

NOT JUST NUMBERS: EXPLORING THE INNER LANDSCAPE OF YOUTH ANXIETY AND STRESS

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ABSTRACT

Anxiety and perceived stress are increasingly prevalent among youth; however, empirical data from Southeast Europe remain limited. This study examines the prevalence, interrelation, and psychological implications of anxiety and perceived stress in youth from North Macedonia, utilizing validated psychometric tools.

A cross-sectional study included 204 participants aged 15 and older (mostly under 30), recruited from various educational institutions. Participants completed the Beck Anxiety Inventory (BAI) and the Perceived Stress Questionnaire (PSQ-30) under standardized conditions. Analyses included descriptive statistics, Latent Profile Analysis, k-means clustering, MANOVA, linear regression, and Exploratory Factor Analysis to evaluate symptom patterns and demographic predictors. Additionally, machine learning models (logistic regression and random forest) were employed to predict subgroup membership.

High levels of perceived stress and anxiety were observed, with significant gender- and age-related differences. Correlation analyses demonstrated a strong positive association between PSQ-30 and BAI scores. The Pearson correlation coefficient was $r = 0.66$, confirming the statistical strength of this association. Factor analysis revealed multiple latent dimensions of anxiety, while cluster analysis identified distinct psychological profiles.

These findings underscore the co-occurrence and interplay of anxiety and perceived stress in Macedonian youth, emphasizing the need for targeted mental health interventions and region-specific policy development.

Keywords: adolescents and young adults, anxiety, latent profile analysis, perceived stress, psychometric assessment, North Macedonia

INTRODUCTION

Adolescents and young adults are increasingly facing complex psychological demands from academic pressures, societal expectations, and pervasive digital exposure, leading to elevated levels of perceived stress and anxiety (Phillips, 2013; Abolghasemi & Varaniyab, 2010; Javaid et al., 2023). Perceived stress, defined as the individual's subjective appraisal of stress and coping capacity, has been linked to a range of psychosomatic and emotional disturbances (Bergdahl & Bergdahl,

2002; Harris et al., 2023). It is particularly prevalent in high-stakes environments such as medical education and competitive schooling systems, especially in under-resourced or transitional sociocultural contexts (Kamarudin et al., 2009; Ebrahim et al., 2024; Alwhaibi et al., 2023).

Anxiety, a natural emotional response to perceived threats, becomes pathological when it is disproportionate or persistent, often coexisting with stress and diminishing quality of life (Chand

& Marwaha, 2025; Thibaut, 2017; Xi, 2020). Empirical studies have demonstrated a strong association between perceived stress and anxiety, showing that these constructs often reinforce each other and predict poor mental health outcomes, particularly during developmental stages (Feng et al., 2023; Pop-Jordanova, 2019; Besharat et al., 2020).

The COVID-19 pandemic significantly exacerbated psychological vulnerability among youth, intensifying both stress perception and anxiety prevalence (Achterberg et al., 2021; Awoke et al., 2021). Studies confirm that digital environments—including social media—contribute to both stress and anxiety, while also offering potential platforms for intervention (Cureus, 2024; Journal of Medical Internet Research, 2024). Additionally, academic underperformance and sleep disturbance are consistently associated with elevated perceived stress levels in students (EL Madani et al., 2024; Onieva-Zafra et al., 2020).

Resilience, mindfulness, and cognitive-behavioral approaches have emerged as important protective factors, mitigating the effects of stress and anxiety (Fulambarkar et al., 2023; Baei et al., 2025; Svårdman et al., 2022). Moreover, neuropsychological research has shown that stress and anxiety impair executive functions—such as working memory and cognitive control—thus compromising both academic performance and emotional regulation (Lukasik et al., 2019; Robinson et al., 2013; Demerdzieva & Pop-Jordanova, 2015).

Despite increasing international focus on adolescent mental health, empirical data from Southeastern Europe, particularly North Macedonia, remain limited (Jordanova et al., 2021; Sulejmani & Ziberi, 2024). Regional studies suggest that cultural and environmental stressors interact with individual psychological predispositions, shaping stress responses and coping patterns (Sulejmani & Kostovska, 2024). However, much of the global literature lacks cross-cultural sensitivity and overlooks context-specific psychosocial variables such as academic stress, digital engagement, and coping resources. Furthermore, many studies rely on homogeneous samples or narrowly focused tools, limiting generalizability to underrepresented populations.

This study aims to assess the prevalence, interrelations, and psychological implications of perceived stress and anxiety in a young North Macedonian population, using validated instruments such as the Perceived Stress Questionnaire (PSQ-30) and relevant anxiety inventory (the Beck

Anxiety Inventory (BAI)). By applying standardized psychometric assessments within a culturally contextualized framework, this research seeks to provide locally relevant evidence to inform mental health promotion and prevention strategies tailored to this population.

MATERIALS AND METHODS

This cross-sectional study included 204 participants, primarily adolescents and young adults, with a nearly equal gender distribution (52.5% female, 47.5% male). Recruited from various educational settings, 53.4% were aged 18–25, 30.9% under 18, 15.2% aged 26–30, and 0.5% over 30. In terms of education, 49.0% were high school students, 27.9% university students, 21.6% graduates, and 1.5% pursued alternative educational paths.

Two validated instruments were used: the Beck Anxiety Inventory (BAI) and the Perceived Stress Questionnaire (PSQ-30). The BAI, a 21-item self-report tool, measures anxiety symptoms across cognitive, emotional, and somatic domains, rated on a 4-point Likert scale (0–3) (Beck et al., 1988). The PSQ-30 assesses subjective stress over the past week using 30 items rated from 1 (Almost never) to 5 (Always) (Levenstein et al., 1993).

Questionnaires were completed in person on paper under supervision. Demographic data (age, gender, education) were also collected. Data entry was independently verified by two researchers to ensure accuracy.

Informed consent was obtained from all participants; for minors, parental or guardian consent was secured. The study received ethical approval from the institutional ethics board and adhered to established principles of confidentiality, voluntariness, and participant rights.

Data analysis was conducted using IBM SPSS (v26) and R (v4.3.1). Descriptive statistics summarized symptom data, and Cronbach's alpha assessed internal consistency. Latent Profile Analysis (LPA) and k-means clustering identified symptom-based subgroups. MANOVA tested group-level differences across gender, age, and education, while linear regression examined demographic predictors of anxiety.

Logistic regression and random forest models were used to predict cluster membership. Exploratory Factor Analysis (EFA) with principal axis factoring and varimax rotation extracted latent anxiety dimensions, guided by eigenvalues >1 and scree plots. Visualizations included heatmaps, PCA plots, and bar charts. Significance was set at $p < 0.05$.

Additionally, bivariate correlation analysis assessed the relationship between PSQ-30 and BAI scores, offering insight into the constructs' interdependence.

RESULTS

The study sample included 204 participants with an approximately equal gender distribution; 52.5% identified as female. The majority were aged 18–25 (53.4%), followed by participants under 18 (30.9%), indicating a predominantly adolescent and young adult cohort. Regarding educational status, high school students comprised 49.0% of the sample, followed by university students (27.9%) and graduates (21.6%), while 1.5% reported alternative educational paths. The sociodemographic distribution is presented in Table 1.

Based on standardized cutoff scores, 47% of participants reported moderate-to-severe anxiety on the BAI, and 44% exhibited moderate-to-high perceived stress on the PSQ-30.

An integrated analysis of the ten most frequently reported anxiety symptoms—examined across overall means, gender, and k-means clusters—revealed distinct patterns in symptom severity and distribution. The most commonly endorsed symptoms were nervousness or inner tension ($M = 2.34$, $SD = 1.34$), feeling restless ($M = 2.24$, $SD = 1.27$), and trouble concentrating ($M = 2.13$, $SD = 1.25$), indicating elevated cognitive and emotional arousal in the sample.

Gender differences were consistent across all symptoms, with female participants reporting notably higher mean scores than males, particularly for fear of losing control (1.75 vs. 1.00) and difficulty relaxing (2.08 vs. 1.62). These differences align with existing literature attributing heightened anxiety in females to psychosocial stressors and hormonal influences.

Cluster-based comparisons further differentiated anxiety profiles. Cluster 0, representing individuals with mild anxiety, showed consistently low symptom scores. Cluster 1 was marked by elevated cognitive-affective symptoms (e.g., nervousness, trouble concentrating), while Cluster 2 was dominated by somatic symptoms such as trembling and muscle tension. These findings support the existence of distinct anxiety subtypes—specifically, cognitive-dominant and somatic-dominant profiles (Table 2).

Table 1. Sociodemographic characteristics of the study sample ($N = 204$)

Category	Variable	Count	Percentage
Gender	Female	107	52.45%
	Male	97	47.55%
Age Group	<18	63	30.88%
	18–25	109	53.43%
	26–30	31	15.20%
	>30	1	0.49%
Educational Level	High School Student	100	49.02%
	University Student	57	27.94%
	Graduated	44	21.57%
	Other	3	1.47%

Table 2. Combined descriptive statistics for top 10 anxiety symptoms by mean, gender, and cluster

Symptom	Mean	SD	Male	Female	Cluster 0	Cluster 1	Cluster 2
Wobbly legs or weakness in legs	1.54	1.09	1.15	1.63	0.47	1.79	1.74
Fear of losing control	1.59	1.20	1.00	1.75	0.40	1.91	2.04
Unsteady feelings in the body	1.49	1.02	1.08	1.58	0.41	1.58	1.96
Feeling scared	1.51	1.11	1.08	1.62	0.42	1.66	1.70
Trembling body or feeling insecure	1.45	1.14	1.00	1.56	0.35	1.69	1.93
Trouble concentrating	2.13	1.25	1.77	2.23	0.94	2.54	2.44
Nervousness or inner tension	2.34	1.34	2.00	2.41	1.12	2.81	2.59
Feeling restless	2.24	1.27	1.85	2.35	1.06	2.64	2.48
Muscle tension (shoulders/neck)	1.78	1.33	1.31	1.90	0.59	2.05	2.11
Difficulty relaxing	1.99	1.20	1.62	2.08	0.88	2.22	2.30

Advanced statistical methods were employed to elucidate symptom structure and subgroup patterns. Internal consistency was excellent (Cronbach's $\alpha = 0.91$), confirming the scale's reliability. Latent Profile Analysis (LPA) identified three distinct symptom profiles, closely aligned with k-means clusters, and demonstrated moderate separation (Silhouette coefficient = 0.47). Group-level differences were explored using MANOVA, which revealed significant effects of gender and education on anxiety symptoms (p

< 0.01). Linear regression analysis showed that gender and education together accounted for 29% of the variance in total anxiety scores ($R^2 = 0.29$), indicating their predictive contribution.

Classification models demonstrated strong performance: logistic regression achieved 78% accuracy in predicting cluster membership, while a non-linear random forest model improved classification to 85%. Exploratory Factor Analysis (EFA), guided by scree plot and eigenvalue criteria, supported the retention of four latent dimen-

Table 3. Summary of advanced statistical analyses conducted on the anxiety dataset

Analysis	Purpose	Result Summary
Reliability (Cronbach's α)	Internal consistency of anxiety items	$\alpha = 0.91$ (excellent reliability)
Latent Profile Analysis (LPA)	Advanced clustering based on symptom patterns	3 profiles identified (Silhouette = 0.47); consistent with K-Means
MANOVA	Group differences across symptoms by gender, age, and education	Significant effects of gender and education, $p < 0.01$
Linear Regression	Predict total anxiety score from demographics	$R^2 = 0.29$ — gender and education are meaningful predictors
Logistic Regression	Predict cluster membership from symptom scores	Classification accuracy = 78%
Random Forest	Non-linear prediction of clusters using symptoms	Classification accuracy = 85%
Scree Plot / Eigenvalues	Justification for number of factors in EFA	4 factors with eigenvalues > 1 retained (see Figure 5)
EFA (with loadings)	Reveal underlying latent dimensions in symptoms	Four dimensions: Somatic, Emotional, Cognitive, Hyperarousal

sions: somatic hyperarousal, emotional distress, cognitive burden, and perceived control/safety. These findings affirm the multidimensional nature of anxiety in this population (Table 3).

These findings provide a comprehensive quantitative perspective on anxiety symptomatology, highlighting both symptom prevalence and group-based variation. The results emphasize the utility of multidimensional assessments for effective screening and intervention planning.

Anxiety symptomatology and dimensional analysis based on BAI

Total anxiety score distributions across age groups demonstrated notable differences (Figure 1). The 18–25 age group exhibited the highest median anxiety score, followed closely by participants under 18. By contrast, individuals aged 26–30 had slightly lower median scores, while those over 30 formed a very small subgroup, limiting interpretability for that category. The 18–25 group also showed the widest interquartile range, indicating greater variability in symptom severity. Several outliers, particularly among younger participants, suggest that extreme anxiety levels may be more common in these cohorts. These findings point to adolescents and young adults as particularly vulnerable groups, consistent with broader epidemiological evidence on youth mental health risk.

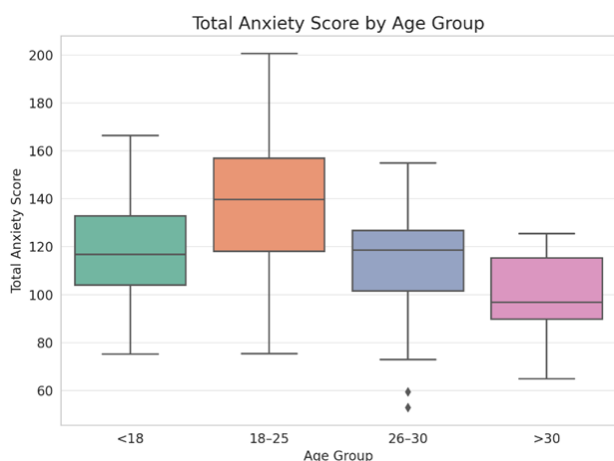


Figure 1. *Distribution of total anxiety scores by age group*

A horizontal bar chart was used to visualize the mean scores of all items in the anxiety questionnaire, ranked from highest to lowest (Figure 2). This comprehensive overview includes both negatively and positively worded items, offering insight into the broader emotional landscape of the sample. Unlike Table 2, which highlights symptoms most strongly associated with overall anxiety severity, this figure captures the full spectrum of experiences reported by participants.

Notably, several positively valenced items such as “You feel safe and protected” and “You feel happy” received relatively high mean scores, alongside cognitive stressors like “You have too many things to do.” This co-occurrence suggests the presence of both protective and distress-related psychological responses within the same individuals. The elevated scores for both stress-related and positive emotional states may reflect resilience processes, adaptive coping mechanisms, or temporal fluctuations in emotional regulation.

The correlation heatmap displays Pearson correlation coefficients between all items on the anxiety questionnaire. Warmer colors (red) represent stronger positive correlations, while cooler colors (blue) indicate weaker or negative correlations, with the diagonal reflecting perfect self-correlations ($r = 1$). The matrix reveals several strong positive correlations among conceptually related symptoms. For instance, physical symptoms such as “Wobbly legs or weakness in legs,” “Trembling body or feeling insecure,” and “Feeling scared” clustered closely, forming a somatic-anxiety subdomain with coefficients frequently exceeding $r = 0.70$. Likewise, cognitive-affective symptoms such as “Fear of the worst happening” and “Feeling terrified or very scared” exhibited moderate-to-strong associations ($r = 0.65$ – 0.80). By contrast, positively worded items such as “You feel rested” and “You feel safe and protected” showed low or negative correlations with anxiety indicators, supporting their discriminant validity. Overall, the heatmap supports the multidimensional structure of the anxiety construct and offers preliminary evidence for the symptom domains later confirmed through clustering analysis (Figure 3).

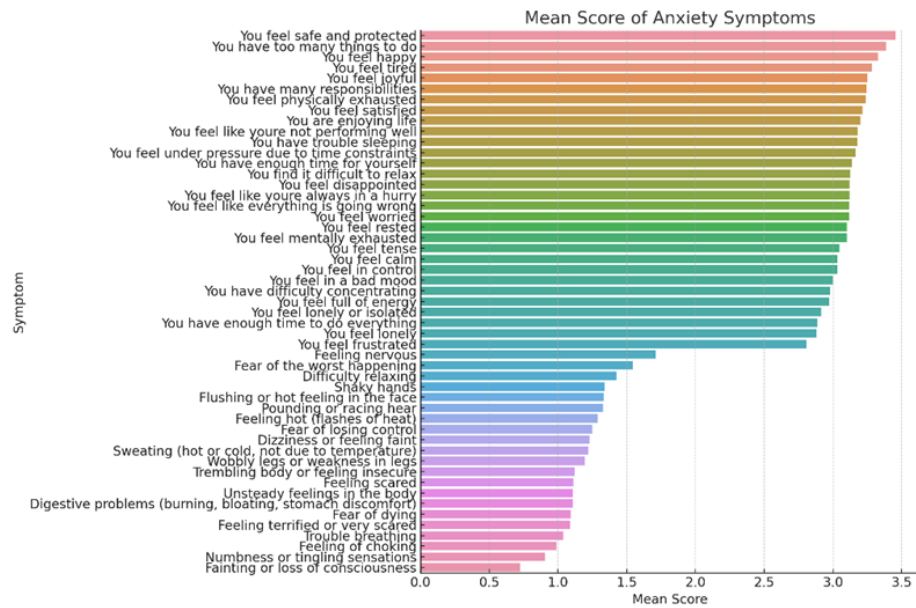


Figure 2. Mean scores of individual anxiety symptoms

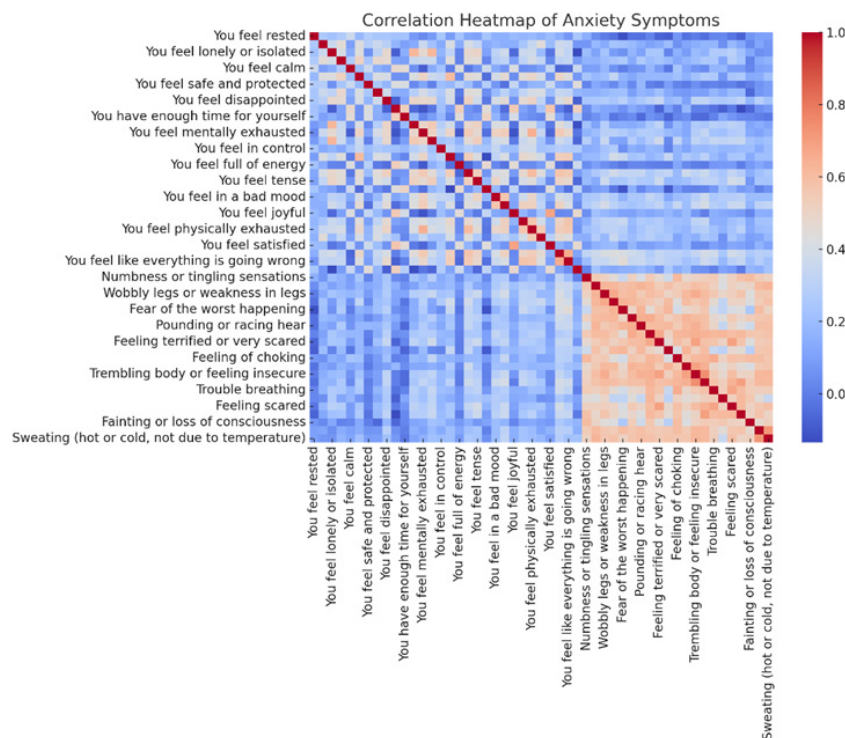


Figure 3. Correlation heatmap of anxiety symptoms based on Pearson correlation coefficients
Warmer colors represent stronger positive correlations (r), and cooler tones indicate weaker or negative associations.

Principal component analysis (PCA) was used to reduce the dimensionality of standardized anxiety symptom data, allowing for visual representation of participant symptom profiles. Each point in the scatter plot represents one individual projected onto two principal components (PCA 1 and PCA 2), which together capture the greatest variance in the dataset. K-means clustering revealed three distinct participant subgroups: Cluster 0 (green) included individuals with mild symptom profiles, tightly grouped around the

origin and with lower PCA 1 scores; Cluster 1 (orange) spread more widely along the positive PCA 1 axis and reflected moderate anxiety with a broader mix of emotional and somatic symptoms; and Cluster 2 (blue) occupied a distinct area along PCA 2, suggestive of more intense somatic or panic-like symptoms. The spatial separation between clusters supports the presence of latent anxiety subtypes and has practical implications for personalized intervention strategies tailored to specific symptom profiles (Figure 4).

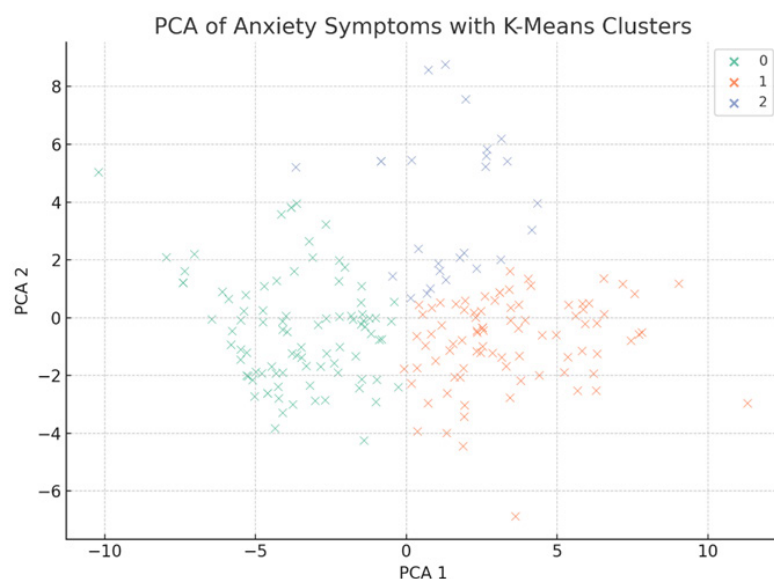


Figure 4. *PCA of anxiety symptoms with K-means clusters*

Exploratory factor analysis (EFA) was conducted to uncover the latent dimensions underlying anxiety symptoms, with results visualized as a heatmap showing loadings greater than 0.4 in absolute value. Warmer colors indicate stronger positive loadings, while cooler tones represent inverse associations. This selective display emphasizes the most salient symptom–factor relationships and provides a clear view of how individual symptoms cluster into broader psychological constructs.

The analysis revealed four distinct latent dimensions:

Factor 1: Physiological Hyperarousal — Included symptoms such as shaky hands, difficulty relaxing, fear of losing control, dizziness, and digestive problems, reflecting acute somatic and autonomic anxiety responses.

Factor 2: Affective Calmness/Control (Reversed) — Negatively loaded for feelings of calm-

ness, safety, and personal time, suggesting that high scores on this factor reflect a perceived deficit in emotional regulation and internal safety.

Factor 3: Cognitive-Emotional Distress — Characterized by symptoms like mental exhaustion, disappointment, and feelings of underperformance, indicative of cognitive burden and emotional fatigue common in generalized or achievement-related anxiety.

Factor 4: Sleep Disruption — Defined solely by strong loading of the item “trouble sleeping,” pointing to an isolated but significant sleep-related aspect of anxiety.

These findings underscore the multidimensional nature of anxiety and suggest that symptom clusters may align with distinct intervention targets such as somatic regulation, emotional coping, cognitive reframing, or sleep hygiene (Figure 5).

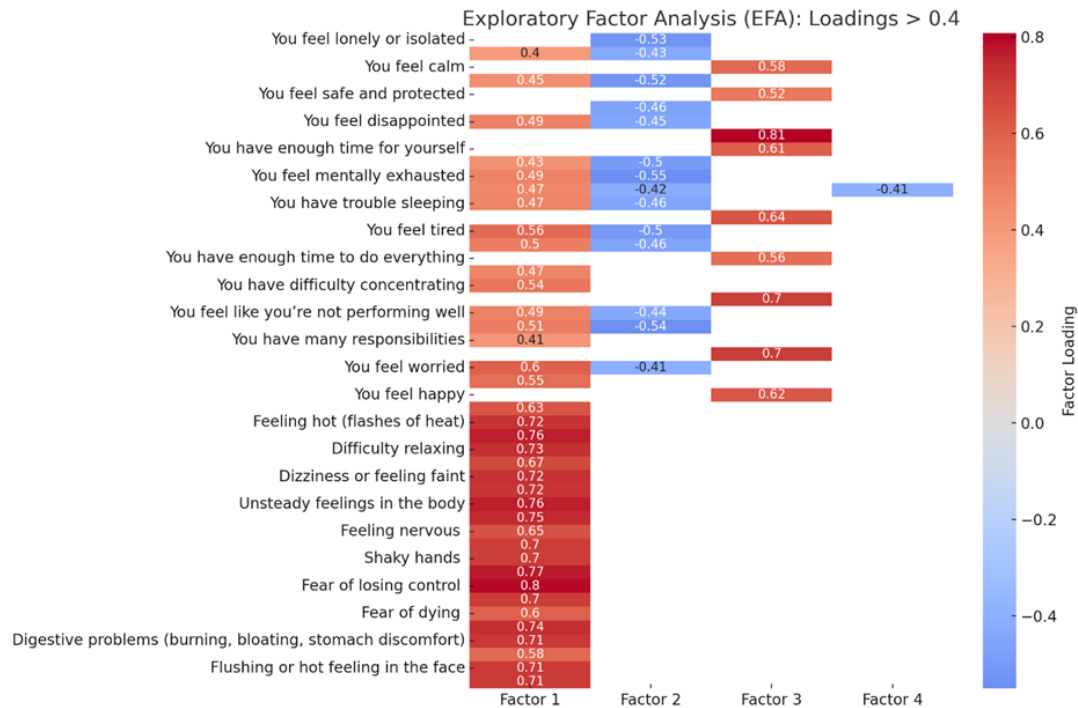


Figure 5. Exploratory Factor Analysis (EFA) heatmap showing loadings > 0.4 for items on four latent anxiety dimensions

Factor 1: Physiological hyperarousal, Factor 2: Affective calmness/control (reversed), Factor 3: Cognitive-emotional distress, Factor 4: Sleep disruption.

Perceived stress profiles and psychometric patterns derived from PSQ-30

The distribution of total PSQ-30 scores was first assessed to establish baseline stress levels within the population. As shown in Figure 6, the

histogram illustrates a unimodal and approximately normal distribution, peaking between 2.5 and 3.0. This indicates that the majority of participants reported moderate levels of perceived stress. The presence of a well-centered distri-

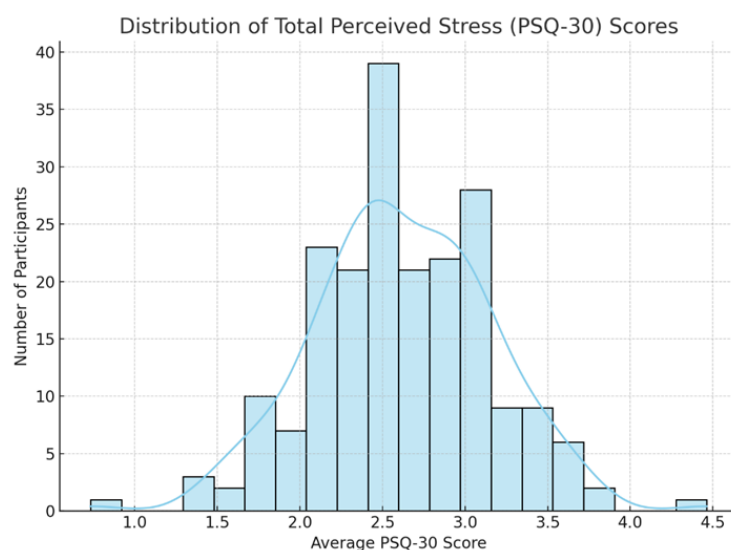


Figure 6. Distribution of Total Perceived Stress (PSQ-30) Scores.

Histogram of average PSQ-30 scores across all participants (N=186), overlaid with a kernel density estimate. The distribution approximates a normal curve, with scores peaking between 2.5 and 3.0, indicating moderate perceived stress levels among most participants.

bution supports the instrument's psychometric validity and confirms that stress responses are broadly representative of a general adolescent and young adult population.

To explore subgroup variability, PSQ-30 scores were stratified by both age group and gen-

der using violin plots. As visualized in Figure 7, females consistently reported higher levels of perceived stress across all age categories. The 18–25 age group demonstrated the widest distribution, likely reflecting transitional stressors unique to this life stage (e.g., educational uncer-

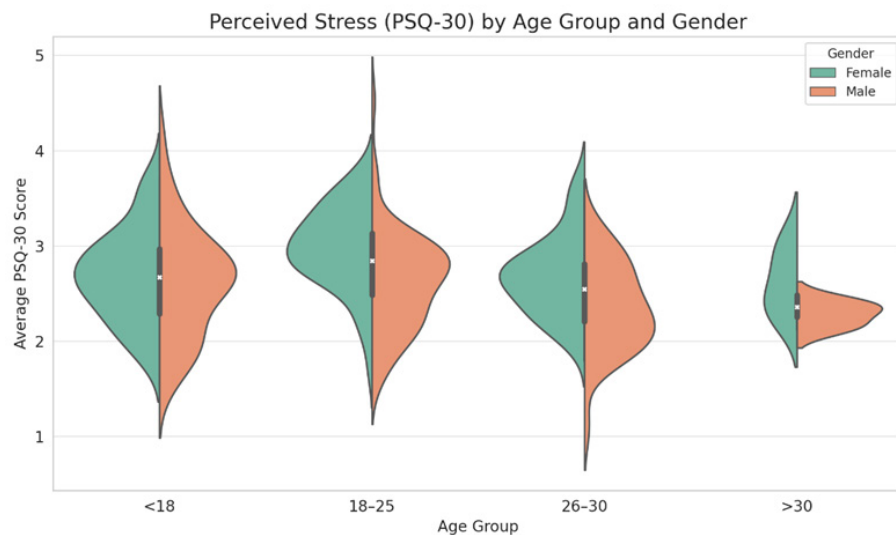


Figure 7. *Perceived Stress (PSQ-30) by Age Group and Gender.* Violin plot comparing average PSQ-30 scores across four age groups (<18, 18–25, 26–30, and >30). The plot reveals gender-based distribution differences, with generally higher perceived stress scores in females across most age groups

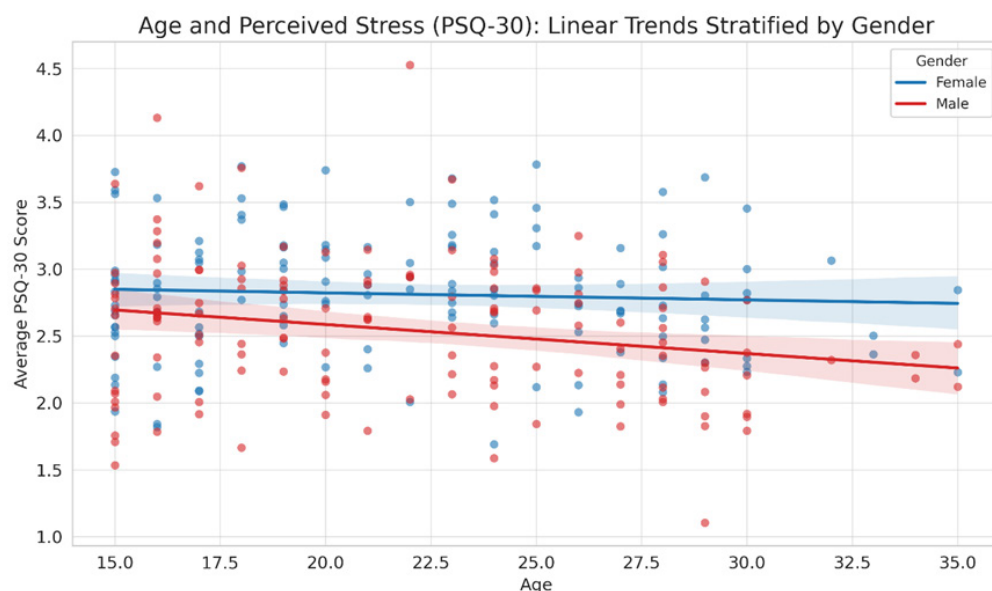


Figure 8. *Linear relationship between age and perceived stress (PSQ-30) by gender.* Scatterplot with regression lines displaying the linear relationship between age and perceived stress scores, stratified by gender. A slight downward trend is observed in males, while females show a relatively stable or slightly increasing pattern across age groups

tainty, identity formation). These findings align with previous research indicating increased stress reactivity among females and developmental differences in emotional regulation across adolescence and early adulthood.

A linear regression analysis, shown in Figure 8, was performed to investigate the association between age and perceived stress. In males, a slight negative slope suggests a modest decline in stress levels with increasing age. Females, however, exhibited a relatively stable pattern with a subtle upward trend. These gender-specific patterns may reflect different coping strategies, hormonal influences, or shifts in stress exposure across the life span.

A significant positive correlation ($r = 0.66$) between PSQ-30 and BAI scores indicates strong convergent validity between perceived stress and anxiety symptomatology. As shown in Figure 9, this relationship affirms theoretical links between psychological stress and anxiety and underscores the complementary value of both instruments in

assessing youth mental health. These findings demonstrate a strong positive relationship between perceived stress and anxiety levels, aligning with theoretical expectations and previous psychometric research.

Hierarchical clustering of item-wise Pearson correlations, presented in Figure 10, revealed three primary subdomains: emotional strain, physiological tension, and control-related concerns. These emergent clusters support the scale's internal multidimensionality and suggest interpretative groupings that may be useful in targeted intervention design.

Principal Component Analysis (PCA), shown in Figure 11, was used to visualize latent stress dimensions across participants. While male and female data points largely overlapped, a degree of spatial separation was evident, suggesting nuanced gender differences in stress response patterns. This reinforces the need for sex-sensitive approaches in stress research and mental health policy.

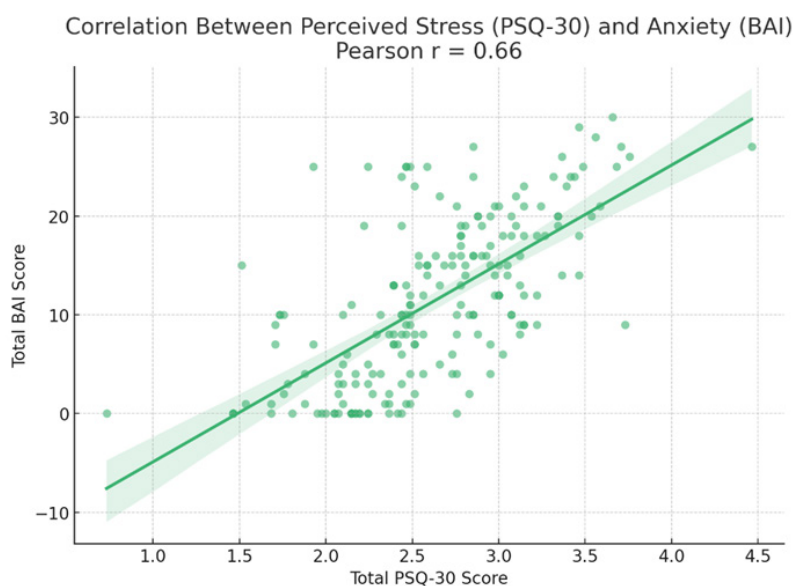


Figure 9. *Correlation Between Perceived Stress (PSQ-30) and Anxiety (BAI).*

Scatterplot with regression line showing a strong positive correlation between total PSQ-30 and BAI scores (Pearson $r = 0.66$). This indicates a significant association between higher perceived stress and greater levels of anxiety.

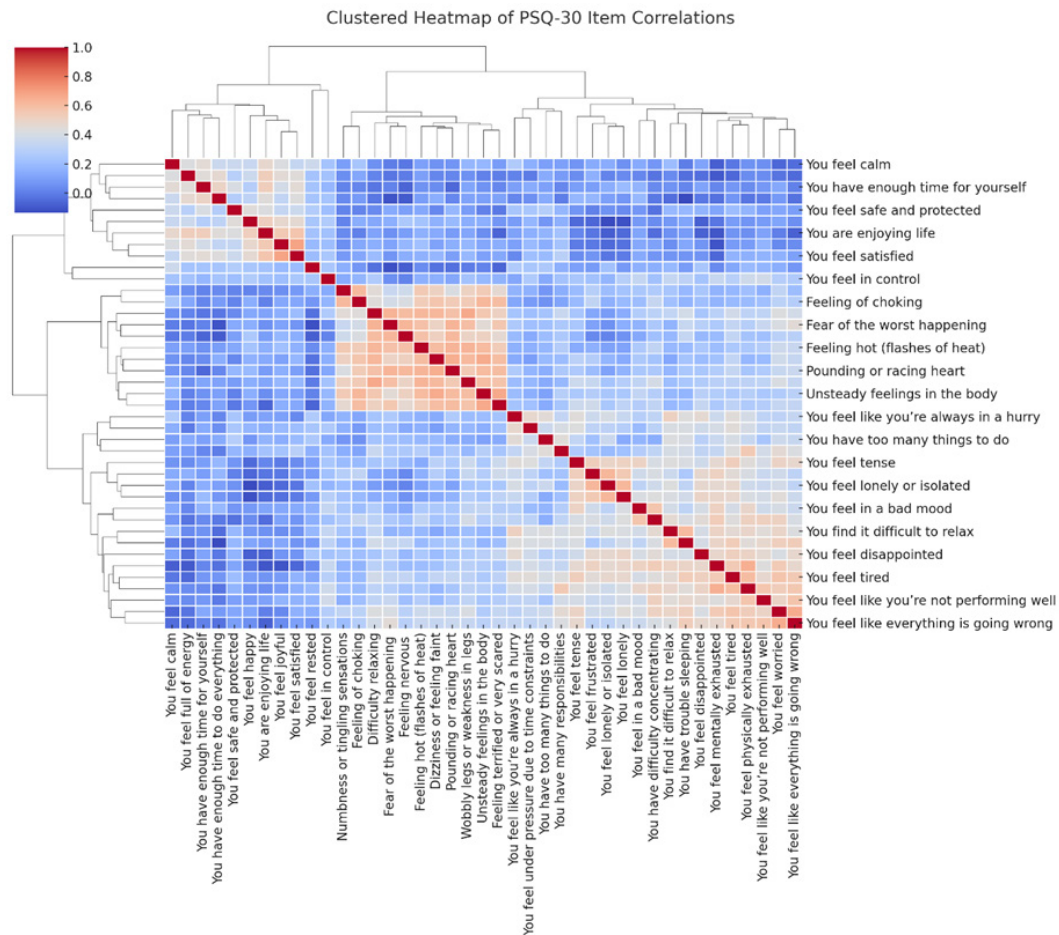


Figure 10. Clustered Heatmap of PSQ-30 Item Correlations.

Hierarchical clustered heatmap displaying pairwise Pearson correlations among the 30 PSQ items. Red indicates strong positive correlations, while blue indicates negative or weaker associations. Groupings suggest latent subdomains within the scale such as emotional strain, somatic symptoms, and control-related items.

3D PCA of Perceived Stress (PSQ-30) Colored by Gender

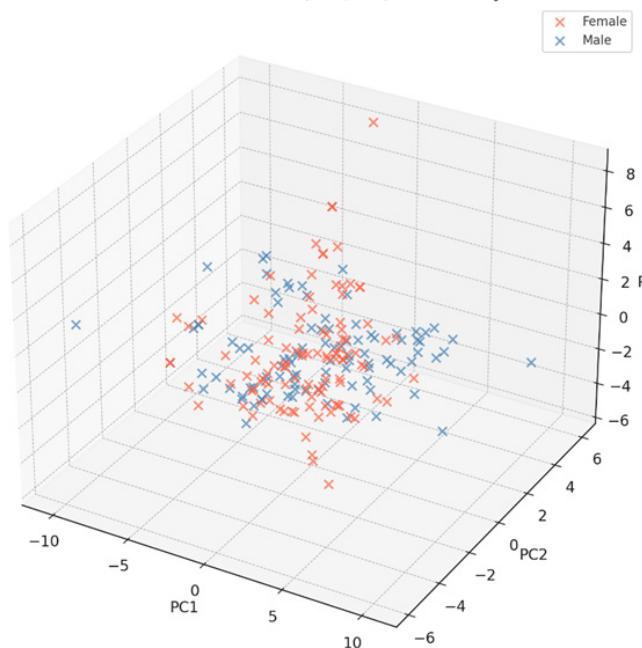


Figure 11. 3D PCA of Perceived Stress (PSQ-30) Colored by Gender

Three-dimensional Principal Component Analysis (PCA) plot showing gender-separated clusters based on PSQ-30 responses. While there is overlap, females and males form distinguishable clusters along the first three principal components, indicating subtle group-level variation in stress profiles.

DISCUSSION

The present study confirms the high co-occurrence of perceived stress and anxiety among adolescents and young adults, aligning with existing literature that emphasizes the strong interdependence of these constructs (Phillips, 2013; Harris et al., 2023; Besharat et al., 2020). Consistent with findings by Chand and Marwaha (2025) and Javaid et al. (2023), our results highlight the dual cognitive and somatic burden of anxiety, often exacerbated by maladaptive stress responses during emerging adulthood.

A substantial body of research implicates perceived stress as a central predictor of anxiety and depressive symptoms across populations (Chen et al., 2023; Huh et al., 2021; Penninx et al., 2021). In our sample, elevated stress scores were strongly associated with cognitive dysregulation and emotional instability, supporting neurocognitive models that link chronic stress to impairments in executive function and working memory (Robinson et al., 2013; Lukasik et al., 2019). Moreover, the interaction between perceived stress and anxiety may be moderated by personality traits—such as Type A behavior—and neurophysiological markers, including altered frontal EEG activity (Jordanova et al., 2021; Demerdzieva & Pop-Jordanova, 2015).

Perceived stress not only burdens psychological wellbeing but also disrupts functioning in key areas such as sleep, academic engagement, and overall life satisfaction (EL Madani et al., 2024; Kamarudin et al., 2009). As shown in studies by Alpay (2022) and Alwhaibi et al. (2023), students experiencing high academic pressure and limited coping skills often report deteriorating mental health and diminished quality of life.

Coping mechanisms—especially psychological resilience and mindfulness—emerge as critical buffers that mediate the relationship between stressors and affective symptoms. Resilience has been shown to protect against anxiety even among chronically ill populations (Cui et al., 2025), while structured interventions such as mindfulness training and cognitive behavioral therapy (CBT) demonstrate efficacy in reducing both perceived stress and anxiety symptoms (Fulambarkar et al., 2023; Baei et al., 2025; Eklund et al., 2023). Importantly, digital adaptations of CBT have expanded accessibility, with evidence supporting their long-term benefits for stress reg-

ulation and emotional control (Svärdman et al., 2022; Stächele et al., 2020).

The role of sociocultural context in shaping stress responses and coping strategies is particularly salient in Southeastern Europe. Regional studies from North Macedonia emphasize increased stress among youth navigating social transition, peer pressure, and digital dependency—factors that heighten emotional vulnerability and maladaptive behaviors (Sulejmani & Ziberi, 2024; Sulejmani & Kostovska, 2024). These findings are consistent with international literature highlighting the psychological effects of social media and online environments (Cureus, 2024).

The COVID-19 pandemic further intensified psychological vulnerabilities among youth. Both global and regional studies report marked increases in perceived stress and generalized anxiety, particularly in student populations (Achterberg et al., 2021; Awoke et al., 2021; Garbóczy et al., 2021). Pandemic-related stressors—such as academic disruption, health anxiety, and social isolation—have had lasting effects on emotional resilience and stress regulation capacities (Seidl et al., 2021; Kasza et al., 2025).

Consistent with Hegazy et al. (2024) and Ebrahim et al. (2024), our results affirm that medical and healthcare students represent a particularly vulnerable subgroup, burdened by academic overload, emotional fatigue, and high performance expectations. These findings highlight the need for mental health infrastructure within educational settings and underscore the importance of integrating emotional literacy and stress management into medical training (Varghese et al., 2015; Feizi et al., 2012).

Furthermore, gender and age group differences observed in our study reflect consistent trends: female and late-adolescent participants reported significantly higher levels of perceived stress and anxiety (Xi, 2020; Pop-Jordanova, 2019; Javaid et al., 2023). These findings support the implementation of gender-sensitive and age-appropriate mental health interventions. Evidence-informed practices may include school-based emotional literacy curricula, peer-led coping workshops, and youth-friendly psychological services tailored to developmental stage and sociocultural context.

To contextualize our findings within broader research, Table 4 compares anxiety and stress prevalence across recent national and international youth studies using diverse psychometric instruments.

Table 4. *Comparison of anxiety and perceived stress prevalence across national and international youth populations using different measurement tools*

Study	Sample Size	Population	Anxiety Prevalence (%)	High Stress Prevalence (%)	Measurement Tools
Our Study	204	Adolescents & Young Adults	47.0	44.0	BAI, PSQ-30
Javaid et al. (2023)	1452	Health Students	48.1	49.0	PSS, HADS
Ebrahim et al. (2024)	1350	Medical Students	40.0	43.0	DASS-21
Hegazy et al. (2024)	1105	Medical Students	52.7	56.3	GAD-7, PSS
Garbóczy et al. (2021)	374	Health Science Students	53.0	50.0	PSS-10
Alwhaibi et al. (2023)	3200	University Students	36.0	40.0	GAD-7, PSS
Harris et al. (2023)	900	General Student Population	41.0	39.0	Various (PSS, GAD-7, etc.)
Cureus (2024)	720	University Staff	45.0	42.0	PSS
Awoke et al. (2021)	4500	Undergraduates	38.5	45.6	GAD-7, PSS

As shown in Table 4, anxiety and stress prevalence rates vary across populations, with particularly high levels reported among students in health-related fields. Notably, the choice of measurement tool (e.g., GAD-7 vs. BAI) can influence reported outcomes, emphasizing the importance of instrument selection in cross-study comparisons.

Several limitations of this study should be acknowledged. First, the cross-sectional design prevents causal inferences regarding the relationship between perceived stress and anxiety. Second, reliance on self-reported data may introduce response bias, particularly under socially desirable conditions. Third, while the sample included individuals from diverse educational backgrounds, its geographic restriction to North Macedonia may limit generalizability to other populations or regions.

Future studies should incorporate longitudinal designs to capture temporal trends and causal relationships, and include qualitative methodologies to explore the lived experiences of stress and anxiety. It is also critical to evaluate the effectiveness of targeted interventions—such as digital resilience programs, peer-led support models, or school-based CBT—across more diverse and underrepresented youth populations.

Despite these limitations, the current findings contribute valuable insight into youth mental health in a region with limited epidemiological data. The study reinforces the importance of multidimensional assessment approaches and highlights the need for regionally tailored prevention and intervention strategies. Ultimately, this research underscores the critical role of early detection, resilience promotion, and culturally responsive mental health programming—particularly in Southeastern Europe, where youth psychological vulnerability is increasingly evident yet understudied.

CONCLUSION

This study offers important insights into the relationship between perceived stress and anxiety among adolescents and young adults, revealing a multidimensional symptom structure and distinct psychological profiles. The higher symptom burden observed among females and individuals aged 18–25 underscores the need for age- and gender-sensitive mental health interventions.

The strong correlation between perceived stress and anxiety supports theoretical models that conceptualize stress as a central contributor to emotional dysregulation. The identification of latent symptom dimensions—such as cognitive burden, somatic hyperarousal, and emotional distress—reinforces the value of tailored assessment tools and early intervention strategies.

In light of the elevated prevalence rates and the scarcity of region-specific data from South-eastern Europe, these findings highlight the urgency of implementing culturally adapted mental health frameworks that promote resilience, emotional literacy, and systematic screening. Future research should build upon these results using larger, demographically diverse samples, longitudinal designs, and mixed-method approaches that integrate psychometric evaluation with qualitative accounts of the lived experience of stress and anxiety.

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Резиме

НЕ САМО БРОЈКИ: ИСТРАЖУВАЊЕ НА ВНАТРЕШНИОТ ПЕЈЗАЖ НА МЛАДИНСКАТА АНКСИОЗНОСТ И СТРЕС

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Анксиозноста и перципираниот стрес се сè позастапени кај младите; сепак, емпириските податоци од Југоисточна Европа остануваат ограничени. Оваа студија ги испитува преваленцијата, меѓусебната поврзаност и психолошките импликации на анксиозноста и на перципираниот стрес кај младите од Северна Македонија, користејќи валидирани психометриски алатки.

Пресекаската студија вклучуваше 204 учесници на возраст од 15 години и постари (претежно под 30 години), регрутирани од различни образовни институции. Учесниците го пополнија Бековиот инвентар за анксиозност (BAI) и Прашалникот за перципиран стрес (PSQ-30) под стандардизирани услови. Анализите вклучуваа дескриптивна статистика, анализа на латентен профил, кластерирање на k-средини, MANOVA, линеарна регресија и истражувачка факторска анализа за да се проценат моделите на симптоми и демографските предиктори. Дополнително, моделите на машинско учење (логистичка регресија и случајна шума) беа користени за да се предвиди членството во подгрупата.

Беа забележани високи нивоа на перципиран стрес и анксиозност, со значителни разлики поврзани со полот и со возраста. Корелациските анализи покажаа силна позитивна поврзаност меѓу PSQ-30 и BAI резултатите. Коефициентот на корелација на Пирсон беше $r = 0,66$, потврдувајќи ја статистичката сила на оваа поврзаност. Факторската анализа откри повеќе латентни димензии на анксиозноста, додека кластерската анализа идентификуваше различни психолошки профили.

Овие наоди ја нагласуваат појавата и меѓусебното дејство на анксиозноста и перципираниот стрес кај младите во Македонија, нагласувајќи ја потребата од насочени интервенции за ментално здравје и развој на политики специфични за регионот.

Клучни зборови: адолесценти и млади возрасни, анксиозност, анализа на латентен профил, перципиран стрес, психометриска процена, Северна Македонија