS) has proven to be a reliable and valid tool for measuring cognitive, emotional, and somatic anxiety symptoms related to possible nuclear war threats. This 17-item scale is brief and straightforward to administer, making it suitable for both research and practical use. Because it does not reference any specific war, the ANWTS is contemporary and can be applied to any context involving a nuclear war threat. The practical implications of creating this new instrument are significant. It provides a more complete and up-to-date measure of this specific type of anxiety, responding to the current inundation of media information about the potential outbreak of a nuclear war, which can influence anxiety levels. The scale's simplicity and comprehensiveness can be helpful in research settings, while its application in clinical interventions may assist in assessing and managing anxiety caused by nuclear war threats. Ultimately, this tool could support effective interventions aimed at reducing anxiety and offer a reliable method for measuring the effectiveness of such interventions.

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Razvoj i validacija Upitnika anksioznosti uslijed prijetnje nuklearnoga rata

Sažetak

Anksioznost je uobičajena reakcija uslijed prijetnje nuklearnoga rata te postoji potreba za pouzdanom i valjanom mjerom za njezinu procjenu. Postojeći upitnici za specifičnu anksioznost uslijed prijetnje nuklearnoga rata mjere samo neke od četiriju skupina simptoma anksioznosti (kognitivne, emocionalne, somatske, bihevioralne) ili mjere strategije suočavanja i stavove prema nuklearnome oružju. U skladu s time, glavni je cilj bio razviti novi mjerni instrument za ispitivanje anksioznosti uslijed prijetnje nuklearnoga rata (ANWTS) i utvrditi njegove psihometrijske karakteristike. U krossekcijskome online istraživanju 287 sudionika iz društvene zajednice (64.8 % sudionica) ispunilo je novi Upitnik anksioznosti uslijed prijetnje nuklearnoga rata (ANWTS), Skalu depresivnosti, anksioznosti i stresa (DASS-21), Upitnik Nuclear War Anxiety te Upitnik Nuclear Coping Strategies. Eksploratornom faktorskom analizom utvrđena je dvofaktorska struktura s podljestvicom kognitivnih i emocionalnih simptoma (11 čestica, ω = .96) i somatskih simptoma (6 čestica, ω = .93). Utvrđene su visoka konvergentna i divergentna valjanost. Ispitivanje razlika među grupama pokazalo je da su sudionice prijavljivale više razine simptoma anksioznosti na objema podljestvicama i na ukupnoj skali od sudionika. Novi Upitnik anksioznosti uslijed prijetnje nuklearnoga rata (ANWTS) sa 17 čestica pokazao se pouzdanim i valjanim u mjerenju kognitivnih, emocionalnih i somatskih simptoma anksioznosti uslijed prijetnje nuklearnoga rata.

Ključne riječi: anksioznost, nuklearni rat, rat, upitnik, valjanost, pouzdanost

Appendix

Anxiety due to Nuclear War Threat Scale (ANWTS)

Please read each statement carefully and choose the answer that best describes the degree to which the stated statement applies to you in the **past week**.

1	2	3	4	5		
does not apply to me at all	mostly does not apply to me	neutral	mostly applies to me	applies to me completely		

	1	2	3	4	5
1. When I think about nuclear war, I feel my heart beating fast.	1	2	3	4	5
2. The thought of nuclear war makes me sick.	1	2	3	4	5
3. I feel a tightness in my chest when I think about nuclear war.	1	2	3	4	5
4. I get dizzy when I think of nuclear war.	1	2	3	4	5
5. Imagining nuclear war makes me unable to sleep normally.	1	2	3	4	5
6. When I think about the possible outcomes of nuclear war, I feel helpless.	1	2	3	4	5
7. Due to the current situation in the world, I am overwhelmed with fear for my life and that of my friends.	1	2	3	4	5
8. When I get information about the possibilities of nuclear war, I feel as if I have no control over my destiny.	1	2	3	4	5
9. I feel worried because I believe there is a possibility of a nuclear war onset.	1	2	3	4	5
10. When I think about nuclear war, I start to panic.	1	2	3	4	5
11. I feel helpless for myself or my family when I consider the possibility of a nuclear war.	1	2	3	4	5
12. I fear that nuclear war will affect the area where I live.	1	2	3	4	5
13. I am worried about my family's well-being if a nuclear war starts.	1	2	3	4	5
14. I am worried when I think about the start of a nuclear war.	1	2	3	4	5
15. When I watch the news, I imagine the possibility of war in my country.	1	2	3	4	5
16. When I think about the war, I worry about the possibility of not seeing my family and friends in the future.	1	2	3	4	5
17. I am concerned about the consequences that a nuclear war may bring.	1	2	3	4	5