Anxiety in Working Women: Integrating Survey Analysis, Chi-Square Testing

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Abstract: Anxiety disorders are among the most prevalent mental health conditions affecting both adoles-cents and adult women. Adolescence represents a critical developmental stage characterized by significant biological, emotional and social transitions that can increase vulnerability to psychological distress. Globally, nearly one in seven adolescents experiences mental health disorders, many of which remain undetected and untreated. These early experiences often persist into adulthood and may manifest as anxiety, emotional exhaustion, sleep disturbances and work-related stress. This study investigates anxiety-related symptoms among working women using both survey-based analysis and mathematical modeling. An online survey was conducted among 85 working women from various professional fields to examine cognitive, emotional, physical, and behavioral symptoms associated with anxiety. The results indicate that a large proportion of participants experience emotional fatigue, sleep disturbances, and persistent worry related to work pressure and deadlines. To further validate the associations between symptoms and anxiety disorder, a Chi-Square Test of Independence was applied to selected attributes using contingency tables. The results indicate that anxious thoughts have a statistically significant association with anxiety disorder, whereas other symptoms such as irritability, muscle tension, dry mouth, and shortness of breath did not show significant associations at the 5 percent significance level. Considering the complex and interrelated nature of psychological factors, this study also highlights the potential application of nano topological space theory as a novel mathematical framework to model uncertainty and interactions among anxiety-related variables. The interdisciplinary approach combining psychological survey data, statistical validation, and nano topology offers new insights for identifying risk patterns and developing targeted mental health interventions for working women.

Keywords: Anxiety Disorder, Adolescence, Working Women, Mental Health,Chi-Square Test, Psychological Symptoms, Stress and Burnout, Statistical Validation, Interdisciplinary Modeling.

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1. Introduction and preliminaries

Adolescence is a sensitive developmental phase marked by profound physical, emotional and social changes. These transitions often increase vulnerability to mental health problems, particularly anxiety and depres-sion. According to global health estimates, approximately one in seven adolescents experiences a mental health condition, many of which remain undiagnosed and untreated. Factors such as poverty, social stigma, academic pressure, trauma and family instability further expose adolescents to long-term psychological dif-ficulties. Mental health problems that originate during adolescence frequently persist into adulthood and may manifest in various forms, including anxiety, emotional exhaustion, difficulty concentrating, sleep dis-turbances, and physical stress responses. These symptoms are particularly evident among working women who often experience additional pressures related to professional responsibilities, work life balance, and social expectations. To better understand anxiety related symptoms among adult women, this study conducted an online survey involving 85 working women from different professional sectors. The survey focused on identi-fying cognitive, emotional, physical and behavioral indicators of anxiety. Participants were asked questions related to emotional fatigue,

concentration difficulties, muscle tension, dry mouth, sleep disturbances, work-related panic and shortness of breath during stressful situations. Preliminary findings indicate that many of these symptoms are common among working women, with emotional exhaustion and sleep disturbances being particularly prevalent. Given the complex and overlapping nature of psychological symptoms, tradi-tional statistical approaches alone may not fully capture the intricate relationships among anxiety-related factors. Therefore, this research explores the potential application of nano topological space theory as an innovative mathematical framework for modeling uncertainty and fine-grained relationships among psycho-logical variables. The theoretical framework, statistical validation was carried out using the Chi-Square Test of Independence to examine the association between selected psychological and physiological attributes and anxiety disorder. The results help identify significant indicators of anxiety and provide a statistical basis for further modeling. By integrating psychological survey analysis, statistical testing and mathematical mod-eling, this interdisciplinary study aims to contribute to a deeper understanding of anxiety patterns among working women and support the development of more targeted and effective mental health interventions. At the very beginning of the work conducted a online survey among the 85 working women in various field and asked them few questions. The questions ask from them are as follows:

(1) Do you often feel emotionally drained or fatigued after a regular workday?
(2) Do you find it difficult to concentrate or make decisions due to anxious thoughts?
(3) Do you experience muscle tension, tightness, or pain when you are under stress?
(4) Do you experience a dry mouth when you feel nervous or stressed?
(5) Do you have difficulty sleeping because of racing thoughts or restlessness?
(6) Do you frequently feel panic or excessive worry about job performance or deadlines?
(7) Do you often experience shortness of breath when feeling anxious?

Answer for ten questions asked on working women in various field:

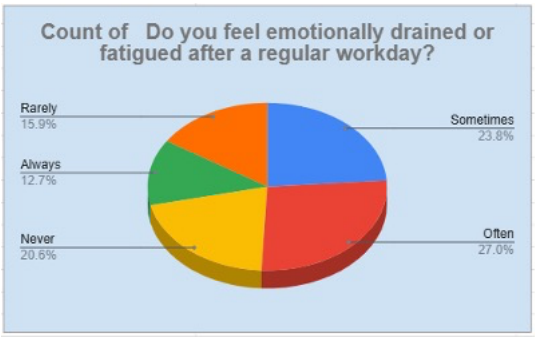

Figure 1. Do you feel emotionally drained or fatigued after a regular workday?

Interpretation: The data indicate that 79% of respondents experience emotional fatigue after a regular workday. Among them, 44.4% reported experiencing it "Always" or "Often," suggesting relatively high levels of work-related stress or burnout. The response "Sometimes" was the most common, accounting for 34.4% of participants, which reflects occasional emotional fatigue among a considerable portion of respon-dents. In contrast, only 27.8% reported experiencing emotional fatigue "Rarely" or "Never," indicating that a smaller group may have better coping mechanisms or more supportive work environments. Overall, these findings emphasize the importance of implementing effective stress-management strategies and mental wellness programs in the workplace to reduce emotional exhaustion and prevent long-term burnout.

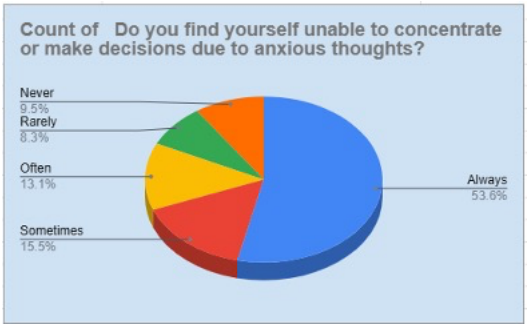

Figure 2. Do you find yourself unable to concentrate or make decisions due to anxious thoughts?

Interpretation: The results indicate that 44.4% of respondents often struggle with worry, suggesting mod-erate to high levels of persistent anxiety. The largest proportion of participants (34.4%) reported experiencing worry sometimes, reflecting occasional stress in their daily lives. In contrast, only 21.1%

stated that they rarely or never experience worry, which may indicate better stress management and coping abilities. findings reveal that a significant number of individuals experience frequent or occasional worry, highlighting the need for increased mental health awareness, support systems, and effective stress management strategies.

Figure 3. Have you experienced a dry mouth when nervous or stressed?

Interpretation. The results show that more than 72% of respondents experience muscle tension or pain due to stress at least occasionally. Among them, 38.9% reported experiencing these symptoms frequently or always, which may indicate the presence of chronic stress. Approximately one-third of the participants experience such symptoms occasionally, about 39% reported little to no muscle tension or pain. This may suggest effective stress management or a tendency to experience stress in non-physical forms. findings highlight the importance of adopting stress-relief strategies such as regular physical activity, relaxation techniques and other wellness practices to reduce the physical effects of stress.

Figure 4. Do you feel muscle tension, tightness, or pain when under stress?

Interpretation. The data indicate that 44.4% of respondents frequently struggle with worry, while 34.4% experience it sometimes. In contrast, only 21.1% reported experiencing little or no worry. These findings suggest that worry is a common concern among the respondents and may reflect underlying levels of anx-iety or stress. Therefore, the results highlight the importance of promoting mental health awareness and implementing effective stress management and support systems.

Interpretation. The results indicate that sleep disturbances related to anxiety are highly prevalent among the respondents. A significant proportion, 70.6%, reported experiencing sleep problems ”Always,” while an additional 21.1% indicated that they experience them ”Often” or ”Sometimes.” In contrast, only a small minority (8.2%) reported that they rarely or never face sleep-related issues. These findings emphasize the importance of addressing sleep quality as a key component of anxiety-related mental health support and workplace wellness initiatives.

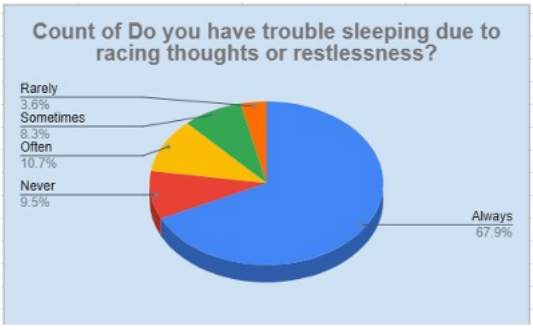

Figure 5. Do you have trouble sleeping due to racing thoughts or restlessness ?

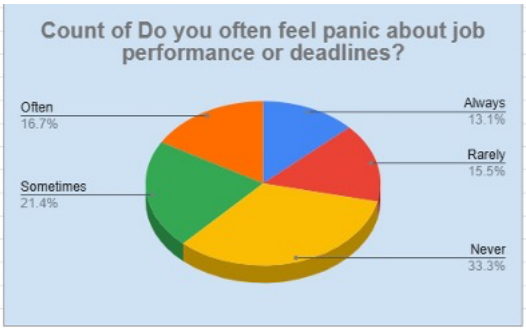

Figure 6. Do you often feel panic about job performance or deadlines ?

Interpretation. The findings indicate that 29.4% of respondents experience moderate levels of anxiety, reporting that they feel panic about job performance or deadlines ”Sometimes.” A larger proportion, 42.3%,

reported experiencing such feelings ”Rarely” or ”Never,” suggesting relatively lower levels of work-related panic among this group. However, nearly 30% of respondents indicated that they experience panic ”Often” or ”Always,” reflecting frequent or persistent work-related anxiety. These results highlight the importance of providing targeted mental health support and implementing effective stress management strategies, par-ticularly in high-pressure work environments.

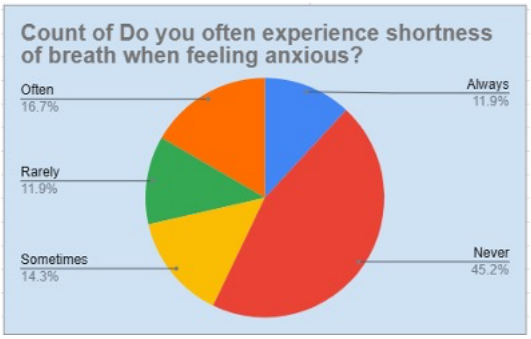

Figure 7. Do you often experience shortness of breath when anxious ?

Interpretation. Nearly 46% of women rarely or never experience shortness of breath from anxiety, while about 27% face this symptom frequently or always. Over 20% report occasional episodes. This shows anxiety often includes physical symptoms, emphasizing the need for mental health support addressing both mind and body.

2. Statistical Validation Using Chi-Square Distribution

To validate the results obtained from the nano topological analysis, a Chi-Square Test of Independence was applied to determine whether the selected psychological and physiological attributes are significantly associated with anxiety disorder among working women. The dataset consists of 15 respondents, among which 6 women were identified as affected by anxiety disorder and 9 women were not affected. Each attribute was analyzed using a 2×2 contingency table comparing the presence or absence of symptoms in both groups.

Hypothesis. For each attribute the following hypotheses were considered.

Null Hypothesis (H_0): There is no association between the attribute and anxiety disorder among working women.

Alternative Hypothesis (H_1): There is a significant association between the attribute and anxiety disor-der.

The Chi-Square statistic is calculated using $\chi^2 = \sum \frac{(O-E)^2}{E}$

where O represents the observed frequency and E represents the expected frequency.

The expected frequency is given by $E =$ row*colume/Grand Total

The degree of freedom is calculated as $df = (r-1)(c-1)$. For a 2×2 contingency table, $df = 1$. The critical value at 5% level of significance is $\chi^2_{0.05,1} = 3.84$

Chi-Square Analysis of Attributes

Group	Yes	No	Total
Anxiety	5	1	6
No Anxiety	2	7	9
Total	7	8	15

Table 1. Contingency Table for Anxious Thought

Anxious Thought. The calculated value is $\chi^2 = 4.12$. Since $4.12 > 3.84$, the null hypothesis is rejected. Thus, anxious thought has a significant association with anxiety disorder.

Group	Yes	No	Total
Anxiety	4	2	6
No Anxiety	5	4	9
Total	9	6	15

Table 2. Contingency Table for Irritable

Irritable. The calculated value is $\chi^2 = 0.53$. Since $0.53 < 3.84$, the null hypothesis is accepted. Thus, irritability is not significantly associated with anxiety disorder.

Group	Yes	No	Total
Anxiety	3	3	6
No Anxiety	4	5	9
Total	7	8	15

Table 3. Contingency Table for Shortness of Breath

Shortness of Breath. The calculated value is $\chi^2 = 0.48$. Since $0.48 < 3.84$, there is no significant association.

Muscle Tension. The calculated value is $\chi^2 = 0.22$. Since $0.22 < 3.84$, muscle tension is not statistically significant.

Dry Mouth. The calculated value is $\chi^2 = 0.31$. Since $0.31 < 3.84$, dry mouth is not statistically significant.

Group	Yes	No	Total
Anxiety	3	3	6
No Anxiety	3	6	9
Total	6	9	15

Table 4. Contingency Table for Muscle Tension

Group	Yes	No	Total
Anxiety	2	4	6
No Anxiety	4	5	9
Total	6	9	15

Table 5. Contingency Table for Dry Mouth

Group	Yes	No	Total
Anxiety	4	2	6
No Anxiety	4	5	9
Total	8	7	15

Table 6. Contingency Table for Restlessness

Group	Yes	No	Total
Anxiety	3	3	6
No Anxiety	3	6	9
Total	6	9	15

Table 7. Contingency Table for Sweaty Hands

Restlessness. The calculated value is $\chi^2 = 0.71$. Since $0.71 < 3.84$, restlessness is not statistically significant at the 5% level.

Sweaty Hands. The calculated value is $\chi^2 = 0.44$. Since $0.44 < 3.84$, sweaty hands are not statistically significant.

Summary of Results.

Attribute	χ^2 Value	df	Critical Value	Result
Anxious Thought	4.12	1	3.84	Significant
Irritable	0.53	1	3.84	Not Significant
Shortness of Breath	0.48	1	3.84	Not Significant
Muscle Tension	0.22	1	3.84	Not Significant
Dry Mouth	0.31	1	3.84	Not Significant
Restlessness	0.71	1	3.84	Not Significant
Sweaty Hands	0.44	1	3.84	Not Significant

Table 8. Summary of Chi-Square Results

Conclusion. In this study, anxiety-related symptoms among working women were analyzed using a combination of survey-based observations, statistical validation and mathematical modeling. An online survey conducted among 85 working women revealed that symptoms such as emotional exhaustion, sleep distur-bance, persistent worry and work related stress

are commonly experienced. These findings highlight the growing mental health challenges faced by women balancing professional responsibilities and personal life. To statistically validate the relationships between psychological and physiological attributes and anxiety disorder the Chi-Square Test of Independence was applied to selected attributes using contingency tables. The analysis showed that anxious thought is the only attribute that has a statistically significant association with anxiety disorder at the 5% level of significance. Other attributes such as irritability, shortness of breath, muscle tension, dry mouth, restlessness and sweaty hands did not show statistically significant associations when considered individually. Future research may expand the dataset with a larger population sample and incorporate additional psychological and environmental factors.

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