

Brain Fog In Relation to Social Well-Being: Exploring the Mediating Role of Quality of Life

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Abstract

Brain fog, a subjective difficulty in memory, attention, and mental clarity, has become increasingly prominent in the general population, especially in the post-COVID-19 context. Although it is primarily reported in clinical populations, recent literature suggests a broader range of associations. Specifically, when a more holistic approach to psychological treatment is considered, understanding its relationship with Quality of Life and Social Well-being becomes essential. Accordingly, the present empirical investigation aimed to examine the relationships among brain fog, Quality of Life, and Social Well-being in adults from the general population. To accomplish the objectives of the study, a correlational research design was employed, and standardised measures were administered to 157 adults aged 40–59 years from the general population. Participants completed an online survey comprising self-report measures for each variable. The findings of the study indicated that brain fog was negatively associated with Quality of Life ($r = -0.69$, $p < .001$) and Social Well-being ($r = -0.37$, $p < .001$). Further, mediation analysis revealed that brain fog had a significant total effect on Social Well-being ($b = -0.18$, $\beta = -0.37$, $p < .001$), with this relationship being significantly mediated by Quality of Life. The indirect effect was statistically significant ($b = -0.09$, $\beta = -0.18$, 95% bias-corrected bootstrap CI $[-0.162, -0.021]$). This study provides insight into how subjective cognitive difficulties relate to well-being in everyday life. These findings may contribute to holistic future interventions to enhance the Quality of Life and alleviate the negative impact of brain fog on Social Well-being.

Keywords: *brain fog, Quality of Life, Social Well-being, general population, mediation, cognitive symptoms.*

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Introduction

Brain fog (BF) has increasingly gained attention as a subjective cognitive experience, particularly in the post-COVID-19 context (Kucyi & Davis, 2015; Yong, 2022). It is commonly reported through symptoms such as forgetfulness, mental cloudiness, reduced concentration, and fatigue, with individuals describing difficulties in executing tasks that were previously manageable (Krishnan et al., 2022; Premraj et al., 2022; Callan et al., 2022). Literature suggests that it cannot be isolated as a discrete clinical condition, but is better understood as a perceived cognitive dysfunction—an internal experience of reduced cognitive capacity that may not always be captured through objective neuropsychological assessment (Rahman et al., 2020; Fernández-de-Las-

Peñas et al., 2021; McWhirter et al., 2024). This highlights brain fog as an individual-specific lived cognitive experience that influences daily functioning even in the absence of measurable deficits.

Emerging literature highlights brain fog within a broader transdiagnostic, continuum-based framework. This suggests that brain fog is not limited to a single condition but is evident across a range of neuropsychiatric and medical conditions, as well as in the general population (Orfei et al., 2022; Haywood et al., 2025). This further undermines the need to investigate brain fog as a significant part of psychosocial and health-related experience that can significantly shape an individual's Quality of Life.

Quality of Life (QoL) can serve as a critical lens for exploring the impact of

brain fog on an individual's well-being. Quality of Life reflects an individual's appraisal of their overall life circumstances, embedded within existing cultural context, personal values, goals, and expectations (WHO, 1995). It is considered as a comprehensive indicator of overall functioning, which comprises multiple domains like physical health, psychological well-being, social relationships, and environmental conditions.

Continuous experiences of mental fatigue and difficulty concentrating may result in decreased levels of productivity and a reduced sense of effectiveness, thereby negatively impacting perceived life satisfaction. Recent literature consistently indicates that cognitive difficulties, when accompanied by fatigue and psychological distress, are linked with lower levels of Quality of Life (Dickinson et al., 2024; Brodén et al., 2024; Puspita, 2023). This relationship can be better understood as operating through two distinct pathways. On one hand, brain fog-related cognitive limitations are directly impacting daily tasks, leading to reduced overall productivity. On the other hand, it indirectly impacts overall well-being by causing emotional frustration and increased distress. This further brings out Quality of Life as a key contributor in linking subjective cognitive experiences to broader indicators of well-being (Dass et al., 2025).

Quality of Life, as a comprehensive construct, encompasses social relationships that are an integral part of Social Well-being (Social Well-being), indicating a close connection between the two. Keyes (1998) identified five key dimensions of Social Well-being, namely social integration, acceptance, contribution, actualisation, and coherence, focusing on both the overall quality of social relationships and the individual's sense of connectedness and purpose within society. Research indicates that higher levels of Social Well-being are associated with better psychological adjustment, improved health outcomes, and slower progression of

physical decline (Saadeh et al., 2022). This provides evidence of a strong association between Social Well-being and Quality of Life, further underscoring Social Well-being as a vital component of holistic well-being, encompassing an individual's social perception within the community and extending beyond individual functioning.

Cognitive challenges, such as brain fog, can have major effects on Social Well-being. Difficulties in attention, memory lapses, and reduced mental clarity can obstruct effective communication, disrupt social interactions, and decrease participation in everyday activities. With time, these challenges may lead to social withdrawal, reduced confidence in interpersonal settings, and a diminished sense of social contribution. Evidence suggests that health-related conditions involving cognitive impairments often have broader psychosocial consequences, influencing developmental trajectories and social functioning (Borel et al., 2022). Consistent with this, recent work highlights that experiences of brain fog may interfere with social engagement and the maintenance of meaningful relationships, indicating a potential pathway through which cognitive difficulties impact Social Well-being (Dass & Packham, 2024).

Taken together, the existing literature suggests that brain fog is a subjective cognitive experience with implications beyond internal cognitive processes. Its impact is not limited to thinking and attention but also extends to Quality of Life and Social Well-being, both of which contribute to overall mental health. Established as a transdiagnostic, continuum-based construct, the nature of brain fog further underscores its relevance beyond formal clinical diagnoses. Examining the relationship among brain fog, Quality of Life, and Social Well-being provides a clear understanding of how everyday cognitive challenges may influence broader psychosocial functioning and affect various domains of well-being. Such an approach contributes to existing

knowledge while also emphasising the need to address these experiences within both research and applied psychological settings. Considering the rich evidence from Western countries, the present study would open a window to analyse the psychological attributes associated with brain fog through the lens of the Indian sociocultural perspective. For this purpose, the present investigation aims to achieve the following objectives:

- i. To examine the levels of experience with brain fog, Quality of Life, and Social Well-being.
- ii. To assess the strength, direction and nature of association between brain fog, Quality of Life and Social Well-being.
- iii. To evaluate the mediating role of Quality of Life between brain fog and Social Well-being.

Hypotheses

- i. Brain fog would be negatively associated with Quality of Life and Social Well-being
- ii. There would be a positive association between Quality of Life and Social Well-being
- iii. Quality of Life would emerge as a mediating Variable

METHOD

Research Design:

The current study adopted a correlational design to examine the relationships among brain fog, Quality of Life, and Social Well-being. Further, a mediation model was tested to examine the indirect effect of brain fog on Social Well-being through Quality of Life.

Participants:

Using the G*Power tool (Faul et al., 2009), an a priori power analysis was conducted under the family-wise Exact type, with the statistical test set to *Correlation*. The analysis was based on an effect size of 0.70, with an alpha level set at 0.05 and desired statistical power of 0.95. The initially estimated sample size required for the study was 115 participants.

Accounting for a 10% anticipated dropout rate, the adjusted target sample size was increased to 130 participants (Faul et al., 2007). Ultimately, data were obtained from 170 individuals, of whom 157 met the eligibility criteria and were retained for the final analysis.

A total of 157 adults aged 40–59 years residing in Delhi NCR participated in the study. Participants were included if they had completed high school education or higher, self-reported the ability to read and understand English, and were able to provide informed consent. A well-defined sociodemographic data sheet was used to collect demographic details, including age, gender, education, occupation, family type, and languages known. Further, individuals with a history of any major psychiatric or neurological disorders were excluded from the study.

Measures

A self-developed socio-demographic sheet was used for collecting information on various important components of the individual, including name, age, sex, date of birth, socioeconomic status, family type, occupation, languages known, and any present or past history of physical, neurological, or psychiatric problems. To assess brain fog, the Brain Fog Scale (Atik & Manav, 2023), a 30-item self-report measure rated on a 5-point Likert scale, was used. The scale comprises three subscales: Cognitive Symptoms, Physiological Symptoms, and Psychological Symptoms. Higher scores indicate greater levels of brain fog (Cronbach's $\alpha = .95$). Quality of Life was assessed using the WHO Quality of Life-BREF, Hindi version (Saxena, 1998), a 26-item self-report measure. Items are scored on a 5-point Likert scale. It has demonstrated acceptable reliability in Indian populations (domain alphas typically 0.66–0.84). The Social Well-being Scale (Keyes, 1998) is a 15-item, 7-point Likert-type self-report scale that assesses Social Well-being. Cronbach's α coefficients for the domains range from

0.41 to 0.81, indicating varying levels of internal consistency.

Procedure

This study received Institutional Review Board (IRB), Christ (Deemed-to-be) University approval RCEC/00533/05/25 dated 14/05/2025. Data were collected through a secure online survey conducted via Google Forms, with all measures presented in English. The survey included an informed consent section in accordance with the Declaration of Helsinki, ensuring voluntary participation, confidentiality, and anonymity. Participants could proceed to the questionnaire only after providing consent. Participants were recruited through community and institutional outreach initiatives including yoga groups, public parks, and residential societies. Participation was entirely voluntary, and no identifying information was collected. A total of 170 individuals were approached, of whom 157 participants completed the survey and were included in the final analysis. All measures were self-administered and required approximately 10–15 minutes to complete.

Statistical Analysis

Data were analysed using Jamovi Project (Version 2.7). Descriptive statistics, Pearson's correlation analysis, and mediation analysis were conducted. Indirect effects were evaluated using bias-corrected bootstrap confidence intervals based on 5,000 bootstrap samples.

RESULTS

The present study was conducted with the major objectives of establishing associations among Quality of Life, brain fog, and Social Well-being, and of assessing levels of brain fog, Quality of Life, and Social Well-being. To achieve these objectives, statistical results are presented in the following tables..

Table 1 reveals that, for this study, most participants experience a moderate level of BF ($M = 75.40$), suggesting that most participants occasionally experience symptoms such as lack of focus and clarity, difficulty with multitasking, inadequacy, difficulty managing emotions, and ineffectiveness in communication, but these symptoms do not severely hamper their day-to-day lives. In contrast, high scores on Quality of Life were reported, indicating a higher Quality of Life ($M = 93.00$), suggesting that participants perceive their Quality of Life as good across all domains, i.e., physical health, psychological well-being, social relationships, and environmental well-being, better in relation to their goals, expectations, standards, and concerns within the context of their culture and value systems. On the other hand, scores were in the moderate range ($M = 63.50$) for Social Well-being, indicating that participants do not perceive their Social Well-being as flourishing, but neither are they experiencing major difficulties in their social functioning. Further implying that their experience is primarily shaped by the life circumstances they are going through.

Table 1

Summary of Descriptive Statistics and Coefficient of Correlation

Variables	Mean	SD	Brain Fog (BF)	Quality of Life (QoL)
Brain Fog (BF)	75.40	22.80	—	
Quality of Life (QoL)	93.00	16.10	-0.69***	—
Social Well-being (SWB)	63.50	11.00	-0.37***	0.39***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

To accomplish the objective of associations between variables of study, values of Pearson's coefficient of

correlation indicate that brain fog is a significant negative correlate of Quality of Life ($r = -0.69$; $p < .001$) and Social Well-

being ($r = -0.37$; $p < .001$). Furthermore, Quality of Life was a significant positive correlate of Social Well-being ($r = 0.39$; $p < .001$). Hence, the findings of the correlation analysis are consistent with the hypotheses.

The trends from the correlation analysis suggest that participants with a higher level of brain fog (lack of focus and clarity, difficulty with multitasking, inadequacy, difficulty managing emotions, and ineffectiveness in communication) will have difficulty attaining a better Quality of Life (psychological health, physiological health, healthy social relationships and environmental well being) and experiencing Social Well-being (appraising social circumstances and accordingly function in the social context). The observed trends suggest that participants with higher levels of Brain Fog (lack of focus and clarity, difficulty with multitasking, inadequacy, difficulty managing emotions, and ineffectiveness in communication) tended to report poorer Quality of Life (psychological health, physiological health, healthy social relationships and environmental well being) and lower Social Well-being (appraising social

circumstances and accordingly function in the social context).

Given the significant correlations among the study variables, a mediation analysis was conducted to examine the total, direct, and indirect effects of brain fog on Social Well-being, with Quality of Life as the mediator. The total effect of brain fog on Social Well-being was statistically significant ($b = -0.18$, $\beta = -0.37$, $p < .001$, 95% bias-corrected bootstrap CI $[-0.272, -0.090]$). However, after including Quality of Life as the mediator, the direct effect of brain fog on Social Well-being was no longer statistically significant ($b = -0.09$, $\beta = -0.19$, $p = .09$, 95% bias-corrected bootstrap CI $[-0.205, 0.019]$). The indirect effect of brain fog on Social Well-being through Quality of Life was statistically significant ($b = -0.09$, $\beta = -0.18$, 95% bias-corrected bootstrap CI $[-0.162, -0.021]$). These findings suggest that Quality of Life significantly mediates the relationship between brain fog and Social Well-being. Specifically, individuals with higher levels of brain fog reported poorer Quality of Life, which, in turn, was associated with poorer Social Well-being.

Table 2[a]

Summary of Indirect Effect in Mediation Analysis

Path between	b	SE	β	z	p	95% BC Bootstrap CI
Brain Fog $\Rightarrow$ Quality of Life $\Rightarrow$ Social Well-being	-0.09	0.04	-0.18	-2.25	0.02	$[-0.162, -0.021]$

Note. b = unstandardized coefficient; SE = standard error; β = standardized coefficient; $z = z$ statistic; BC = bias-corrected; CI = confidence interval; p = significance level.

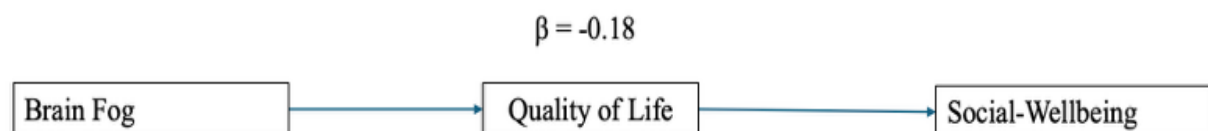


Fig. 1[a]: Path diagram for Indirect Effect

Further, brain fog significantly predicted Quality of Life ($b = -0.48$, $\beta = -0.69$, $p < .001$, 95% bias-corrected

bootstrap CI $[-0.571, -0.387]$), indicating that higher brain fog was associated with poorer Quality of Life. In turn, Quality of

Life significantly predicted Social Well-being ($b = 0.18$, $\beta = 0.26$, $p = .02$, 95% bias-corrected bootstrap CI [0.036, 0.329]), suggesting that higher Quality of Life was associated with higher Social Well-being.

Table 2[b]

Summary of component and Total Effect in Mediation Analysis

Path between	b	SE	β	z	p	95% BC Bootstrap CI
Brain Fog $\Rightarrow$ Quality of Life	-0.48	0.05	-0.69	-10.43	<.001	[-0.571, -0.387]
Quality of Life $\Rightarrow$ Social Well-being	0.18	0.08	0.26	2.31	0.02	[0.036, 0.329]
Brain Fog $\Rightarrow$ Social Well-being	-0.18	0.04	-0.37	-4.39	<.001	[-0.272, -0.090]

NOTE: Social Well-being = Social Well-being; b = unstandard coefficient; SE = Standard Error; β = Standard Coefficient; z = statistic; p = significance level

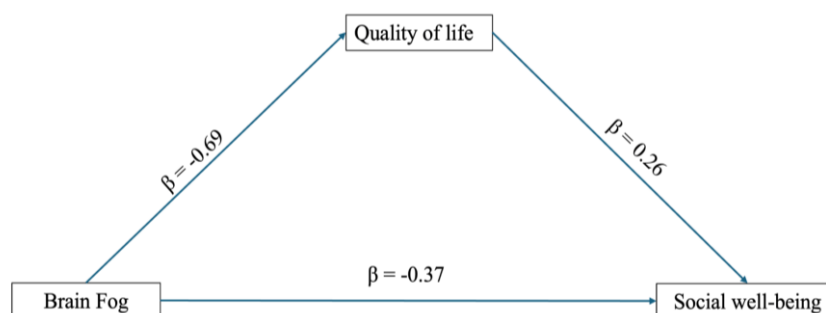


Fig. 1[b]: Path diagram showing Component paths and Total Effect

When Quality of Life was included in the model, the direct effect of brain fog on Social Well-being ($b = -0.09$, $\beta = -0.19$, $p = .09$, 95% bias-corrected bootstrap CI [-0.205, 0.019]) was no longer statistically significant. In contrast, the indirect effect remained statistically significant ($b = -0.087$, 95% bias-corrected bootstrap CI [-0.162, -0.021]), suggesting that Quality of Life mediates the relationship between brain fog and Social Well-being. These findings suggest that the association between brain fog and Social Well-being operates largely through its influence on Quality of Life.

Summary of Direct Effect in Mediation Analysis

Path between	b	SE	β	z	p	95% BC Bootstrap CI
Brain Fog $\Rightarrow$ Social Well-being	-0.09	0.06	-0.19	-1.68	.09	[-0.205, 0.019]

NOTE: b = unstandard coefficient; SE = Standard Error; β = Standard Coefficient; z = effect size; p = significance level

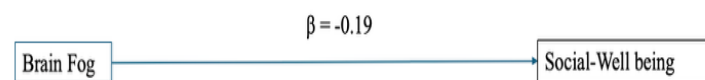


Fig. 1[c]: Path diagram for Direct Effect

Discussion

This study examined the relationships among brain fog, quality of life, and social well-being, with a particular focus on the mediating role of quality of life. The findings indicated that quality of life significantly mediated the association between brain fog and social well-being. Specifically, higher levels of brain fog were associated with poorer quality of life, which, in turn, was associated with poorer social well-being. These findings suggest that the influence of brain fog on social well-being operates largely through its impact on individuals' quality of life.

Brain fog is experienced as difficulties with memory, attention, and mental clarity, disrupting day-to-day functioning, including task completion, communication, and decision-making (Lucius, 2021; Premraj et al., 2022). These challenges may contribute to a reduced quality of life, affecting domains such as psychological well-being, physical health, and overall functioning (McWhirter et al., 2024). As functioning declines, individuals may report reduced productivity, difficulty fulfilling roles, and limited daily engagement, which may further reduce their perceived Quality of Life (Shigematsu et al., 2024; Chatys-Bogacka et al., 2024).

Social Well-being can be understood as an important extension of Quality of Life, wherein reduced Quality of Life may limit social participation, interpersonal relationships, and a sense of integration within the social context

(Boreham, 2016). A possible explanation for the present findings is that the subjective cognitive difficulties associated with brain fog may not directly impair social functioning; rather, they first influence how individuals perceive and evaluate their overall life circumstances. Reduced cognitive functioning may contribute to decreased productivity, difficulty in managing daily tasks, and reduced self-confidence, thereby impacting overall Quality of Life. This reduction in Quality of Life may further affect an individual's social functioning, leading to withdrawal from daily interactions, difficulty in fulfilling social roles, reduced motivation, and low confidence. These findings highlight quality of life as an important psychological mediator through which brain fog may influence social well-being.

Limitations

Despite the valuable insights offered by the present study, the findings should be interpreted in light of certain limitations. The study employed a convenience sampling technique and focused specifically on middle-aged adults (40–59 years), as this developmental stage is particularly relevant to the experience of subjective cognitive difficulties and their implications for Quality of Life and Social Well-being. Consequently, the findings may not be generalizable to younger or older populations, in whom the presentation and correlates of Brain fog may differ. Future research should examine these relationships across different developmental stages to facilitate age-based comparisons. Additionally, the study utilized English-language questionnaires, and eligibility was based on participants' self-reported ability to read and understand English. Although this ensured that participants could comprehend the study measures, the findings may not be

generalizable to individuals from diverse linguistic backgrounds. Future studies may employ culturally adapted and validated versions of these instruments across multiple Indian languages.

Furthermore, brain fog was assessed using a self-report measure, and no objective neuropsychological assessment was included to corroborate participants' subjective cognitive complaints. Although participants with a history of major psychiatric or neurological disorders were excluded from the study, other factors such as sleep quality, medication use, hormonal status, and subclinical psychological symptoms were not statistically examined or controlled for and may have influenced the observed associations. Moreover, while the Brain Fog Scale demonstrated excellent internal consistency in its original validation study, further psychometric evaluation across diverse Indian populations would strengthen its broader applicability. In addition, although the Social Well-being scale is a widely used measure, some of its domains have demonstrated relatively low internal consistency, which may have influenced the precision of the observed associations. Future studies employing larger and more diverse samples, objective cognitive assessments, and longitudinal research designs may provide a more comprehensive understanding of the relationships among Brain Fog, Quality of Life, and Social Well-being.

Conclusion

The present study examined the relationship between brain fog, Quality of Life, and Social Well-being among middle-aged adults, with a particular focus on the mediating role of Quality of Life. The findings demonstrated that greater brain fog was associated with poorer Quality of Life and poorer Social Well-being, with Quality of Life significantly mediating the relationship between brain fog and Social

Well-being. These findings highlight the importance of considering Quality of Life as a key psychological mechanism through which subjective cognitive difficulties may influence Social Well-being.

The study contributes to the growing literature on brain fog by extending the understanding of its psychosocial correlates within the Indian context. The findings underscore the need for a holistic approach in the assessment and management of individuals experiencing brain fog, with interventions aimed not only at addressing subjective cognitive difficulties but also at enhancing Quality of Life to promote better Social Well-being. Such an approach may assist clinicians and mental health professionals in developing comprehensive intervention strategies for individuals experiencing brain fog.

Despite the methodological limitations acknowledged in the present study, the findings provide preliminary evidence for the mediating role of Quality of Life in the relationship between brain fog and Social Well-being. Future research employing longitudinal designs, larger and more diverse samples, culturally validated assessment tools, and objective cognitive measures is warranted to further strengthen the understanding of these relationships and inform the development of evidence-based interventions.

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