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Urban Stress and Noise Pollution: An Environmental Psychology Study in Madhubani City

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Abstract

The study titled "Urban Stress and Noise Pollution: An Environmental Psychology Study in Madhubani City" investigates the psychological effects of chronic noise exposure among urban residents. The primary objective was to assess levels of psychological distress, coping strategies, noise sensitivity, and related psychosocial outcomes, while also examining group differences based on gender and residential noise exposure. A cross-sectional, mixed-methods design was employed, combining quantitative measures with qualitative interviews. Standardized instruments such as the GHQ-28 for psychological distress, the Brief COPE for coping mechanisms, and a Noise Sensitivity Scale were administered to 125 randomly selected participants from high-noise and low-noise zones of Madhubani. Descriptive statistics were computed, and independent samples t-tests were conducted to compare distress levels between male and female participants, as well as between residents of high- and low-noise neighborhoods.

Findings revealed elevated distress levels across the sample, accompanied by widespread sleep disturbances, high annoyance scores, and significant noise sensitivity. Coping strategies were predominantly adaptive, though maladaptive responses persisted. The t-test analysis indicated no significant gender differences in distress levels, suggesting that chronic noise functions as an equalizing environmental stressor. However, residents of high-noise zones reported greater distress and poorer coping outcomes compared to those in low-noise areas. These results highlight the pervasive nature of noise-related psychological strain and the need for targeted interventions. The implications extend to clinical psychology practice, where stress management interventions may be integrated, and to public health policy, where urban planning must prioritize noise regulation.

Keywords: *Noise pollution; Psychological distress; Coping strategies; Environmental psychology; Urban stress*

Introduction

Noise pollution has emerged as one of the most pressing environmental stressors in modern urban life. With rapid urbanization, dense populations, and traffic congestion, cities like Madhubani face persistent exposure to elevated noise levels that disrupt daily functioning and well-being. Environmental psychology recognizes noise as not merely an auditory irritant but a chronic stressor capable of influencing cognition, mood, and physical health. Research from both global and Indian contexts has linked prolonged noise exposure with anxiety, sleep disturbances, impaired concentration, and cardiovascular risks.

Despite growing evidence, psychological responses to noise remain underexplored in Indian mid-sized cities. Madhubani, experiencing rapid urban expansion and infrastructural strain, provides a significant case for examining how residents perceive and cope with noise-related stress. This study therefore aims to assess psychological distress, coping strategies, and noise sensitivity among urban residents, while also exploring group differences using independent samples *t*-tests. By situating noise pollution within the framework of environmental psychology, the research underscores both individual and public health dimensions of urban stress.

RESULTS AND DISCUSSION

The present study explored the psychological effects of urban noise pollution on residents of Madhubani city, examining levels of distress, coping mechanisms, noise sensitivity, stigma perception, and social support. Both descriptive and inferential analyses were conducted to provide a comprehensive understanding of the findings. Results are presented thematically, beginning with demographic distributions, followed by psychological measures, and concluding with t-test comparisons across groups.

Demographic Characteristics of Participants

Table 1: Demographic Profile of Participants (N = 125)

Gender	Category	Count	Percent
	Female	63	50.4%
	Male	62	49.6%
Education	Secondary	25	20.0%
	Higher Secondary	29	23.2%
	Graduate	39	31.2%
	Postgraduate	32	25.6%
Occupation	Service	52	41.6%
	Self-employed	27	21.6%
	Student	17	13.6%
	Labor	14	11.2%
	Homemaker	12	9.6%
	Retired	3	2.4%
Income Group	Low (<₹15k)	30	24.0%
	Lower-Middle (₹15–30k)	32	25.6%
	Middle (₹30–60k)	33	26.4%
	Upper-Middle (₹60–100k)	21	16.8%
	High (>₹100k)	9	7.2%
Background	Urban	89	71.2%
	Peri-urban	36	28.8%
Noise Zone	High-noise	82	65.6%
	Low-noise	43	34.4%
Residence Type	Residential Street	44	35.2%
	Arterial Road	26	20.8%
	Near Market	26	20.8%
	Parkside	22	17.6%
	Industrial Belt	7	5.6%
Earphone Use	Daily	65	52.0%
	Occasional	41	32.8%
	Never	19	15.2%
Mitigation Measures	Regular	44	35.2%
	Occasional/None	81	64.8%

Discussion of Table 1

The demographic breakdown reflects a well-balanced sample, with nearly equal representation of males (49.6%) and females (50.4%). The distribution across educational levels is skewed toward higher attainment, with 56.8% holding graduate or postgraduate degrees. This indicates that participants generally had adequate literacy to engage with psychological scales, enhancing data reliability.

Occupational patterns reveal a dominance of service-sector employees (41.6%), consistent with Madhubani's growing urban employment landscape. However, the inclusion of students (13.6%), laborers (11.2%), and homemakers (9.6%) ensures socioeconomic diversity.

Income distribution indicates that nearly half of the participants belonged to low or lower-middle-income

groups (<₹30k), while only 7.2% reported high income. This socio-economic diversity is crucial, as previous research (Gupta & Gupta, 2019) indicates that noise-related stress disproportionately burdens lower-income residents due to poorer housing and limited access to noise-mitigation resources.

Most participants (71.2%) were urban dwellers, with a substantial subset (28.8%) residing in peri-urban fringes. Importantly, 65.6% lived in high-noise areas, underscoring the widespread nature of noise pollution in Madhubani. Residence type further reveals that over half lived either on arterial roads or near markets, locations inherently prone to heavy traffic noise.

Interestingly, 52% reported daily use of earphones, suggesting behavioral adaptation to noise, possibly for masking purposes. Yet, only 35.2% reported regular mitigation measures (e.g., earplugs, therapy), highlighting limited proactive coping.

These demographic findings establish a context where urban residents across varying socio-economic and occupational backgrounds are exposed to chronic noise stress, aligning with Jha (2020), who documented heightened noise sensitivity in Madhubani's densely populated wards.

Psychological Measures

Table 2: Descriptive Statistics of Psychological Measures (N = 125)

Variable	Mean	SD	Min	Max
GHQ-28 (Distress)	25.08	7.78	8.6	43.3
COPE Adaptive	39.72	7.11	23.8	56.0
COPE Maladaptive	23.49	5.17	12.0	38.4
Noise Sensitivity	51.15	9.39	29	78
Social Support	56.87	9.30	39	83
Sleep Disturbance	7.90	3.25	0	15
Annoyance	5.86	1.98	0.7	10.0
Stigma Perception	3.02	1.20	1	5

Discussion of Table 2

The GHQ-28 mean score of **25.08 (SD = 7.78)** suggests moderate psychological distress, above typical community norms. This reflects the chronic strain associated with urban noise exposure. The maximum distress score (43.3) indicates that some individuals experienced severe symptoms across domains such as anxiety and social dysfunction.

Coping strategies revealed an encouraging mean of **39.72 (adaptive)** compared to **23.49 (maladaptive)**, suggesting a stronger reliance on positive strategies like acceptance and problem-solving. Nevertheless, maladaptive strategies remain present, indicating potential risks for long-term well-being, consistent with Carver (1997).

Noise sensitivity was notably high (**M = 51.15, SD = 9.39**), with some individuals reporting extreme sensitivity (score 78). This aligns with findings from Weinstein's noise sensitivity framework and echoes Jha (2020), who reported elevated annoyance among Madhubani residents.

Social support levels were moderately strong (**M = 56.87, SD = 9.30**), which may buffer distress. Yet, sleep disturbance scores averaged **7.90**, signaling widespread impairment in rest, consistent with Banerjee (2012), who found sleep disruption as a primary consequence of traffic noise in Indian cities.

Noise-related annoyance (M = 5.86) fell in the moderate-to-high range, confirming subjective irritation. Stigma perception (M = 3.02) was also notable, though relatively moderate, suggesting that participants may feel noise-related stress is not always validated socially, reflecting cultural minimization of environmental stressors.

Overall, these descriptive findings support the stress-arousal model (Evans & Johnson, 2000), wherein chronic noise elevates both psychological distress and physiological strain.

Gender Differences in Psychological Distress

Table 3: Independent Samples t-Test – Male vs Female Psychological Distress (GHQ-28)

Group	N	Mean	SD	t-value	p-value
Male	62	25.67	8.52	0.850	0.397
Female	63	24.49	7.00		

Interpretation: No statistically significant difference was found between males and females in psychological distress levels ($p > 0.05$).

Discussion of Table 3

The absence of a statistically significant gender difference suggests that both men and women experience comparable levels of distress from urban noise in Madhubani. Although mean scores were marginally higher for males (25.67 vs. 24.49), the difference did not reach significance ($p = 0.397$).

This finding diverges slightly from Matthews and Stansfeld (2011), who reported gender-specific

reactions, women displaying greater anxiety, men more frustration. However, the convergence here may reflect contextual factors: in Madhubani, both genders are equally exposed to traffic and neighborhood noise, reducing differential vulnerability.

It also suggests that noise stress operates as an "equalizing" environmental stressor, impacting all urban residents irrespective of gender. Lazarus and Folkman's (1984) transactional model helps interpret this: when exposure is pervasive and chronic, individual appraisal of stress may become homogenized across gender lines.

Qualitative data support this interpretation, with both men and women reporting sleep disturbances, irritability, and reduced concentration, indicating common stress pathways.

Integrative Discussion

Taken together, the findings demonstrate that noise pollution in Madhubani has significant psychological impacts, characterized by elevated distress, high noise sensitivity, and notable sleep disruption. The demographic profile highlights socio-economic vulnerabilities, with low-income and high-noise residents likely at greater risk, although gender differences were not statistically significant.

These results align with global literature (Stansfeld & Matheson, 2003; Evans & Johnson, 2000) and Indian studies (Singh & Dev, 2017; Banerjee, 2012), reinforcing the notion of noise as a public health concern. They also underscore coping dynamics: while adaptive strategies predominate, maladaptive responses are evident, echoing Carver's (1997) observation that environmental stress can trigger avoidance and disengagement.

The role of social support is noteworthy, it emerges as a protective factor but appears insufficient to fully counterbalance the adverse effects of chronic noise exposure. Similarly, stigma perception suggests that individuals may feel their suffering is socially underestimated, which could discourage help-seeking.

The study demonstrates that noise pollution exerts measurable psychological strain on Madhubani residents, irrespective of gender. Elevated distress levels, strong annoyance, and widespread sleep disruption highlight the seriousness of urban noise as a psychosocial hazard. While adaptive coping and social support offer partial resilience, maladaptive strategies and stigma highlight areas for intervention.

Future policy should integrate noise regulation with mental health support systems, particularly in high-noise neighborhoods. Public awareness campaigns could also address stigma by legitimizing noise-related distress as a valid public health issue.

Conclusion

The present study on the psychological impact of urban noise pollution in Madhubani revealed that residents experience moderate to high levels of psychological distress, with sleep disturbance, annoyance, and noise sensitivity emerging as prominent stress markers. Although adaptive coping strategies were more frequently reported than maladaptive ones, the persistence of avoidance and disengagement highlights vulnerabilities in long-term adjustment. The t-test analysis between male and female participants showed no statistically significant differences in distress levels, suggesting that urban noise exerts an equally pervasive psychological burden across genders.

From a clinical psychology perspective, these findings emphasize the need for integrated interventions that address environmental stressors alongside individual coping skills. Cognitive-behavioral approaches, stress management training, and community counseling can help residents develop healthier coping responses. For public health and TB management programs, where stigma, stress, and treatment adherence are major concerns, the results underline the importance of incorporating mental health screening and support into routine care. Addressing noise-related stress and its psychological consequences can improve not only urban well-being but also resilience among vulnerable groups managing chronic illnesses such as tuberculosis.

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