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Exploring the Developmental Trajectory of Anxiety Traits Across Distinct Age Bracket

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Abstract: Objective: This study aimed to examine the relationship between age intervals and anxiety traits, hypothesizing that with age progression, there might be an escalation in anxiety manifestations. **Methods:** Utilizing a cross-sectional design, we analyzed data from 1,103 participants, gathered using an online survey incorporating the Taylor Manifest Anxiety Scale (TMAS). The age distribution ranged from adolescents to the elderly, with participants represented globally. **Results:** The findings depicted a subtle but significant progression in anxiety with increasing age. Descriptive statistics for the TMAS scores across age quartiles showed consistent increments from younger to older age groups. Analysis of variance confirmed significant differences in anxiety levels between age quartiles. **Conclusions:** The results illuminate the relevance of customized interventions, emphasizing the importance of holistic well-being, particularly for the aging population. Healthcare providers should consider age-specific assessments and management strategies for anxiety disorders. This research enriches our understanding of the dynamics of age anxiety and establishes a foundation for subsequent studies. Future research should prioritize longitudinal designs and adopt integrative biological and psychological models to untangle the intricacies between age and anxiety.

Keywords: Anxiety, Age Intervals, Developmental Stages, Mental Health.

استكشاف المسار التطوري لسمات القلق عبر فئات عمرية مختلفة

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الملخص: الهدف: هدفت الدراسة الحالية إلى فحص العلاقة بين الفئات العمرية ومستويات القلق، حيث افترضت أن القلق قد يزداد مع التقدم في العمر. **المنهجية**: استخدمت الدراسة تصميمًا مقطعيًا لتحليل بيانات 1103 مشاركين استجابوا على أدوات الدراسة إلكترونيًا، وتراوحت أعمارهم بين المراهقة والشيخوخة. **النتائج**: أظهرت النتائج وجود زيادة متسقة في مستويات القلق مع التقدم في العمر، كما كشفت نتائج تحليل التباين عن فروق ذات دلالة إحصائية بين الفئات العمرية المختلفة، وكانت مستويات القلق أعلى لدى الفئات الأكبر سنًا. **الاستنتاجات**: تبرز النتائج أهمية تطوير تدخلات علاجية تراعي الفروق العمرية، مع التركيز على تعزيز الصحة النفسية لدى كبار السن على وجه الخصوص. كما ينبغي لمقدمي الرعاية الصحية اعتماد تقييمات واستراتيجيات علاجية مخصصة لكل فئة عمرية عند التعامل مع اضطرابات القلق. تساهم هذه النتائج في تعميق الفهم للعلاقة بين العمر والقلق، كما تُشكل قاعدة يمكن أن تُبنى عليها دراسات مستقبلية يُفضل أن تعتمد تصاميم طولية ونماذج تكاملية بيولوجية-نفسية لفهم أعمق لتعقيدات هذه العلاقة..

الكلمات المفتاحية: القلق، الفئات العمرية، المراحل النمائية، الصحة النفسية.

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Introduction

Anxiety is a common mental health concern that can impact people of all ages. However, some research suggests that anxiety symptoms may manifest differently across various age groups (Collins & Marchioni, 2023; Javaid *et al*., 2023). This raises questions about the relationship between age and anxiety traits. Anxiety disorders represent one of the leading causes of disability worldwide, with lifetime prevalence estimates ranging from 12-29% globally (Mutz *et al*., 2022; Mutz & Lewis, 2021; Purves *et al*., 2020a). Anxiety can emerge throughout life, yet robust evidence suggests certain disorders manifest differently across developmental stages (Wilmer *et al*., 2021). For instance, specific phobias arise primarily in childhood; separation anxiety peaks from 7-12 years of age, while generalized anxiety disorder is most common in middle age (Joseph *et al*., 2023; Keough & Eisen, 2023; Szuhany & Simon, 2022). This implies that anxiety etiology and expression may significantly shift over the lifetime (Correa & Brown, 2019).

Several predominant models outline the core components of anxiety disorders (Böttger *et al*., 2023). The tripartite model emphasizes physiological hyperarousal, generalized psychological distress, and avoidance behaviors as central features (McKay, 2022). Barlow's triple vulnerabilities theory highlights negative affect, perceived lack of control, and attentional biases (Azab, 2022; Plag & Ströhle, 2023). Age-related biological, neurological, cognitive, and psychological changes could plausibly impact any of these factors and contribute to anxiety vulnerability(Mutz *et al*., 2022) .

For example, exaggerated threat perception and attention biases, cognitive anxiety facets, may increase with age due to greater self-focus, life experience, and lesson learning (Abend *et al*., 2018; Wei *et al*., 2023). Older individuals tend to exhibit positivity effects and preferentially remember positive over negative information, which could mitigate anxiety (Erbey *et al*., 2020) . However, attention biases can persist even in late life (Aizpurua *et al*., 2021). Age-related declines in working memory can also increase anxiety by altering the ability to disengage from ruminative thoughts (Naveh-Benjamin & Cowan, 2023; Quentin & Cohen, 2019).

Physiological anxiety symptoms can similarly intensify with aging due to reduced resilience to stress (Han *et al*., 2021; Yegorov *et al*., 2020). Cortisol dysregulation, HPA axis changes, inflammation, and autonomic decline can dysregulate neurobiological stress response systems (Riddle & Taylor, 2020). These effects interact with neurotransmitter changes, such as selective attrition of dopamine receptors, linked to increased anxiety behavior in animal models (Bellanova *et al*., 2023; Min *et al*., 2023). Structural neuroimaging reveals age-related gray matter volume loss in medial PFC regions supporting emotion regulation. These data suggest possible neurological correlates for anxiety increase in later life (Buhrmann *et al*., 2021; Ramanol *et al*., 2018, 2019).

Developmental patterns for anxiety prevalence remain debated. Retrospective data often show that adolescence is the peak period for phobia and anxiety onset, perhaps due to pubertal changes and social pressures (Klaufus *et al*., 2022). However, findings vary across cultures, cohorts, and diagnostic criteria (Klaufus *et al*., 2022; Kowalchuk *et al*., 2022). Some studies reveal U-shaped patterns with higher anxiety in adolescence and old age compared to midlife (Beja, 2018; Bittmann, 2021; Blanchflower, 2021; Blanchflower & Graham, 2022; Graham & Ruiz Pozuelo, 2017;

Toshkov, 2022). But others show linear increases that persist throughout life or midlife peaks for disorders such as generalized anxiety. These inconsistencies highlight the need to clarify anxiety trajectories across age groups (de Lijster *et al*., 2019; Lallukka *et al*., 2019; Narmandakh *et al*., 2021; Ribeiro *et al*., 2020).

Most prior studies utilize retrospective recall, small samples unrepresentative of general populations, categorical diagnostic approaches, or wide age ranges lacking fine-grained distinctions (Mughal *et al*., 2020; Raifman *et al*., 2022; Salari *et al*., 2020). Few systematically compare anxiety symptoms using dimensional measurement across narrowly defined life stages from youth through older age (Avidor *et al*., 2022; Reis *et al*., 2022). The present study will address these gaps by assessing anxiety traits using validated scales over decades of age in a large international sample.

Clarifying nuanced age patterns can refine theoretical models of anxiety development. Stage theories like Erikson's posit crises specific to each life period, such as identity in adolescence and despair in old age, that may trigger anxiety (Bringmann *et al*., 2022; Fried, 2020; Klusmann *et al*., 2021; Menassa *et al*., 2023). Discrete age peaks imply sensitive windows of vulnerability. Delineating differences between anxiety onset in adolescents versus adults can inform divergent etiological pathways and intervention targets (Liu *et al*., 2021; Murray *et al*., 2021).

These complex developmental patterns likely stem from multidirectional interactions among genetic, biological, psychological, and environmental influences that change over age. Heritability estimates for anxiety disorders increase substantially from childhood to adulthood, suggesting amplified genetic vulnerability over time (Abuhasan *et al*., 2025; Ask *et al*., 2021; Lin & Tsai, 2020) . Gene-environment interaction may underlie rising genetic effects if contextual triggers accumulate with aging (Meier & Deckert, 2019). Critical life events also tend to provoke greater anxiety reactions at certain stages of life, indicating windows of enhanced environmental susceptibility (Kurth & Pihkala, 2022; Pihkala, 2020; Hamarah *et al*., 2025).

In summary, existing evidence indicates that anxiety disorders are present heterogeneously throughout life. However, developmental patterns remain poorly characterized, especially with respect to dimensional anxiety traits. The current study will significantly advance knowledge on age variability in anxiety expression using robust methodology. Findings can inform theoretical models and guide targeted screening and intervention to the highest-risk periods for anxiety issues throughout the life course. Understanding the interplay of age and anxiety can inform intervention strategies, policy making, clinical diagnosis, and public awareness campaigns. This research seeks to answer the following questions: First, what is the relationship between age intervals and anxiety traits on a global scale? Second, does anxiety increase with age progression?

Methods

Research Design

Cross-Sectional Design: This study used a cross-sectional design, capturing data at a specific point in time. This approach is suitable to assess the prevalence of anxiety traits across different age intervals in various regions around the world.

Participants

The study collected responses from a diverse cohort of 5,371 English-proficient individuals. Figure 1 shows a breakdown of the demographics of the participants, segmented by specific criteria. A comprehensive

enumeration, along with corresponding percentages, is elucidated in Table.

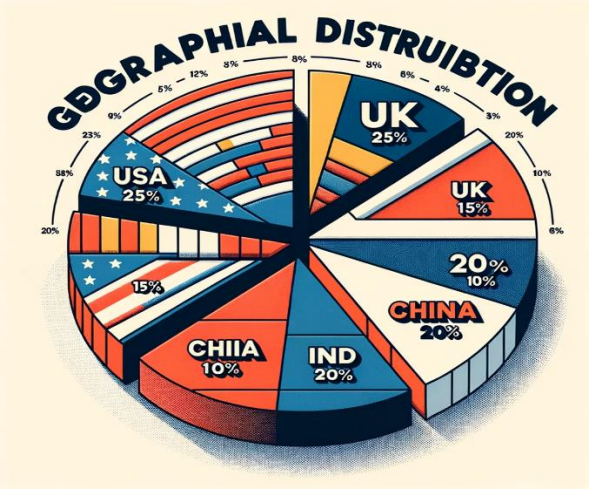

Figure (1): Geographical distribution of study sample.

Inclusion and Exclusion Criteria

For the purpose of maintaining data integrity and relevance, several filtration mechanisms were applied: First, only 76% of the total participants' data was incorporated into the final analysis. This subset consisted solely of respondents who expressed confidence in the accuracy of their provided information. Second, The responses of participants under the age of 14 were systematically excluded to ensure that the study focused on more mature and reliable perspectives.

Geographic Distribution

The geographical spectrum of the participants was broad and encompassed various regions. The dataset can be characterized as cross-cultural, with contributions from countries including, but not limited to, the United States, Canada, India, Pakistan, UAE, South Africa, and the UK.

Measures

In this study, we employ a refined version of the Taylor Manifest Anxiety Scale (TMAS), a seminal tool first conceptualized by Janet A. Taylor in 1953. Initially crafted as a 65-item instrument intended for experimental participant selection, the TMAS was subjected to methodological optimization, culminating in a concise 50-item variant. This iteration sources its descriptors from the renowned Minnesota Multiphasic Personality Inventory, targeting salient indicators of manifest anxiety. Our application of the TMAS leveraged 50 declarative prompts, examples of which include 'I believe that I am not more nervous than others' and 'I work under great tension'.

Participants were tasked with assessing the resonance of each statement, categorizing them within the binary confines of 'true' or 'false'. These designations are numerically encoded (0 or 1), giving a possible cumulative score range of 0-50; an ascending score corresponds to amplified manifestations of anxiety. Empirically, the TMAS exhibits robust construct validity, as demonstrated by correlations of 0.81 and 0.92 with the Psychasthenia scale of the Multiple Minnesota Personality Inventory (MMPI). The instrument's internal consistency is further buttressed by Kuder-Richardson coefficients spanning 0.78 to 0.84. Within the confines of our research parameters, the TMAS reflected a KR20 index of 0.88, underscoring its reliability. The diagnostic orientation of the instrument, prioritizing the elucidation of anxiety as a pervasive personality trait over clinical diagnostic criteria, is synergistic with the overarching investigative trajectory of our study.

Procedures

Current research used a systematic approach, drawing on data sourced from a multitude of countries, thus ensuring its global relevance. The primary instrument for measuring anxiety in this study was TMAS. An online survey was meticulously crafted and subsequently distributed across various digital platforms, with the aim of providing wide accessibility. This survey not only incorporated the TMAS to measure anxiety, but also elicited essential demographic information from the respondents, including their age, gender, and

country of residence. Before the initiation of the survey, participants received an informed consent form. This form clarified the objectives of the study, ensuring that the participants understood its nature and purpose. Emphasis was placed on the participation of the respondents, providing the potential respondents with the freedom to participate, withdraw or abstain according to their comfort.

Participants were explicitly assured of the confidentiality and anonymity of their responses. It was clarified that their data would be used exclusively for scholarly research, with no personal identifiers being published or shared.

Statistical plan

Statistical analyses were performed with SPSS version 27.0. Preliminary assessments utilized descriptive statistics and normality tests. One-way analysis of variance (ANOVA) was used to explore differences in anxiety levels between age quartiles. Given variances detected through Levene's test, post-hoc pairwise comparisons utilized the Games-Howell test. Pearson's correlation coefficients examined the linear relationships between continuous age and anxiety scores. The magnitude of the differences was assessed using Cohen's d, and additional robustness checks included subgroup and sensitivity analyzes, and ANOVA to account for possible confounders, such as gender and educational level.

Results

Table 1 provides insights into the age distribution of the study's 1103 participants. Notably, there's no missing data, underscoring the completeness of the dataset. The age percentiles—25th at 23 years, 50th (median) at 30 years, and 75th at 41 years—indicate a relatively young participant pool. This age distribution might have implications for the study's outcomes, especially if age trends play a pivotal role in the research findings. Table 1 shows some demographic information about the participants.

Table (1): Sample Composition of Participants.

Criteria / Gender	Number of Participants	Percentage (%)
Male	513	46.56
Female	575	52.10
Other	15	1.32
Geographical Distribution		
USA	308	27.94
Canada	144	13.03
India	176	14.90
Pakistan	62	5.59
UAE	55	4.66
South Africa	71	5.98
UK	103	9.31
Others	220	19.94
Age		
14-23 Years	267	24.21
24-30 Years	288	26.06
31-41 Years	343	31.12
42-70 Years	205	18.61
Total	1103	100

Table 2 presents a clear overview of the age demographics of the participants. The age ranges are divided into four main categories, and the data provides a snapshot of the distribution in each category. A striking observation is the spread of participants across these age brackets, indicating a diverse age representation in the study. The median age within each range gives a central age representation, while the 'mf' column indicates the product of frequency and median age, commonly used in determining a weighted average. The calculated mean age of the entire cohort is approximately 33.29 years, suggesting that the average participant's age leans toward the younger segments of the sample.

Table (2): Age Distribution, Median Age, and Cumulative Frequency for Participants.

Age Range	Frequency	Median (Age)	MF
14-23 Years	300	18.5	5550
24-30 Years	276	27	7452
31-41 Years	261	36	9396
42-70 Years	266	56	14896
Total	**1103**		**∑mf/1103=33.29**

Table 3 showcases a consistent distribution of 'anxietyTot11' scores with a total sample of

1103. Notably, the mean scores exhibit an incremental pattern from Category 1 (27.90) to Category 4 (29.20). Although the standard deviations suggest a similar dispersion of scores across categories, there's an evident increase in variability from Category 1's 2.799 to Category 4's 3.253. The tight 95% confidence intervals across all categories underscore the precision of these mean estimates. While the consistent minimum score of 25 is observed across categories, the maximum score slightly elevates from 37 in Categories 1 and 2 to 38 in Categories 3 and 4, hinting at potential upper-bound differences in the latter groups.

Table (3): Descriptive Statistics for anxietyTot11 Across Four Categories.

	N	Mean	Std. Deviation	Std. Error	95% CI: Lower Bound	95% CI: Upper Bound	Min	Max
1	300	27.90	2.799	.162	27.58	28.22	25	37
2	276	28.04	2.812	.169	27.71	28.37	25	37
3	261	28.62	3.179	.197	28.23	29.01	25	38
4	266	29.20	3.253	.199	28.81	29.59	25	38
Total	1103	28.42	3.049	.092	28.24	28.60	25	38

Table 4 presents the results of the Levene's test, a diagnostic tool assessing the homogeneity of variances across groups. A significant Levene statistic (Sig. = .002) suggests that there is a deviation from the assumption of equal variances across the four categories of the 'anxietyTot11' scores. With a statistic of 5.109 and degrees of freedom df1 = 3 and df2 = 1099, the evidence indicates potential differences in variability across the groups, which must be considered when conducting subsequent statistical analyses.

Table (4): Levene's Test for Equality of Variances for anxietyTot11.

	Levene Statistic	df1	df2	Sig.
anxietyTot11	5.109	3	1099	.002

Table 5 delineates the variance in 'anxietyTot11' scores both within and between the specified categories. The significant F-value of 10.790 (Sig. = .000) indicates that there are statistically significant differences in the mean scores of 'anxietyTot11' across the categories. The between-group variance (Mean Square = 97.679) is substantially greater than the within-group variance (Mean Square = 9.053), further corroborating this difference. Given the significance level, subsequent post-hoc tests would be beneficial to discern pairwise group differences.

Table (5): ANOVA for Differences in anxietyTot11 Across Categories.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	293.038	3	97.679	10.790	.000
Within Groups	9949.450	1099	9.053		
Total	10242.488	1102			

The table 6 presents a post-hoc analysis using the Games-Howell test to assess differences in the 'anxietyTot11' scores across age quartiles. Several pairwise comparisons, as marked with an asterisk, indicate statistically significant mean differences. The 95% Confidence Intervals provide a range in which the true mean difference likely lies, offering more context to the magnitude and direction of these differences. Notably, some quartile comparisons, such as between Agequart 1 and 3 and between Agequart 2 and 4, demonstrate significant differences in 'anxietyTot11' scores.

Table (6): Post-hoc Analysis (Games-Howell) of anxietyTot11 Across Age Quartiles.

Agequart (I)	Agequart (J)	Mean Difference (I-J)	Std. Error	Sig.	95% CI: Lower	95% CI: Upper
1	2	-.140	.234	.933	-.74	.46
1	3	-.721*	.255	.025	-1.38	-.06
1	4	-1.299*	.257	.000	-1.96	-.64
2	1	.140	.234	.933	-.46	.74
2	3	-.581	.260	.115	-1.25	.09
2	4	-1.159*	.262	.000	-1.83	-.49
3	1	.721*	.255	.025	.06	1.38
3	2	.581	.260	.115	-.09	1.25
3	4	-.579	.280	.166	-1.30	.14
4	1	1.299*	.257	.000	.64	1.96
4	2	1.159*	.262	.000	.49	1.83
4	3	.579	.280	.166	-.14	1.30

* Indicates significance at the 0.05 level.

Discussion

Anxiety, with its debilitating implications, has been a focal point of mental health studies. Undoubtedly, its manifestation spans all age groups, but the intricate ways in which it presents itself throughout the lifespan merit a deeper exploration (Penninx *et al*., 2021; Purves *et al*., 2020b; Solmi *et al*., 2021; Vos *et al*., 2017). As various pieces of research suggest, anxiety disorders, which are among the most significant contributors to global disability , reveal themselves differently at different life stages, hinting at the multifaceted nature of anxiety (Plag & Ströhle, 2023; Szuhany & Simon, 2022).

The present study was poised to examine the potential nexus between age and anxiety, leveraging a robust data set of 1,103 participants classified into distinct age quartiles. The results show that as age increases, so does anxiety, albeit slightly. This progression of anxiety with age can be attributed to the many challenges and transitions that individuals face, including health complications, financial stresses, and social disconnections (Knappe *et al*., 2022; LeBlanc *et al*., 2020; Legerstee *et al*., 2018). Furthermore, age-associated cognitive declines may exacerbate these anxiety symptoms, reducing the ability to handle stress (Cox & Deary, 2022; Randhawa & Varghese, 2022).

However, it is crucial to highlight that the variations in anxiety levels, while statistically noteworthy, were relatively minor in their magnitude (Knowles & Olatunji, 2020). The subtle differences indicate the need for clinicians to be vigilant about possible anxiety escalations in older adults, but also underscore that the practical implications of these differences might be limited.

An interesting facet of this study is the use of the TMAS, which has revealed that participants ranged from low to moderate anxiety levels. This range, as Taylor (1953), alludes to individuals who are better poised at managing stress, have better social interactions, and generally have a superior well-being. Nevertheless, one must exercise caution, as TMAS, while valuable, isn't a definitive diagnostic tool. Thus, a comprehensive clinical assessment remains indispensable for a comprehensive understanding and subsequent interventions.

While our findings align with previous studies that observed an increase in anxiety with age (Javaid *et al*., 2023; Mutz *et al*., 2022; Ramanoël *et al*., 2019). The relationship between age and anxiety remains a convoluted arena, influenced by a variety of factors as

pointed out by various studies (Naveh-Benjamin & Cowan, 2023; Preston & Biddell, 2021; Wei *et al*., 2023). This complexity accentuates the need for more intricate research designs that are deeper into this relationship.

The results of this study play a pivotal role in enhancing our understanding of age-anxiety dynamics. The incremental progression of anxiety with age, especially in older adults, hints at the importance of tailored interventions to ameliorate the effects. It is imperative, moving forward, to adopt a holistic approach, encompassing both biological and psychological paradigms, to truly grasp the nuances of anxiety across the lifespan.

In conclusion, while this research has provided significant insight into the age-anxiety relationship, it also sets the foundation for future studies. There is a pressing need for multiple approaches, including longitudinal studies to track intra-individual trajectories, integrated biological and psychological research models, and a focus on holistic well-being and targeted interventions, particularly for the aging population. This multipronged approach would undoubtedly offer a clearer picture, propelling us closer to understanding the intricate dance between age and anxiety.

Limitations

Several limitations should be noted in this study. First, the online nature of the data collection process may introduce technological access bias, as individuals without reliable internet access or the necessary technology were excluded. Additionally, the use of the Taylor Manifest Anxiety Scale (TMAS), which is in English, may limit the generalizability of the findings to non-English-speaking populations and could introduce language biase. While social desirability bias was considered, no specific steps were taken to mitigate this in the study design. Future research could benefit from incorporating strategies such as anonymous data collection or using more robust instruments to reduce this bias. Furthermore, the study relied on self-reported data, which may be subject to response biases. The sample size and the specific demographic characteristics of the participants (e.g., academic level, predominantly from [region/country]) may also limit the broader applicability of the results. These limitations suggest that the findings should be interpreted with caution, and future studies should address these issues by diversifying the sample and employing alternative data collection methods, such as in-person surveys or a multilingual approach.

Implications

The nuanced relationship between age and anxiety has multifaceted implications for various stakeholders, including individuals, healthcare professionals, and clinical settings. For individuals, understanding this connection offers tools to better identify and navigate their anxiety experiences. For healthcare professionals, this correlation accentuates the importance of age-specific diagnostic and therapeutic interventions adapted to the individual. At its core, the study serves as a clarion call for intensified awareness, urging a proactive approach to mental health literacy and intervention.

Conclusions

Age and anxiety—closely correlated constructs—have long been a focal point in mental health research. Backed by a broad and diverse international sample, this study adds valuable insights by shedding light on their complex interplay. Our findings reveal a

consistent trend: anxiety levels tend to rise gradually with age. This observation aligns with earlier research and highlights the importance of developing interventions that are sensitive to age-related differences.

This research also highlights an imperative: discussions surrounding mental health should be all-encompassing, refuting any preconceptions of age-based exclusivity in mental disorders like anxiety. Our findings highlight the omnipresent nature of anxiety, testifying to its widespread influence and the consequent imperative for holistic awareness and education. In conclusion, our study represents a pivotal contribution to understanding the nuanced variations in anxiety that occur with aging. The vast expanse of mental health research beckons and our contributions paint but a fragment of the broader tableau. The responsibility lies with us, the community of researchers, clinicians, and policymakers, to probe deeper, uncover more, and design solutions that seamlessly blend deep insights with pragmatic interventions. The interplay between age and anxiety persists, and the challenge ahead is to craft a future replete with understanding, compassion, and holistic support.

List of Abbriviations

Taylor Manifest Anxiety Scale (TMAS): TMAS

Multiple Minnesota Personality Inventory: MMPI

One-way analysis of variance: ANOVA

Multiple Analysis of Variance: MANOVA

Disclosure Statement

- **Ethics approval and consent to participate:** All procedures performed in this study involving human participants were in accordance with the ethical standards of An-Najah University Research Ethics Board (IRB), the American Psychological Association (APA, 2010) and with the Helsinki Declaration (2013). Informed consent was obtained from all participants. The protocol of our study was received ethical approval from An- Najah National University Research Ethics Board (IRB) before data collection was initiated.
- **Consent for publication:** Not applicable.
- **Availability of data and materials:** The datasets generated during and/or analyzed during the current study are available from the corresponding author on request
- **Competing interests:** The authors declare that they have no competing interests.
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- **Authors' contributions:** Wael M. F. Abuhassan, Suhail Ahmad Dar, and Veysel Kaplan prepared the theoretical background section. Osama Ramadan, Joseph Almazan, and Zainalabideen Yasser Jumaa prepared the methodology and analysis sections. Finally, Dana Bdier and Fayez Mahamid prepared the discussion and conclusion sections. . All authors read and approved the final manuscript.
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