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Sustained Cognitive Activation and Recreational Deprivation among Urban Working Indian Women: A Cross-Sectional Study

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Research Article

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Abstract

Background:

Sustained cognitive over-engagement and restricted access to restorative leisure may contribute to subclinical psychological strain among working women. Although constructs such as gendered mental load, psychological detachment, and leisure inequality have been examined independently, their empirical association remains insufficiently quantified. Persistent cognitive activation beyond formal work demands may reduce opportunities for mental recovery, particularly in populations balancing occupational and domestic responsibilities. This study examined the prevalence and association of Mental Hyperactivity (MH) and Recreational Deprivation (FRD) among working Indian women.

Methods:

A cross-sectional survey was conducted among 108 urban working women aged 20–45 years. MH was assessed using a 45-item self-report Likert scale measuring sustained cognitive activation and difficulty disengaging from responsibilities. FRD was measured using a 30-item scale assessing restricted leisure frequency, autonomy, and satisfaction. Item-level missing data (5.02%) were addressed using mean imputation. Internal consistency was evaluated using Cronbach's alpha. Descriptive statistics, midpoint-based prevalence estimates, Pearson correlation, simple and hierarchical regression analyses, and regression diagnostics were performed. Hierarchical regression analysis demonstrated that Mental Hyperactivity remained a significant predictor of Recreational Deprivation after controlling for professional and domestic workload hours ($\Delta R^2 = .612$, $p < .001$).

Results:

Both scales demonstrated excellent internal consistency (MH $\alpha = .958$; FRD $\alpha = .954$). Based on theoretical midpoint classification, 68.52% of participants exhibited elevated MH and 76.85% exhibited elevated FRD. A very strong positive correlation was observed between MH and FRD ($r = .833$, 95% CI [.765, .883], $p < .001$), corresponding to approximately 69% shared variance. Regression diagnostics indicated no multicollinearity concerns. Although substantial, this shared variance should be interpreted cautiously given the self-report measurement context.

Conclusions:

Mental Hyperactivity and Recreational Deprivation were strongly associated in this sample, indicating substantial co-occurrence of sustained cognitive activation and restricted restorative leisure among working women. Although conceptually distinct, the magnitude of association suggests closely

interacting processes within everyday role management. Longitudinal and multi-method research is required to clarify temporal dynamics and potential intervention pathways.

Clinical Trial Registration

Not applicable.

Background

Mental well-being among working women has become an increasingly important focus within contemporary psychological research, particularly in societies characterized by expanding female workforce participation alongside persistent domestic and caregiving responsibilities. As women assume dual roles in professional and household domains, the cognitive and emotional demands associated with coordinating multiple responsibilities may intensify.Classic work–family theory, as proposed by Greenhaus and Beutell [18], identified inter-role conflict as a significant source of strain., Subsequent reviews and meta-analyses by Allen et al. [1], Amstad et al. [2], Frone [15], and Frone et al. [16] have consistently linked work–family conflict to psychological distress, adverse health outcomes, and psychiatric symptoms. Daily process research by Grzywacz et al. [19] further demonstrates spillover effects between occupational and family domains.Although substantial research, including work by Bianchi et al. [4], has examined clinical outcomes such as anxiety, depression, and occupational burnout, comparatively less attention has been devoted to subclinical patterns of sustained cognitive over-engagement that operate below diagnostic thresholds yet may contribute meaningfully to psychological strain.Burnout research, particularly the work of Bianchi et al. [4], has primarily focused on emotional exhaustion and depersonalization within occupational contexts, whereas sustained cognitive activation may extend beyond formal job boundaries and persist across domains.Sustained cognitive activation has been examined within frameworks of perseverative cognition and rumination. The Perseverative Cognition Hypothesis proposed by Brosschot et al. [6] suggests that repetitive thought prolongs physiological activation beyond objective stress exposure. Systematic review evidence provided by Clancy et al. [7] further suggests that perseverative cognition is associated with adverse health-related behaviours and health outcomes.Meta-analytic evidence provided by Ottaviani et al. [33] further confirms associations between repetitive cognition and dysregulated physiological responses. Theoretical reviews by Verkuil et al. [48] further link perseverative cognition to broader somatic disease risk through prolonged activation of stress-related physiological mechanisms. Ehring and Watkins [14] conceptualized repetitive negative thinking as a transdiagnostic process implicated in emotional dysregulation, and Watkins [49] proposed theoretical distinctions between constructive and unconstructive forms of repetitive thought. Empirical experience-sampling studies by Moberly and Watkins [29] demonstrate that ruminative self-focus predicts fluctuations in negative affect in daily life, Segerstrom et al. [37] proposed multidimensional models of repetitive thought that highlight frequency, intrusiveness, and content as defining characteristics. Psychometric analyses by Treynor et al. [47] and Watkins et al. [50] have clarified important distinctions between rumination and worry in non-clinical

populations. Mediation research by Ehring and Ehlers [13] further links rumination to post-traumatic stress outcomes through emotion regulation pathways. Occupational research by Cropley et al. [9] further shows that post-work rumination is associated with maladaptive behaviors and impaired recovery, Theoretical discussions by Cropley and Zijlstra [10] emphasize the persistence of work-related rumination beyond formal working hours.

Conceptualizing Mental Hyperactivity

Mental Hyperactivity (MH), as conceptualized in the present study, refers to sustained cognitive activation characterized by racing thoughts, ongoing task-related preoccupation, compulsive planning, anticipatory rehearsal, intrusive problem-solving, and difficulty disengaging from responsibilities. Unlike acute stress reactions, which are event-bound and transient, MH reflects chronic cognitive engagement across contexts and time periods. From a workload perspective, Meijman and Mulder [27] argued that sustained demands may maintain activation of executive processes, thereby limiting opportunities for restoration.

Positioning Mental Hyperactivity within existing cognitive activation frameworks

Although Mental Hyperactivity (MH) shares conceptual proximity with constructs such as rumination, perseverative cognition, work-related rumination, and cognitive workload, the construct is intended to capture a broader pattern of sustained cross-domain cognitive activation. Existing constructs typically emphasize either affect-laden repetitive thought (e.g., rumination) or work-specific cognitive preoccupation (e.g., work-related rumination). In contrast, MH refers to persistent task-oriented cognitive engagement that spans both occupational and domestic domains and is not necessarily driven by negative affect or threat appraisal.

The construct therefore integrates several cognitive features that may co-occur in everyday role management, including anticipatory planning, mental rehearsal of responsibilities, ongoing task monitoring, and difficulty disengaging from role-related obligations. While these processes may initially support effective functioning under high role demand, persistent activation without adequate recovery opportunities may limit psychological detachment and restorative leisure engagement.

Accordingly, MH is conceptualized as a non-clinical cognitive activation pattern reflecting sustained engagement with responsibilities across multiple life domains. Rather than replacing existing constructs, MH is proposed as an integrative construct capturing the cumulative cognitive activation that may emerge when professional and domestic role demands overlap.

Distinguishing Mental Hyperactivity from Related Constructs

Mental Hyperactivity (MH), although conceptually informed by existing frameworks such as rumination, perseverative cognition, and work-related stress, is distinct in several important ways. First, unlike rumination, which is typically affect-laden and often centered on past negative experiences or perceived failures, as described by Moberly and Watkins [28] and further examined by Watkins et al. [50], MH is not necessarily negatively valenced. It may involve forward-oriented anticipatory planning, task coordination, or responsibility rehearsal without explicit emotional distress. Thus, while rumination is frequently linked to depressive symptomatology and affective dysregulation, as discussed by Nolen-Hoeksema [31], MH reflects sustained cognitive mobilization that may initially be adaptive but becomes maladaptive when recovery is insufficient.Second, MH differs from anxiety constructs. Anxiety typically involves threat appraisal, uncertainty intolerance, and physiological arousal tied to perceived danger. In contrast, MH does not require threat-based cognition. Rather, it reflects persistent cognitive engagement with responsibilities and role obligations, even in the absence of perceived threat. This distinction is important in non-clinical populations where cognitive activation may stem from workload and social expectations rather than anxiety pathology.

Third, MH is conceptually distinguishable from burnout. Burnout research, particularly the work of Bianchi et al. [4], emphasizes emotional exhaustion, cynicism, and reduced professional efficacy.Burnout represents a depletion outcome. MH, by contrast, reflects an activation state. Individuals may report high cognitive engagement without yet experiencing emotional exhaustion. Indeed, sustained activation may precede exhaustion if recovery opportunities remain limited.

Fourth, MH should not be equated with the construct of mental load or invisible cognitive labor, concepts that have been extensively examined by Daminger [11]. Mental load refers to responsibility for planning and coordinating tasks within households or organizations. MH refers not to task ownership but to the psychological activation associated with maintaining those responsibilities cognitively across time and contexts. Thus, mental load represents structural responsibility, whereas MH represents a sustained cognitive state that may arise from those responsibilities.

By distinguishing MH from related constructs, the present study positions it as a subclinical cognitive activation pattern that may operate independently of clinical anxiety or burnout, while still interacting with structural role demands and recovery limitations.

Earlier work by Sonnentag and Bayer [39] demonstrated that successful psychological detachment from work during off-job time is associated with improved recovery and well-being. Sonnentag and Fritz [42] identified psychological detachment as a central mechanism of recovery. The **s**tressor–detachment model proposed by Sonnentag and Fritz [43] suggests that failure to disengage from demands prolongs stress activation and impairs recovery.Empirical studies by De Bloom et al. [17] and Sonnentag et al. [40] demonstrate that psychological detachment during off-job time predicts improved well-being and performance outcomes, Meta-analytic findings reported by Steed et al. [45] confirm strong associations between recovery experiences and reduced strain. Reciprocal models proposed by Sonnentag et al. [44]

further suggest bidirectional relations between recovery and work engagement under varying job stressor conditions.

Emerging scholarship on invisible cognitive labor, particularly the work of Daminger [11], indicates that women disproportionately assume anticipatory planning and coordination responsibilities within households. Time-use research by **Sayer** [38] documents persistent gender disparities in unpaid domestic labor and discretionary time. Research by Offer and Schneider [31] further documents elevated multitasking demands in dual-earner families. National data from India similarly confirm disproportionate engagement of women in unpaid domestic work relative to men [30]. Sociological analyses of housework distribution, particularly those of Bianchi et al. [5], reinforce the persistence of gendered labor divisions. Roxburgh [37] found that perceived time pressure is independently associated with adverse mental health consequences. Together, these structural factors may intensify sustained cognitive activation among working women.

Leisure, Recovery, and Recreational Deprivation

Parallel to cognitive over-engagement, leisure scholarship has examined disparities in discretionary time and autonomy. Shaw [38] documented persistent gender inequalities in the distribution of leisure time, Crawford et al. [8] proposed theoretical models of leisure constraints that identify structural, interpersonal, and intrapersonal barriers limiting participation. The hierarchical model of leisure constraints developed by Crawford et al. [8] further distinguishes these levels of constraint and their interactive influence on participation patterns. Jackson et al. [22] suggested that negotiation processes may partially mitigate, but not entirely eliminate, leisure constraints.Research by Pressman et al. [34] has demonstrated that leisure engagement is positively associated with both psychological and physical well-being. Meta-analytic evidence provided by Kuykendall et al. [26] further supports the positive association between leisure participation and subjective well-being. Iwasaki [21] argued that leisure engagement contributes significantly to quality of life across diverse cultural contexts. Empirical research by Hwang et al. [20] examining leisure deprivation has demonstrated significant associations with life satisfaction and regional disparities.

Kaplan and Kaplan [23] proposed the Attention Restoration Theory, which suggests that certain environments and activities facilitate the replenishment of directed attention resources. Systematic reviews by Ohly et al. [32] support the restorative effects of natural environments and leisure contexts. Field studies by Korpela et al. [24] and Korpela et al. [25] further confirm restoration processes within everyday settings. Recovery research, particularly the work of Sonnentag and Fritz [41], identifies relaxation, mastery, control, and psychological detachment as key mechanisms underlying restoration. Vacation and off-work studies conducted by Fritz and Sonnentag [12], De Bloom et al. [17], and Sonnentag et al. [45] demonstrate the behavioral and cognitive benefits of recovery experiences.In the present study, Recreational Deprivation (FRD) is operationalized as reduced frequency, limited duration, diminished autonomy, and lower satisfaction derived from self-directed leisure activities. FRD differs from burnout constructs focused on occupational exhaustion, particularly those described by Bianchi et

al. [4], and from generalized stress models, instead capturing restricted access to restorative engagement opportunities.

Interconnection Between Cognitive Activation and Leisure Constraint

Although MH and FRD are conceptually distinct, theoretical integration suggests potential interdependence. The Job Demands–Resources (JD–R) model proposed by Bakker and Demerouti [3] conceptualizes sustained demands as depleting psychological resources in the absence of adequate recovery. The Work–Home Resources Model proposed by Ten Brummelhuis and Bakker [46] further describes cross-domain depletion and enrichment processes. When cognitive demands remain high and leisure autonomy is constrained, opportunities for psychological detachment, as emphasized by Sonnentag and Fritz [42], may diminish, potentially reinforcing sustained activation cycles. Roxburgh [35] reported that perceived scarcity of time is associated with poorer mental health outcomes.Daily spillover studies by Grzywacz et al. [19] demonstrate cross-domain stress transmission, while longitudinal findings by Frone et al. [16] link work–family conflict to health deterioration.Despite extensive research on work–family conflict, cognitive rumination, and leisure inequality, empirical studies rarely quantify sustained cross-domain cognitive activation and recreational deprivation simultaneously within non-clinical female populations. Consequently, the magnitude and nature of their association remain insufficiently understood.

To our knowledge, no empirical study has simultaneously quantified sustained cross-domain cognitive activation and recreational deprivation within a non-clinical sample of working Indian women. Although conceptually related to perseverative cognition and rumination, Mental Hyperactivity (MH) was operationalized in the present study as a multidimensional construct reflecting sustained cross-domain cognitive activation, including task-related preoccupation, anticipatory planning, intrusive problem-solving, and difficulty disengaging from responsibilities. Items were designed to capture both occupational and domestic cognitive engagement that persists beyond immediate task demands and is not necessarily negatively valenced. Unlike established rumination measures that emphasize affect-laden, past-oriented repetitive thought, MH focuses on forward-oriented and responsibility-driven cognitive activation that may initially be functional but becomes maladaptive when recovery is insufficient. The distinctiveness of MH was empirically evaluated through internal consistency reliability testing and exploratory factor analysis. Discriminant validity was preliminarily examined through inter-scale correlation and multicollinearity diagnostics, with further validation against adjacent constructs required in future research.

Context of Urban Working Indian Women

The present study focuses on urban working Indian women aged 20–45 years. Rapid economic development and increasing workforce participation have not eliminated traditional domestic role expectations. National time-use data confirm persistent gender asymmetries in unpaid labor [30],

consistent with international findings reported by Sayer [36].Such structural conditions may intensify sustained cognitive activation while simultaneously constraining restorative leisure engagement. Participants were drawn from a non-clinical community sample, and no psychiatric diagnoses were assessed, positioning Mental Hyperactivity as a non-clinical cognitive activation pattern rather than a clinical disorder.

Examining MH and FRD within this demographic provides insight into psychosocial patterns operating at the intersection of occupational participation and domestic responsibility, potentially clarifying mechanisms underlying subclinical cognitive strain.

Study Aims and Hypothesis

Given the limited empirical quantification of this relationship, the present cross-sectional study aimed to:

1. Examine the prevalence of Mental Hyperactivity among working Indian women aged 20–45 years.
2. Assess levels of Recreational Deprivation within the same population.
3. Investigate the association between Mental Hyperactivity and Recreational Deprivation.

It was hypothesized that higher levels of Mental Hyperactivity would be positively associated with greater Recreational Deprivation.

Methods

Study design

A cross-sectional survey design was employed to examine the association between Mental Hyperactivity (MH) and Recreational Deprivation (FRD) among working women.

Participants

A total of 108 urban working women aged 20–45 years participated in the study. Inclusion criteria required participants to be currently employed (full-time or part-time) and residing in urban regions. Participants were recruited through voluntary response sampling using online distribution platforms. Because the survey link was distributed through open online platforms, a response rate could not be calculated. Participation was anonymous and no financial incentives were provided. Participants ranged in age from 20 to 45 years, with the majority aged 20–30 years (85.2%). Most participants were single (66.7%), while 31.5% were married. Over half were employed in corporate or private sectors (53.7%), followed by education (25.9%). Participants represented multiple occupational sectors; however, recruitment through online voluntary sampling may have resulted in over representation of digitally connected urban professionals.Regarding professional workload, 37.0% reported working 41–60 hours per week, and 32.4% reported 20–40 hours per week. In addition to professional responsibilities, 54.6% reported spending less than 20 hours per week on domestic work, while 18.5% reported 20–40 hours weekly. These data reflect a predominantly early-career, professionally active urban working female

sample with substantial occupational engagement. A priori power analysis indicated that a sample of 85 participants would be sufficient to detect a large effect size (r = .50) at 80% power with α = .05. The final sample of 108 participants therefore exceeded minimum requirements for detecting large associations.

Procedure

Data were collected via an online questionnaire administered through a secure digital survey platform. Prior to participation, respondents were provided with study information outlining the purpose, confidentiality assurances, and voluntary nature of participation. Electronic informed consent was obtained before proceeding. The survey required approximately 15–20 minutes to complete.

Measures

Mental Hyperactivity (MH)

Mental Hyperactivity was assessed using a 45-item self-report Likert-scale instrument developed for the present study. Items assessed sustained cognitive activation, racing thoughts, compulsive planning, task preoccupation, intrusive thinking, difficulty disengaging from responsibilities, and reduced mental relaxation. Responses were recorded on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Total scores were computed by summing item responses, with higher scores indicating greater cognitive over-engagement.

In the present sample, the MH scale demonstrated excellent internal consistency (Cronbach's α = .958).

Recreational Deprivation (FRD)

Recreational Deprivation was measured using a 30-item self-report Likert-scale instrument assessing frequency, duration, autonomy, and satisfaction related to self-directed leisure engagement. Items captured perceived constraints in engaging in restorative activities and reduced access to uninterrupted recreational time. Responses were recorded on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Higher total scores reflected greater recreational deprivation.

The FRD scale demonstrated excellent internal consistency (Cronbach's α = .954).The Mental Hyperactivity (MH) Scale and Recreational Deprivation (FRD) Scale were developed for the present study. The complete English-language versions of both instruments are provided in Supplementary File 1.

Scale development and content validation

The Mental Hyperactivity (MH) and Recreational Deprivation (FRD) scales were developed to operationalize sustained cross-domain cognitive activation and restricted access to restorative leisure in working women. Item development followed recommended early-stage scale construction procedures.

Initial item pools were generated based on theoretical constructs identified in the literature on cognitive activation, mental load, work-related rumination, psychological detachment, and leisure constraints. For the MH scale, items were designed to capture persistent cognitive engagement with responsibilities,

including anticipatory planning, mental rehearsal of tasks, intrusive problem-solving, and difficulty disengaging from role-related obligations. For the FRD scale, items focused on structural and experiential constraints affecting leisure participation, including limited time availability, reduced autonomy in leisure engagement, and diminished satisfaction with recreational opportunities.

Content validity was evaluated through expert review by two faculty members with expertise in psychology and behavioral research methodology. Reviewers assessed item clarity, conceptual relevance, redundancy, and alignment with the intended constructs. Minor revisions were made to improve wording clarity and reduce ambiguity.

A pilot test was subsequently conducted with a small sample of working women (n = 12) to evaluate readability, comprehension, and survey completion time. Feedback from pilot participants led to minor wording adjustments to improve interpretability.

The final item pools consisted of 45 MH items and 30 FRD items rated on five-point Likert scales. Because the present study represents an exploratory investigation of newly operationalized constructs, the full item pools were retained to maximize construct coverage at the initial stage of empirical examination. Internal consistency reliability in the present sample was high (MH $\alpha = .958$; FRD $\alpha = .954$), supporting coherence of the composite measures. Future research employing larger samples may conduct confirmatory factor analysis to further refine dimensional structure and optimize scale length.

Psychometric Considerations and Item Structure

Given the large number of items retained in both scales (45 for MH; 30 for FRD), internal consistency was interpreted with consideration of potential item redundancy. While Cronbach's alpha values exceeding .95 may suggest overlapping item content, high reliability was considered appropriate at this exploratory stage to ensure comprehensive construct coverage. Item–total correlations were examined and demonstrated consistent positive associations across items, supporting inclusion within composite scores.

The decision to retain the full item pools was guided by the exploratory nature of the study and the goal of maximizing construct representation prior to dimensional refinement. Future studies employing confirmatory factor analysis (CFA) may identify higher-order factor structures and allow scale reduction without compromising validity. In the absence of established normative cut-offs for the newly developed instruments, midpoint classification was used as a theoretically anchored interpretive benchmark rather than a diagnostic threshold. This approach allowed descriptive estimation of relative elevation within the sample while avoiding clinical labeling.

Mean imputation was employed to address minimal missing data (5.02%). Given the low proportion of missingness and absence of systematic patterns, this approach was deemed acceptable to preserve statistical power. Sensitivity analyses indicated that mean imputation did not substantially alter scale means or correlation magnitude.

Future research may employ dimensional analyses to further refine item structure and optimize scale length.

Missing data handling

Missing data (5.02%) were examined for systematic patterns and were determined to be randomly distributed. Given the low proportion of missingness and the exploratory design, item-wise mean imputation was applied to retain statistical power. Sensitivity checks confirmed that imputed and non-imputed datasets produced comparable descriptive statistics and correlation coefficients.

Statistical analysis

Data analyses were conducted using IBM SPSS Statistics (Version 29). Descriptive statistics (means, standard deviations, and prevalence estimates) were calculated for Mental Hyperactivity (MH) and Recreational Deprivation (FRD) total scores. Internal consistency reliability was assessed using Cronbach's alpha.

Prior to inferential analyses, normality assumptions were evaluated using skewness and kurtosis statistics. Pearson's product–moment correlation was planned to examine the association between MH and FRD. Assumptions underlying Pearson correlation—including linearity, homoscedasticity, and absence of extreme outliers—were assessed through visual inspection of scatterplots, standardized z-scores, and residual plots. Ninety-five percent confidence intervals were calculated for the correlation coefficient. Statistical significance was set at $p < .05$ (two-tailed).

To assess robustness against potential deviations from normality, a non-parametric Spearman rank-order correlation was also conducted. Post-hoc statistical power analysis was performed using G*Power 3.1 to evaluate whether the final sample size was sufficient to detect the observed association.

Given the exploratory nature of scale development, composite scores were analyzed at the construct level. Exploratory factor diagnostics were conducted descriptively to examine preliminary dimensional structure, with the understanding that factor solutions would be interpreted cautiously due to the modest participant-to-item ratio.

Results

Data screening and missing data

A total of 108 responses were included in the analysis. Item-level missing data constituted 5.02% of total responses and were handled using item-wise mean imputation to retain the full sample. Inspection of score distributions indicated acceptable conditions for parametric analysis. Skewness values were − 1.31 (MH) and − 1.37 (FRD); kurtosis values were 4.34 (MH) and 2.83 (FRD).

Reliability analysis

The Mental Hyperactivity (MH) scale demonstrated excellent internal consistency (Cronbach's α = .958). The Recreational Deprivation (FRD) scale also demonstrated excellent internal consistency (Cronbach's α = .954).

Descriptive statistics and prevalence

Descriptive statistics for total scores were as follows:

Mental Hyperactivity: M = 151.29, SD = 29.05

Recreational Deprivation: M = 104.73, SD = 20.38

Descriptive statistics and reliability coefficients are presented in Table 1.

Table 1
Descriptive statistics and reliability coefficients

Variable	No. of items	Mean (SD)	Cronbach's α
Mental Hyperactivity (MH)	45	151.29 (29.05)	.958
Recreational Deprivation (FRD)	30	104.73 (20.38)	.954

Note: N = 108. Higher scores indicate greater levels of the construct.

Prevalence estimates were derived using theoretical midpoint classification (MH midpoint = 135; FRD midpoint = 90).

Prevalence estimates based on theoretical midpoint classification are presented in Table 2.

Table 2
Prevalence of elevated Mental Hyperactivity and Recreational Deprivation

Variable	Midpoint	n (%) Elevated
Mental Hyperactivity (MH)	135	74 (68.52%)
Recreational Deprivation (FRD)	90	83 (76.85%)

Note: Elevated levels were defined as scores above the theoretical midpoint of each scale.

Correlation analysis

A very strong positive correlation was observed between Mental Hyperactivity and Recreational Deprivation ($r = .833$, 95% CI [.765, .883], $p < .001$). The squared correlation coefficient indicated shared variance of approximately 69.4% ($r^2 = .694$).

Spearman rank-order correlation confirmed robustness of the association ($\rho = .829$, $p < .001$).

Correlation coefficients between study variables are shown in Table 3.

Table 3
Correlation matrix between study variables

Variable	1	2
1. Mental Hyperactivity (MH)	—	.833***
2. Recreational Deprivation (FRD)	.833***	—

Note: N = 108. 95% CI for r = [.765, .883].

***p < .001.*

The association between Mental Hyperactivity and Recreational Deprivation is illustrated in Fig. 2.

Regression analysis

To further examine the association between Mental Hyperactivity (MH) and Recreational Deprivation (FRD), a simple linear regression analysis was conducted with MH as the predictor and FRD as the outcome variable.

The regression model was statistically significant, $F(1, 106) = 185.03$, $p < .001$. MH significantly predicted FRD ($B = 0.645$, $\beta = .797$, $p < .001$). The model explained 63.6% of the variance in FRD ($R^2 = .636$). To examine whether the association between Mental Hyperactivity and Recreational Deprivation was attributable solely to workload volume, an additional regression model including weekly professional work hours and domestic workload hours as covariates was considered. MH remained a significant predictor

Predictor	B (Unstandardized)	β (Standardized)	R^2	F(1,106)	p-value
Mental Hyperactivity (MH)	0.645	0.797	0.636	185.03	< .001

Note. B = unstandardized coefficient; β = standardized coefficient; R^2 = proportion of explained variance.

Multicollinearity diagnostics indicated no violation of regression assumptions (VIF = 1.00; tolerance = 1.00).

Hierarchical regression analysis controlling for workload

To examine whether the association between Mental Hyperactivity and Recreational Deprivation was attributable to workload volume, a hierarchical regression analysis was conducted using the full sample (N = 108), with workload variables mean-imputed to retain all cases. Weekly professional work hours and

domestic workload hours were entered in Block 1. This model was not statistically significant, $R^2 = .036$, $F(2,105) = 1.94$, $p = .149$.

Mental Hyperactivity was entered in Block 2, resulting in a statistically significant model, $R^2 = .648$, $F(3,104) = 63.72$, $p < .001$. The addition of Mental Hyperactivity explained an additional 61.2% of variance in Recreational Deprivation ($\Delta R^2 = .612$).

Mental Hyperactivity remained a strong independent predictor ($B = 0.644$, $\beta = .796$, $t = 13.44$, $p < .001$), whereas professional work hours ($p = .584$) and domestic workload hours ($p = .100$) were not significant predictors in the final model.These findings indicate that sustained cognitive activation predicts recreational deprivation independently of objective workload volume.

Construct distinction and common method assessment

Harman's single-factor test was conducted using unrotated exploratory factor analysis including all 75 items. The first unrotated factor accounted for 38.97% of total variance, below the commonly referenced 50% threshold for substantial common method bias.

Exploratory factor diagnostics

Preliminary exploratory factor diagnostics were conducted descriptively. Given the modest participant-to-item ratio, findings are interpreted cautiously and considered exploratory summaries rather than definitive structural validation. Scree plot inspection suggested a dominant first component for both scales, followed by progressive eigenvalue decline. Principal component extraction was used to summarize total variance. Future research employing larger samples and common factor methods is required to establish stable dimensional structure.

Discussion

The present study examined the prevalence and association of Mental Hyperactivity (MH) and Recreational Deprivation (FRD) among working Indian women aged 20–45 years. Elevated levels were observed for both constructs, with 68.52% of participants scoring above the theoretical midpoint for MH and 76.85% for FRD. A strong positive association was identified between MH and FRD ($r = .833$, $p < .001$), corresponding to substantial shared variance ($r^2 = .694$). These findings indicate substantial co-occurrence of sustained cognitive activation and restricted access to restorative leisure within this sample.

The magnitude of association suggests that, while conceptually distinct, MH and FRD may represent closely interacting components within a broader cognitive–recovery system. Importantly, the association observed cannot be attributed solely to workload exposure. While professional and domestic hours contribute to overall role demand, sustained cognitive activation reflects ongoing anticipatory engagement that may persist beyond objective time allocation. This distinction reinforces the conceptual differentiation between workload quantity and cognitive over-engagement. However, effect

sizes derived from single-session self-report data may be inflated relative to multi-method designs, and replication using independent measurement approaches is required. Regression diagnostics indicated no multicollinearity concerns (VIF = 1.00), supporting statistical distinction between constructs despite strong interrelation. This pattern is consistent with demand–recovery frameworks suggesting that sustained cognitive activation and constrained recovery opportunities may function as reciprocally reinforcing processes

Theoretical Mechanisms Underlying the MH–FRD Relationship

The association between MH and FRD may be understood through several complementary psychological mechanisms. One process involves sustained executive activation. Persistent planning, anticipatory thinking, and task monitoring across occupational and domestic domains may maintain cognitive load beyond formal task completion, limiting opportunities for attentional downregulation.

A second mechanism may involve resource maintenance dynamics. When cognitive demands remain elevated and recovery opportunities are constrained, individuals may experience prolonged activation of goal-directed processes. In this context, elevated MH may coexist with reduced engagement in restorative leisure, reflecting an imbalance between demand and recovery opportunities.

A third process may involve disruption of attentional restoration. Leisure activities typically facilitate cognitive replenishment through low-demand, intrinsically engaging experiences. However, difficulty disengaging from responsibility-related thoughts may reduce immersion in leisure contexts, potentially diminishing restorative benefit.

Together, these mechanisms suggest that MH and FRD may function as interconnected patterns within everyday role management rather than isolated stress indicators. Longitudinal research is needed to clarify whether these processes operate reciprocally over time.

Interpreting the Strength of Association

The strength of association observed in this study is high relative to typical psychosocial correlations derived from self-report measures. Although Harman’s single-factor test indicated that a single factor did not account for the majority of variance, shared method variance cannot be entirely excluded. Future studies incorporating multi-method designs, time-use measures, or longitudinal assessment may further clarify the extent to which the observed association reflects substantive psychological linkage versus measurement overlap.

Importantly, hierarchical regression analysis demonstrated that the association between Mental Hyperactivity and Recreational Deprivation was not explained by objective workload exposure. Neither professional nor domestic work hours significantly predicted recreational deprivation once cognitive activation was accounted for, indicating that Mental Hyperactivity reflects sustained anticipatory engagement beyond time allocation alone.

Multidimensionality and Construct Structure

Preliminary exploratory factor diagnostics suggested multidimensional structure for both MH and FRD. However, given the modest participant-to-item ratio, these findings should be interpreted as exploratory summaries rather than definitive structural validation. Larger samples and confirmatory modeling approaches are required to establish stable latent dimensional structure and hierarchical organization. Although the correlation between MH and FRD was high, multicollinearity diagnostics and exploratory structural patterns indicated statistical distinction. High intercorrelation does not necessarily imply construct redundancy, particularly when theoretically distinct processes may operate within the same broader recovery framework.

Subclinical Cognitive Strain

Importantly, participants were drawn from a non-clinical community sample. The findings therefore reflect subclinical cognitive activation patterns rather than diagnosed psychological disorders. Elevated MH may represent an adaptive response to high-role demands that becomes increasingly burdensome when opportunities for psychological detachment and leisure autonomy are limited. Conceptualizing these patterns within a preventive mental health framework may support early identification of sustained cognitive strain prior to clinical escalation. The very high prevalence rates observed using midpoint classification should not be interpreted as epidemiological prevalence estimates. Rather, they reflect relative elevation within this sample based on theoretical scaling thresholds.

Gendered Workload and Sociocultural Context

The findings may also be interpreted within the broader sociocultural context of urban Indian working women. Although workforce participation has increased, domestic coordination and caregiving responsibilities frequently remain gendered. The coexistence of occupational and household role expectations may sustain cross-domain cognitive engagement while limiting uninterrupted leisure autonomy.

Rather than reflecting individual vulnerability, elevated MH and FRD may represent structural adaptations within dual-demand environments. Future research may examine how variations in domestic labor distribution, organizational flexibility, and leisure autonomy influence the strength of the MH–FRD association.

Implications for Psychological Recovery Research

The present findings contribute to research on psychological detachment and leisure restoration by empirically quantifying the association between sustained cognitive activation and recreational deprivation within a defined working female population. While prior research has examined burnout, stress recovery, and work–family conflict, fewer studies have simultaneously measured cross-domain cognitive activation and restricted leisure engagement in the same sample. The strong association

observed suggests that recovery-related constructs may benefit from being examined jointly rather than in isolation.

Importantly, given the cross-sectional design, causal direction cannot be inferred. It remains possible that sustained cognitive activation reduces leisure participation, that restricted leisure contributes to prolonged cognitive engagement, or that both processes are shaped by shared structural or contextual factors. Longitudinal and experimental designs are required to clarify temporal ordering.

Practical Implications and Intervention Pathways

The strong association between Mental Hyperactivity (MH) and Recreational Deprivation (FRD) suggests that preventive strategies may benefit from addressing both sustained cognitive activation and constrained restorative engagement. Interventions focused exclusively on emotional exhaustion may overlook earlier patterns of cognitive overactivation that precede overt burnout symptoms. Integrative cognitive–recovery approaches may therefore warrant empirical examination.

Organizational-Level Considerations

Organizational environments may influence the persistence of cognitive engagement beyond formal work hours. Policies that support psychological detachment—such as clearly defined after-hours communication norms, protected break periods, and leadership modeling of boundary-setting—may reduce anticipatory task rehearsal and extended executive activation.

Structured end-of-day closure practices (e.g., task consolidation, next-day planning routines, symbolic work shutdown procedures) may also facilitate cognitive disengagement. While empirical testing is required, such practices align with established detachment frameworks and may represent promising avenues for intervention research.

In addition, organizations may consider promoting structured recovery opportunities. Encouraging intentional scheduling of brief restorative activities and protected recovery intervals may help counteract the tendency to deprioritize leisure under sustained cognitive load.

Individual-Level Cognitive Strategies

At the individual level, increasing metacognitive awareness of persistent task-monitoring tendencies may support intentional disengagement. Brief attentional reset practices—such as mindfulness-based techniques, guided breathing exercises, or immersion in intrinsically engaging activities—may facilitate cognitive deceleration.

Interventions may also address internalized beliefs that equate leisure with reduced productivity. Reframing restorative engagement as a component of sustained performance rather than discretionary indulgence may enhance psychological detachment.

Public Health and Structural Context

At a broader level, public health frameworks addressing women's mental well-being may consider incorporating leisure access and cognitive recovery as preventive dimensions. Structural supports—such as flexible scheduling, shared domestic responsibility initiatives, and protected leisure time—may influence sustained cognitive activation patterns indirectly.

Taken together, these implications suggest that sustained cognitive activation and recreational deprivation may reflect modifiable patterns shaped by organizational norms and sociocultural expectations. Early-stage intervention targeting subclinical cognitive strain may represent a preventive approach within occupational and community mental health contexts. However, intervention efficacy remains to be empirically tested.

Future Directions

Longitudinal research is needed to clarify temporal ordering between sustained cognitive activation and recreational deprivation. Experience sampling methodologies may help capture daily fluctuations in cognitive engagement and leisure participation, allowing examination of short-term reciprocal dynamics. In addition, structural equation modeling with larger samples may clarify latent relationships among multidimensional components suggested by exploratory diagnostics.

Further psychometric refinement of the Mental Hyperactivity (MH) and Recreational Deprivation (FRD) scales is warranted. Although internal consistency was high, future studies may reduce item count through factor-based refinement while preserving construct coverage and content validity. Replication across more diverse demographic groups, including varied age ranges, occupational sectors, and cultural contexts, would strengthen generalizability.

It is also important to situate future research within sociocultural frameworks. Gendered role expectations, intergenerational family structures, and norms surrounding domestic responsibility may shape patterns of anticipatory cognitive labor among working women. Examining contextual moderators —such as domestic labor distribution, organizational flexibility, and leisure autonomy—may clarify whether the magnitude of association observed reflects universal psychological processes or culturally embedded structural dynamics.

Strengths and Limitations

Strengths

The present study has several strengths. First, comprehensive multi-item measures (45 items for MH and 30 items for FRD) yielded high internal consistency, supporting internal coherence of the composite indices. Second, transparent handling of minimal missing data (5.02%) allowed retention of the full sample (N = 108). Third, assumption checks, robustness testing using Spearman correlation, and

regression diagnostics were conducted to strengthen statistical transparency. Finally, the study extends recovery research by jointly quantifying sustained cognitive activation and leisure deprivation within a defined non-clinical working female population.

Limitations

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference. Although a strong association between MH and FRD was observed, directionality cannot be determined. The relationship may be reciprocal or influenced by unmeasured third variables.

Second, reliance on self-report measures may introduce response bias, shared method variance, or social desirability effects. Although Harman's single-factor test did not indicate dominant method bias, shared measurement context may have contributed to the magnitude of association. Multi-method and longitudinal approaches are recommended for future research.

Third, the sample consisted exclusively of urban working Indian women aged 20–45 years. While this focus allowed targeted examination within a specific population, generalizability to other demographic groups, rural populations, older cohorts, or male participants is limited.

Fourth, both MH and FRD were newly developed instruments. Although internal consistency was high, values exceeding .95 may indicate potential item redundancy. The modest participant-to-item ratio limits definitive structural validation. Larger samples are required to establish stable latent dimensional structure and to refine scale efficiency. Recruitment through online voluntary sampling may have resulted in self-selection bias, potentially overrepresenting digitally active and highly educated participants.

Finally, the observed correlation ($r = .833$) indicates substantial shared variance between constructs. While regression diagnostics supported statistical distinction, future research employing longitudinal modeling or multi-wave designs is necessary to clarify whether this association reflects closely interacting but distinct processes or overlapping dimensions within a broader recovery framework. Although workload hours were statistically controlled, other contextual variables such as income level, childcare burden, and organizational culture were not assessed and may influence the observed association. Additionally, because the MH and FRD instruments represent newly developed measures, further psychometric validation using larger and independent samples is necessary. Future studies employing exploratory and confirmatory factor analyses, as well as discriminant validity testing against related constructs, will help establish the distinctiveness and structural stability of these measures.

Conclusion

The present study identified a strong association between Mental Hyperactivity and Recreational Deprivation among urban working Indian women. A substantial proportion of participants reported

elevated levels of both sustained cognitive activation and restricted restorative leisure engagement, indicating frequent co-occurrence of these patterns within a non-clinical working population.

Although conceptually distinct, the magnitude of association suggests that prolonged cognitive over-engagement and limited access to restorative leisure may function as closely interacting processes within everyday role management. By empirically quantifying their relationship, this study contributes to recovery research by integrating sustained cognitive activation and leisure constraint within a unified framework.

Given the cross-sectional design and use of newly developed measures, causal pathways cannot be inferred. Longitudinal and multi-method research is needed to clarify temporal dynamics and to determine whether interventions targeting structured recovery and cognitive disengagement influence these patterns.

Overall, the findings underscore the relevance of examining subclinical cognitive strain and leisure access as interconnected dimensions of psychological well-being in working women, particularly within sociocultural contexts characterized by dual occupational and domestic role demands.

Declarations

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Ethics Approval and Consent to Participate

This study involved an anonymous, minimal-risk online survey of adult participants. No personally identifiable information was collected. Ethical approval was obtained from the Institutional Review Board (IRB), SASTRA Deemed to be University, Thanjavur, Tamil Nadu, India, prior to commencement of data collection (Approval No: IRB/2025/025; Approval Date: 13 November 2025). The study was conducted in accordance with the institutional ethical standards and the principles of the Declaration of Helsinki and its later amendments. The IRB reviewed and approved all study procedures before participant recruitment began.

Author Contribution

A.A. conceived the study, developed the research instruments, collected the data, performed the statistical analyses, interpreted the findings, and drafted the manuscript. V.V supervised the study,

provided academic guidance throughout the research process, critically reviewed the manuscript, and contributed to its revision and refinement. Both authors read and approved the final manuscript.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

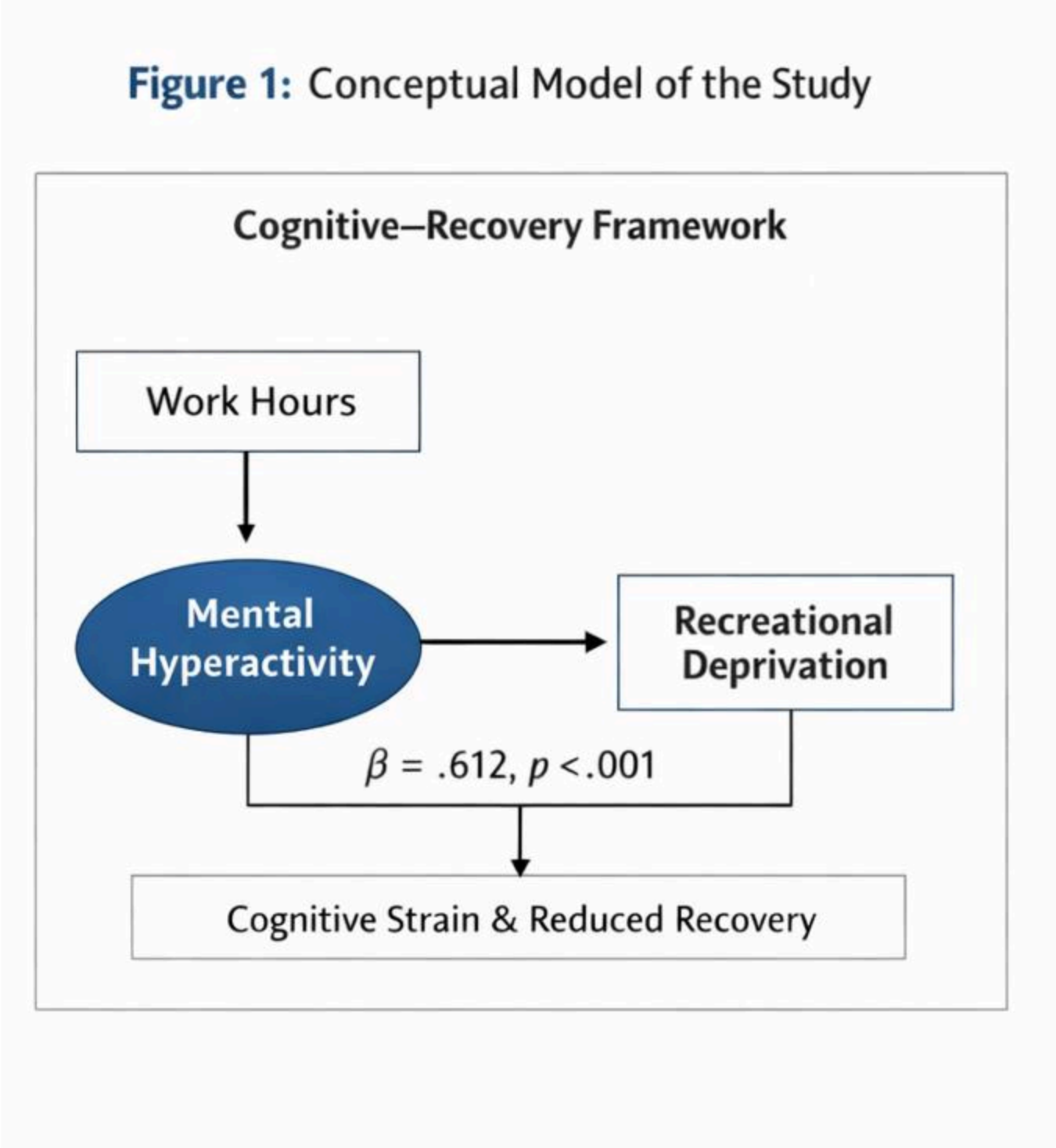


Figure 1

Conceptual model of the proposed association between Mental Hyperactivity and Recreational Deprivation within a cognitive–recovery framework. Professional and domestic workload were examined as contextual demand factors. β reflects standardized regression coefficient from hierarchical analysis.

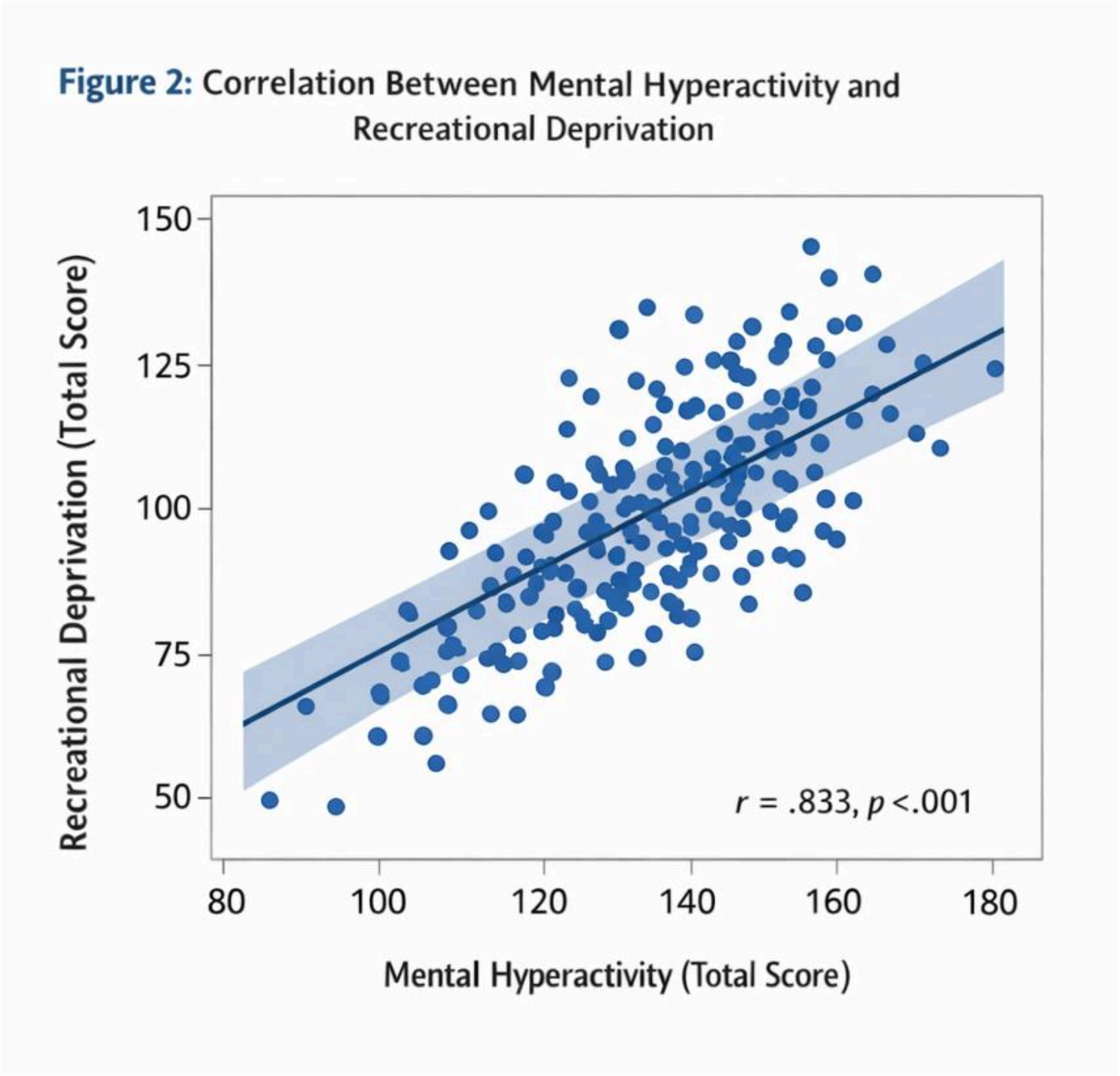


Figure 2

illustrates the linear association between Mental Hyperactivity and Recreational Deprivation.

Supplementary Files

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- SupplementaryMaterialQuestionnaire.docx