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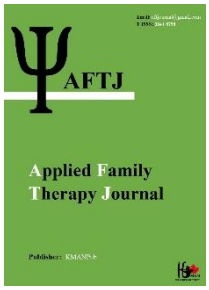

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Development of a Neuropsychological Questionnaire for Marital Conflicts and Examination of Its Psychometric Properties in Iran

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A B S T R A C T

Objective: The aim of the present study was to develop a neuropsychological questionnaire for marital conflicts and to examine its psychometric properties in Iran.

Methods and Materials: This study was conducted in two phases: pilot and final. In the pilot phase, the initial questionnaire was administered to 81 couples experiencing marital conflict, and its structure was examined using exploratory factor analysis. In the final phase, the revised version was administered to 318 couples with marital conflict and 112 married individuals without severe conflict. To assess convergent validity, the Barati and Sanaei Marital Conflict Questionnaire and the ENRICH Marital Satisfaction Questionnaire were used. Data analysis was conducted using reliability indices, construct validity, convergent and discriminant validity, and confirmatory factor analysis.

Findings: The results indicated that the questionnaire has a five-factor structure including the prefrontal cortex, anterior cingulate gyrus, deep limbic system, basal ganglia, and temporal cortex. Correlation coefficients with the marital conflict scale ranged from 0.58 to 0.62, and correlations with marital satisfaction were negative and significant. Additionally, significant differences were observed between couples with and without conflict across all components ($p < 0.01$).

Conclusion: The neuropsychological marital conflict questionnaire demonstrated satisfactory validity and reliability and can be used as a culturally adapted and valid instrument for assessing the neuropsychological dimensions of marital conflicts in research and clinical interventions.

Keywords: *Marital conflicts, neuropsychology, questionnaire, psychometric properties, validity, reliability, marital satisfaction*

1. Introduction

Marital relationships constitute one of the most central and complex interpersonal systems in adult life, serving as a primary context for emotional support, identity formation, and psychological well-being. Despite their importance, marital relationships are inherently vulnerable to conflict, which can range from mild disagreements to

chronic and destructive patterns of interaction. Marital conflict is not merely a behavioral phenomenon but a multidimensional construct shaped by cognitive, emotional, interpersonal, and increasingly, neurobiological processes. Contemporary research suggests that understanding marital conflict requires moving beyond purely social or psychological explanations toward integrative models that incorporate neuropsychological mechanisms underlying human interaction (Bahramian et al., 2025; Nikrahan, 2023).

Traditional models of marital conflict have emphasized communication patterns, irrational beliefs, attachment styles, and emotional regulation as key determinants of relational distress. Empirical findings have demonstrated that maladaptive communication styles, cognitive distortions, and ineffective conflict resolution strategies are strongly associated with increased marital dissatisfaction and conflict escalation (Bahramian et al., 2025; Paydari-Niam & Jadidian, 2025). Similarly, emotional factors such as alexithymia, anxiety sensitivity, and sexual dissatisfaction have been shown to contribute significantly to the emergence and persistence of marital conflict (BakhshiPour et al., 2024). While these frameworks have provided valuable insights, they often treat these variables as isolated constructs, overlooking the underlying neurobiological systems that govern emotional processing, behavioral regulation, and interpersonal responsiveness.

Recent advances in neuroscience and neuropsychology have begun to bridge this gap by highlighting the role of brain systems in shaping relational behaviors. The human brain is fundamentally a social organ, with specialized neural circuits dedicated to processing emotional cues, regulating behavior, and facilitating social cognition. Disruptions or inefficiencies in these systems can lead to maladaptive interpersonal behaviors, including those observed in marital conflict. For instance, the prefrontal cortex plays a crucial role in executive functioning, impulse control, and decision-making, all of which are essential for constructive conflict resolution. Deficits in this region are associated with impulsivity, poor planning, and difficulties in regulating emotional responses during interpersonal interactions (Hathaway & Newton, 2023; Zhao et al., 2021).

In parallel, the anterior cingulate cortex is involved in cognitive flexibility, error monitoring, and emotional regulation. Dysfunction in this region may result in rigid thinking patterns, perseveration, and an inability to disengage from negative emotional states, all of which contribute to recurrent and unresolved marital conflicts. The deep limbic system, which includes structures such as the amygdala and hippocampus, is central to emotional processing and memory. Hyperactivation or dysregulation in this system can lead to heightened emotional reactivity, increased sensitivity to perceived rejection, and persistent negative affect, thereby exacerbating relational tensions (Teicher et al., 2016; Vrtička et al., 2012).

Moreover, the basal ganglia are implicated in anxiety regulation, habit formation, and motivational processes. Dysfunctions in this system may manifest as chronic worry, avoidance behaviors, and heightened stress responses in marital contexts. Similarly, the temporal cortex is critical for social perception, language processing, and interpretation of emotional cues. Impairments in this region can lead to misinterpretation of a partner's intentions, difficulties in communication, and increased likelihood of conflict escalation (Godfrey et al., 2022). Collectively, these neuropsychological systems form an integrated network that underlies the cognitive-emotional dynamics of marital relationships.

The integration of neuroscience into the study of marital conflict is further supported by emerging evidence on neural synchronization and interpersonal attunement. Research has shown that couples with higher marital satisfaction exhibit greater neural synchrony during interactions, suggesting that effective communication and emotional alignment are rooted in shared neural processes (Li et al., 2022). Conversely, disruptions in these processes may lead to misalignment, misunderstanding, and conflict. These findings underscore the importance of examining marital conflict through a neuropsychological lens, as they reveal the biological underpinnings of relational dynamics.

Attachment theory also provides a valuable framework for understanding the interplay between neurobiology and marital conflict. Adult attachment styles, which are shaped by early relational experiences, influence how individuals perceive, interpret, and respond to interpersonal cues. Neuroimaging studies have demonstrated that attachment styles modulate neural responses in regions associated with mentalizing and emotional regulation, such as the prefrontal cortex and limbic system (Schneider-Hassloff et al., 2015; Zhang et al., 2018). Individuals with insecure attachment patterns are more likely to exhibit heightened emotional reactivity, misinterpretation of social signals, and maladaptive coping strategies, all of which contribute to increased marital conflict (Mikulincer & Shaver, 2016).

Furthermore, developmental and environmental factors play a critical role in shaping neuropsychological functioning. Exposure to early life stressors, such as

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childhood maltreatment, has been shown to alter brain development and increase vulnerability to emotional dysregulation and interpersonal difficulties in adulthood (Teicher et al., 2016). These alterations can manifest in marital relationships as heightened sensitivity to conflict, difficulty in emotional regulation, and maladaptive interaction patterns. Similarly, broader social and contextual factors, including stress, social support, and cultural norms, influence both neuropsychological functioning and relational dynamics (Almuhtaseb et al., 2021; Liu & Vazsonyi, 2024).

Despite the growing body of evidence linking neuropsychological processes to marital conflict, there remains a significant gap in the availability of assessment tools that explicitly capture these dimensions. Most existing instruments focus on behavioral or self-reported aspects of conflict without integrating the underlying neurocognitive and emotional mechanisms. This limitation restricts the ability of researchers and clinicians to fully understand the complexity of marital conflict and to design interventions that target its root causes. The need for culturally sensitive, theoretically grounded, and psychometrically robust instruments that incorporate neuropsychological constructs is therefore increasingly evident.

In recent years, interdisciplinary approaches combining psychology, neuroscience, and complexity theory have been proposed to address this gap. The theory of brain complexity, for example, conceptualizes marital behavior as an emergent property of dynamic interactions among multiple neural systems, emphasizing the nonlinear and interconnected nature of relational processes (Nikrahan, 2023). Similarly, advances in computational and technological domains have highlighted the potential risks and complexities of relational dynamics, even extending to human–AI interactions, where maladaptive patterns can emerge from poorly regulated systems (Zhang et al., 2025). These perspectives reinforce the importance of adopting integrative frameworks that account for both the biological and contextual determinants of relational behavior.

Additionally, the role of trauma and adversity in shaping marital dynamics has received increasing attention. Couples who experience dual trauma often exhibit complex interaction patterns characterized by both vulnerability and resilience, further complicating the dynamics of conflict and resolution (Charbonneau-Lefebvre et al., 2025). Understanding these patterns requires tools that can capture not only observable behaviors but also the underlying neuropsychological processes that drive them. Such tools can facilitate more precise assessment, enhance diagnostic accuracy, and inform the development of targeted therapeutic interventions.

The importance of effective assessment is further underscored by the growing demand for evidence-based interventions in couple therapy. Approaches such as schema therapy, the Gottman method, compassion-focused therapy, and mentalization-based therapy have demonstrated effectiveness in improving marital relationships, yet their success often depends on accurate identification of underlying cognitive-emotional and neuropsychological patterns (Ashrafi et al., 2025; Paydari-Niam & Jadidian, 2025). Without appropriate assessment tools, the ability to tailor interventions to the specific needs of couples remains limited.

Given these considerations, the development of a neuropsychologically informed questionnaire for assessing marital conflict represents a critical step toward advancing both research and clinical practice. Such an instrument can provide a more comprehensive understanding of the mechanisms underlying marital conflict, bridging the gap between theoretical models and practical applications. By integrating insights from neuroscience, psychology, and relational studies, it becomes possible to capture the multidimensional nature of marital conflict in a way that is both scientifically rigorous and clinically meaningful.

The present study aims to develop and validate a neuropsychological questionnaire for marital conflicts based on brain system functioning and to examine its psychometric properties within an ایرانی cultural context.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a mixed-methods, instrument development design conducted in two sequential phases, including a pilot study and a main (final) study, with the primary objective of developing and validating a neuropsychological questionnaire for marital conflicts. In the pilot phase, the study adopted a quantitative exploratory approach to examine the preliminary validity and internal structure of the instrument. The initial version of the questionnaire was administered to a sample of 81 married individuals experiencing severe marital conflict. Participants were selected using a convenience sampling method from individuals referring to family counseling centers affiliated with the State Welfare Organization and the Judiciary in Isfahan during the year 2025. Inclusion criteria comprised

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being formally married, having at least one year of marital life, experiencing moderate to severe marital conflict for a duration exceeding six months, the need for counseling services, literacy, age between 18 and 65 years, and provision of informed written consent. Exclusion criteria included severe psychiatric disorders, use of medications affecting brain function, presence of acute family crises, incomplete or inconsistent responses, and withdrawal from the study. The pilot study was conducted to identify potential item deficiencies, evaluate the initial factor structure, and refine the questionnaire prior to the main study.

In the main phase, a larger sample consisting of 318 married individuals with marital conflict was recruited using purposive and convenience sampling methods. Among these participants, 150 individuals were simultaneously assessed using a standardized marital satisfaction scale, while 168 participants were evaluated using a standardized marital conflict scale. In addition, to examine discriminant validity, a comparison group consisting of 112 married individuals without severe marital conflict was selected purposively from the same population, based on self-reported absence of significant marital issues and scoring below the threshold of moderate conflict as defined in prior normative studies. The rationale for the sample size in the main study was aligned with the requirements of confirmatory factor analysis and the number of items in the final instrument. The use of a two-phase design, including pilot testing, main implementation, and a comparison group, provided a robust methodological framework for comprehensive evaluation of the psychometric properties of the instrument.

2.2. Measures

Data were collected using a combination of the researcher-developed neuropsychological marital conflict questionnaire and standardized psychometric instruments. The primary instrument, developed in this study, was designed to assess brain system-related behavioral patterns associated with marital conflict, grounded in a theoretical framework encompassing five neuropsychological domains, including the prefrontal cortex, anterior cingulate gyrus, deep limbic system, basal ganglia, and temporal cortex. Items were constructed based on theoretical constructs and refined through pilot testing and factor analytic procedures.

To assess convergent validity, the Barati and Sanaei Marital Conflict Questionnaire was employed. This instrument consists of 42 items designed to measure marital conflict across seven dimensions, including reduced cooperation, decreased sexual relationship, increased emotional reactions, increased child support-seeking behaviors, increased individual relationships with one's own relatives, reduced family interactions with the spouse's relatives and friends, and financial separation. Responses are recorded on a five-point Likert scale ranging from "never" to "always," with total scores ranging from 42 to 210, where higher scores indicate greater marital conflict. The instrument has demonstrated acceptable to excellent reliability in prior studies, with Cronbach's alpha coefficients ranging from moderate to high levels, and has been validated within the Iranian population.

In addition, the ENRICH Marital Satisfaction Questionnaire was used to assess marital satisfaction. This instrument, originally developed by Olson et al. (1989), evaluates multiple dimensions of marital relationships and identifies strengths and problematic areas within couples' interactions. The 47-item version used in this study is scored on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Higher scores indicate greater marital satisfaction. The Persian version of the instrument has been translated and validated in previous research, demonstrating strong psychometric properties, including high internal consistency and construct validity. In the present study, reliability coefficients for both instruments were recalculated, confirming their suitability for use in the current sample.

2.3. Data Analysis

Data analysis was conducted in a systematic and multi-stage manner, consistent with the objectives of instrument development and psychometric evaluation. Prior to conducting factor analyses, preliminary statistical assumptions were examined, including the assessment of missing data patterns, detection of multivariate outliers, and evaluation of the normality of item distributions using skewness and kurtosis indices. The results indicated that the data met the assumptions required for factor analysis.

Exploratory factor analysis was performed in the pilot phase using the principal components method with varimax rotation to identify the underlying factor structure of the questionnaire and to refine the item pool. Sampling adequacy was assessed using appropriate indices, and criteria for item retention included a minimum factor loading of 0.40, absence of significant cross-loadings, and conceptual consistency with the intended factor. Items that did not meet these criteria were either revised or removed,

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resulting in a refined factor structure aligned with the theoretical model of five neuropsychological systems.

In the main phase, confirmatory factor analysis was conducted using JASP software (version 0.19.3.0) to evaluate the fit of the proposed five-factor model to the empirical data. Model fit was assessed using multiple indices, including the Comparative Fit Index (CFI ≥ 0.90), Tucker–Lewis Index (TLI ≥ 0.90), Root Mean Square Error of Approximation (RMSEA ≤ 0.08), and Standardized Root Mean Square Residual (SRMR ≤ 0.08). Reliability was evaluated through internal consistency measures, including Cronbach's alpha and composite reliability coefficients (CR ≥ 0.70), as well as average variance extracted (AVE ≥ 0.50) to assess construct validity.

Furthermore, convergent validity was examined by calculating Pearson correlation coefficients between the scores of the developed questionnaire and the standardized measures of marital conflict and marital satisfaction. Discriminant validity was assessed by comparing mean scores between groups with and without marital conflict using independent samples t-tests. The ability of the instrument to differentiate between these groups was considered an indicator of its discriminant validity. All statistical analyses were conducted using SPSS and AMOS software, ensuring methodological rigor and robustness in evaluating the psychometric properties of the developed instrument.

3. Findings and Results

The findings are presented in a sequential manner, beginning with the qualitative development of the instrument, followed by the description of the pilot and main samples, the exploratory and confirmatory factor-analytic results, and the final evidence for reliability and validity. Overall, the questionnaire development process supported a culturally grounded neuropsychological model of marital conflict based on five brain-related domains: the prefrontal cortex, anterior cingulate gyrus, deep limbic system, basal ganglia, and temporal cortex. The qualitative phase generated the conceptual basis of the instrument, and the quantitative phases confirmed that the resulting questionnaire had a stable structure, acceptable model fit, strong internal consistency, meaningful convergence with marital conflict and marital satisfaction, and clear discriminative power between couples with and without marital conflict.

Table 1

Conceptual organization of the neuropsychological marital conflict questionnaire

Neuropsychological domain	Organizing themes	Examples of basic themes	Behavioral focus in marital interaction	Initial items	Retained final items
Prefrontal cortex	Deficits in problem solving and decision making	Impulsivity, hasty decisions, poor planning, distractibility, hypomentalizing, pleasure seeking, speech disorganization	Poor executive control, disorganized dialogue, weak planning, reduced reflective functioning	26	23
Anterior cingulate gyrus	Cognitive rigidity and fixation	Getting stuck in the past, oppositionality, inflexibility, novelty aversion, perseveration	Repetitive arguments, rigid positions, low flexibility in conflict situations	19	18
Deep limbic system	Emotional dysregulation	Rejection sensitivity, sadness, emotional overreaction, emotional numbness, suspiciousness	Unstable mood, negative interpretations, emotional withdrawal, low intimacy	22	20
Basal ganglia	Anxiety-related and psychosomatic activation	Chronic worry, fear of discussion, somatic anxiety, hypervigilance, conflict avoidance	Tension, avoidance, threat sensitivity, anxious inhibition in marital exchanges	19	17
Temporal cortex	Social-emotional processing deficits	Verbal or physical aggression, misreading others' emotions, suspiciousness, communication disturbance	Misinterpretation of social cues, aggression, poor emotional decoding	14	13

The qualitative findings showed that the questionnaire was developed through a systematic and evidence-based process grounded in thematic network analysis, semi-structured expert interviews, and Q-sort data from couples with marital conflict. The item pool was not imposed purely from abstract theory; rather, it was refined through lived relational experience and neuropsychological interpretation. Each retained item was linked directly to a basic theme, then to an organizing theme, and finally to one of the five core neuropsychological systems. This structure strengthened the content coherence of the instrument and supported its cultural relevance. The preliminary item pool contained 100

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items, and after content review and psychometric refinement, 91 items were retained in the final version. Items with acceptable content validity indicators were preserved, revised, or merged, and the retained pool adequately covered all major behavioral, emotional, and cognitive manifestations of marital conflict across the five domains.

Table 2

Descriptive characteristics of the pilot and main study samples

Variable	Pilot study (n = 81)	Main study (n = 430)
Age range (years)	19–57	18–66
Age, M (SD)	36.25 (7.66)	38.94 (8.25)
Marital duration range (years)	1–43	1–48
Marital duration, M (SD)	13.16 (8.87)	14.64 (8.45)
Men, n (%)	16 (19.8)	86 (20.0)
Women, n (%)	65 (80.2)	344 (80.0)
Diploma, n (%)	34 (42.0)	160 (37.2)
Bachelor's degree, n (%)	20 (24.7)	124 (28.8)
No children, n (%)	24 (29.6)	95 (22.1)
One child, n (%)	28 (34.6)	145 (33.7)
Two children, n (%)	24 (29.6)	133 (30.9)
Three or more children, n (%)	5 (6.2)	57 (13.3)
No conflict, n (%)	2 (2.5)	24 (5.6)
Low conflict (levels 2–4), n (%)	12 (14.8)	82 (19.1)
Moderate conflict (level 5), n (%)	21 (25.9)	125 (29.1)
High conflict (levels 6–9), n (%)	29 (35.8)	108 (25.1)
Complete conflict, n (%)	17 (21.0)	91 (21.2)

The descriptive results indicated that the two quantitative samples were broadly comparable in age and marital duration, although the main study included a wider age and relationship range. In both studies, women constituted about four-fifths of the participants. The largest educational groups were diploma and bachelor's degree holders, and the most frequent family structures were one-child and two-child households. With regard to self-perceived marital conflict, the distribution was clearly heterogeneous, but moderate to severe conflict predominated. In the total pattern of responses, only a small minority described their relationship as conflict-free, whereas the largest concentration fell at the moderate conflict level, followed by high conflict and complete conflict. This pattern shows that the validation sample was appropriately saturated with participants experiencing substantial relational strain, while still retaining enough lower-conflict cases for discriminant validity testing.

The analysis of conflict domains further showed that marital disagreements were most common in family relations (67%), financial issues (61%), moral matters (58%), sexual issues (53%), childrearing (47%), major life decisions (47%), and marital neglect (46%). Moderately frequent domains included organization of tasks (40%), time management (36%), appearance and dress (33%), housework (33%), and daily routine matters (32%). Less frequent but still relevant domains included fidelity (30%), religious issues (28%), leisure (27%), and social issues (24%), whereas political issues (10%), inheritance (10%), news (11%), reading (12%), and spiritual or charitable activities (13%) were the least frequent sources of conflict. These findings suggest that conflict in marriage is concentrated primarily in family, financial, moral, sexual, and shared-responsibility domains rather than in more individualized or peripheral lifestyle issues.

Figure 1

Network Analysis of Couples' Conflict Domains.

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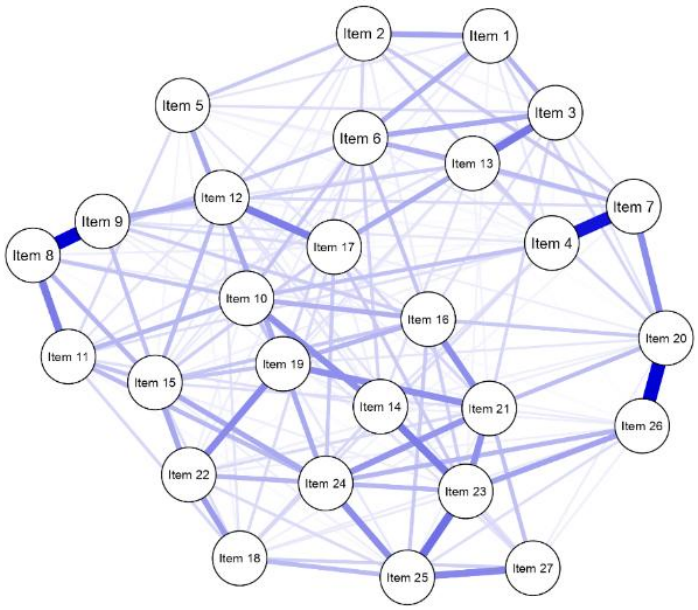

The network analysis of the 27 conflict domains revealed 183 nonzero edges out of 351 possible connections, corresponding to a sparsity coefficient of 0.48, indicating that nearly half of the potential interrelations among conflict areas were active and meaningful. The strongest associations were observed between organization of tasks and time management, between marital neglect and dowry-related issues, between dowry and inheritance, between moral matters and fidelity, and between cultural and spiritual issues. The network also formed several meaningful clusters, including daily life management, financial-legal tensions, values and beliefs, and intimacy-related domains. Some nodes, especially appearance and dress, educational issues, social issues, and cultural issues, occupied more central positions in the network, suggesting that they may function as visible surface expressions of deeper, more primary clusters of conflict. Taken together, the network findings supported the assumption that marital conflict is multidimensional, dynamic, and internally interconnected rather than isolated within a single domain.

Table 3

Summary of exploratory factor analysis across the five questionnaire domains

Scale	Initial items	Retained items	Removed items	KMO	Bartlett's χ^2 (df)	p	Factors extracted	Explained variance	Factor labels
Prefrontal cortex	26	23	3	0.86	1445.67 (325)	< .001	5	62%	Impulsive behaviors; distractibility; hypomentalizing; pleasure seeking; speech disorganization
Anterior cingulate gyrus	19	18	1	0.89	1083.39 (171)	< .001	3	61%	Inflexibility; novelty aversion; fixation
Deep limbic system	22	20	2	0.87	1189.28 (231)	< .001	2	53%	Paranoia; emotional numbness
Basal ganglia	19	17	2	0.81	624.80 (171)	< .001	1	49%	Basal ganglia dysfunction
Temporal cortex	14	13	1	0.87	666.20 (91)	< .001	1	47%	Temporal cortex dysfunction

The exploratory factor analyses conducted in the pilot sample strongly supported the factorial adequacy of the data. All KMO indices were in the good to very good range, varying from 0.81 to 0.89, and all Bartlett's tests were statistically significant at $p < .001$, indicating that the correlation matrices were suitable for factor extraction. Across the five scales, nine items were removed because they failed to show adequate factor fit, leaving a final pool

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of 91 retained items. The prefrontal scale yielded a five-factor solution explaining 62% of the variance, the anterior cingulate gyrus scale a three-factor solution explaining 61%, the deep limbic scale a two-factor solution explaining 53%, and the basal ganglia and temporal cortex scales single-factor solutions explaining 49% and 47% of the variance, respectively. These findings indicate that the questionnaire achieved both conceptual differentiation and empirical coherence. At the level of lower-order dimensions, the final structure included twelve first-order factors nested within the five broader neuropsychological systems.

Figure 2

Structural Equation Model of the Prefrontal Cortex Scale.

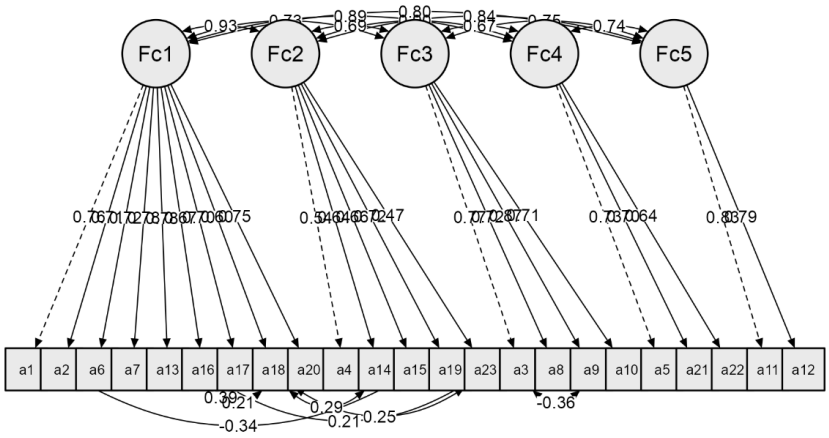

Figure 3

Structural Equation Model of the Anterior Cingulate Gyrus Scale.

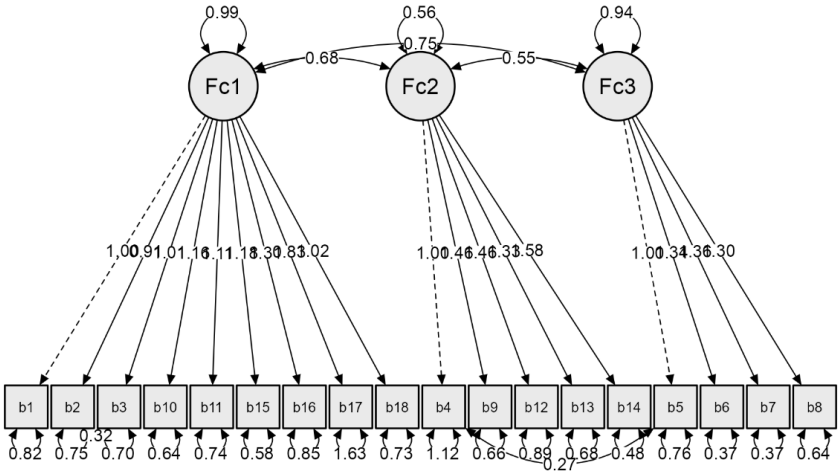

Figure 4

Structural Equation Model of the Deep Limbic System Scale.

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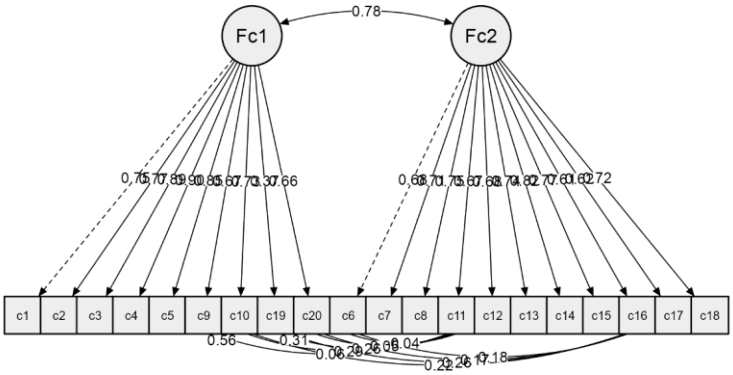

Figure 5

Structural Equation Model of the Basal Ganglia Scale.

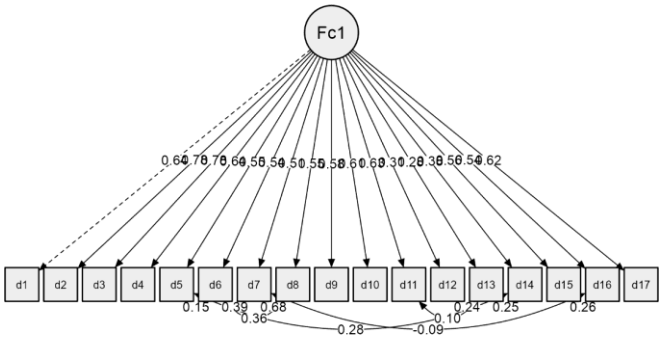

Figure 6

Structural Equation Model of the Temporal Cortex Scale.

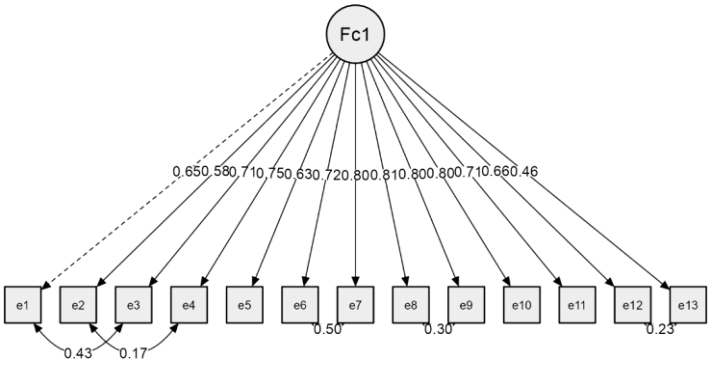

Table 4

Summary of confirmatory factor analysis and model fit indices

Scale	Retained items	Factor structure	Standardized loading range	CFI	TLI	IFI	GFI	RMSEA	CMIN/DF	Interpretation
Prefrontal cortex	23	5 factors	0.47–0.87	0.90	0.90	0.91	0.91	0.07	3.56	Good fit
Anterior cingulate gyrus	18	3 factors	0.54–0.91	0.93	0.92	0.93	0.91	0.08	4.25	Good fit
Deep limbic system	20	2 factors	0.37–0.90	0.90	0.90	0.89	0.91	0.08	4.79	Acceptable fit
Basal ganglia	17	1 factor	0.28–0.78	0.90	0.90	0.91	0.91	0.08	3.90	Good fit
Temporal cortex	13	1 factor	0.46–0.81	0.94	0.93	0.94	0.92	0.07	4.36	Good fit

The confirmatory factor analyses in the main sample supported the construct validity of the proposed model. The prefrontal, anterior cingulate gyrus, basal ganglia, and temporal cortex scales all demonstrated good model fit according to the major fit criteria, whereas the deep limbic system showed an acceptable rather than excellent fit because its IFI value was slightly below the conventional .90 threshold. Standardized factor loadings were statistically significant for all retained indicators at $p < .01$, although a few items in the deep limbic and basal ganglia domains showed relatively weak loadings compared with the rest of the model. Even so, the total pattern of fit indices indicated that the overall structure was psychometrically defensible and theoretically coherent. The prefrontal domain was confirmed as a five-factor construct, the anterior cingulate gyrus as a three-factor construct, the deep limbic system as a two-factor construct, and the basal ganglia and temporal cortex as unidimensional domains. This pattern replicated the exploratory findings and confirmed the stability of the five-domain neuropsychological model in the larger validation sample.

Table 5

Reliability, convergent validity, and discriminant validity of the five main scales

Scale	Items	M	SD	Cronbach's α	McDonald's ω	Split-half	r with total marital conflict	r with total marital satisfaction	Conflict group, M (SD)	Non-conflict group, M (SD)	t
Prefrontal cortex	23	44.01	18.45	0.95	0.94	0.92	0.59**	-0.63**	48.71 (16.71)	30.66 (16.61)	9.85
Anterior cingulate gyrus	18	41.25	18.89	0.95	0.95	0.91	0.59**	-0.54**	46.35 (16.57)	26.79 (17.62)	10.57
Deep limbic system	20	45.70	20.02	0.92	0.88	0.87	0.62**	-0.56**	51.55 (16.78)	29.12 (19.24)	11.70
Basal ganglia	17	29.50	14.68	0.89	0.84	0.81	0.58**	-0.44**	33.06 (13.61)	19.39 (12.83)	9.28
Temporal cortex	13	26.60	13.81	0.93	0.91	0.89	0.62**	-0.50**	29.60 (12.13)	14.29 (11.95)	11.53

**$p < .01$.

The reliability results showed that all five major scales had strong internal consistency. Cronbach's alpha ranged from 0.89 to 0.95, McDonald's omega ranged from 0.84 to 0.95, and split-half coefficients ranged from 0.81 to 0.92, indicating good to excellent reliability across domains. At the subscale level, the prefrontal factors also showed acceptable to high reliability, with alpha values ranging from 0.74 for pleasure seeking to 0.90 for impulsive behaviors. Within the anterior cingulate gyrus domain, alpha coefficients ranged from 0.87 to 0.92, and within the deep limbic domain, the paranoia and emotional numbness subscales showed alpha coefficients of 0.95 and 0.92, respectively. These results confirm that both the broad domains and the more specific components of the questionnaire have satisfactory internal consistency.

Evidence for convergent validity was also strong. All five neuropsychological domains correlated positively and significantly with total marital conflict, with coefficients ranging from 0.58 to 0.62. The strongest positive associations were observed for the deep limbic system and temporal cortex. At the subscale level of the marital conflict measure, the highest correlations were generally found for negative emotional reactions and reduced sexual relationship, whereas the weakest correlations were observed for financial separation. Specifically, negative emotional reactions correlated between 0.58 and 0.67 across

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the five domains, and reduced sexual relationship correlated between 0.53 and 0.58. By contrast, financial separation showed smaller correlations, from 0.18 to 0.25, indicating that this aspect of marital conflict may depend more on contextual and practical variables than on the neuropsychological processes captured by the present measure.

The associations with marital satisfaction provided additional support for convergent validity in the expected inverse direction. All correlations between the neuropsychological scales and total marital satisfaction were negative and statistically significant, ranging from -0.44 to -0.63. The strongest negative association was observed for the prefrontal cortex scale, followed by the deep limbic system and temporal cortex. A similar pattern was found across the marital satisfaction subscales. The largest negative relations were observed for contractual response, global marital satisfaction, and marital communication, whereas weaker but still significant relations emerged for equality roles, children and parenting, relatives and friends, and ideological orientation. This pattern is theoretically consistent with the assumption that greater impairment in emotional regulation, executive control, social interpretation, and cognitive flexibility is associated with lower satisfaction across multiple dimensions of married life.

Finally, the discriminant validity findings clearly distinguished couples with marital conflict from couples without serious conflict. Independent-samples t tests showed significant between-group differences on all five main scales at $p = .01$. Couples with conflict scored substantially higher than couples without conflict on the prefrontal cortex, anterior cingulate gyrus, deep limbic system, basal ganglia, and temporal cortex domains. The largest difference was observed for the deep limbic system, followed closely by the temporal cortex and anterior cingulate gyrus. This overall pattern extended to all reported lower-order subscales as well. The conflict group had higher scores in impulsive behaviors, distractibility, hypomentalizing, pleasure seeking, speech disorganization, inflexibility, novelty aversion, fixation, paranoia, and emotional numbness. The magnitude and consistency of these differences indicate that the instrument has satisfactory discriminatory power and is capable of differentiating couples experiencing clinically meaningful relational distress from those without severe conflict. Taken together, the results demonstrate that the neuropsychological marital conflict questionnaire has a coherent multidimensional structure, robust internal consistency, satisfactory convergent validity, and clear discriminant validity, thereby supporting its use as a valid and reliable assessment tool in both research and clinical contexts.

4. Discussion

The present study aimed to develop and validate a neuropsychological questionnaire for marital conflicts grounded in brain system functioning and to evaluate its psychometric properties within a culturally relevant context. The findings demonstrated that the instrument possesses a coherent multidimensional structure, strong reliability indices, satisfactory construct validity, and meaningful convergent and discriminant validity. These results collectively support the conceptualization of marital conflict as a neuropsychologically embedded phenomenon, shaped by the interaction of multiple brain systems involved in emotion regulation, executive functioning, social cognition, and behavioral control.

One of the most significant findings of this study was the identification of a five-domain structure encompassing the prefrontal cortex, anterior cingulate gyrus, deep limbic system, basal ganglia, and temporal cortex. This structure is consistent with contemporary neuropsychological models that emphasize the distributed and interconnected nature of brain systems in regulating interpersonal behavior. The prefrontal cortex, for instance, has been consistently associated with executive functions such as impulse control, planning, and decision-making, which are critical for effective conflict resolution. The high factor loadings and strong reliability indices observed in this domain indicate that deficits in executive functioning play a central role in marital conflict, a finding that aligns with previous research highlighting the importance of cognitive control in regulating interpersonal interactions (Hathaway & Newton, 2023; Zhao et al., 2021).

Similarly, the anterior cingulate gyrus emerged as a distinct domain characterized by cognitive rigidity, fixation, and resistance to change. These features are closely related to difficulties in cognitive flexibility and emotional regulation, which are essential for adaptive responses in conflict situations. The identification of this domain supports the notion that persistent and unresolved marital conflicts may stem from an inability to shift perspectives or disengage from negative cognitive-emotional loops. This interpretation is consistent with neuroimaging studies demonstrating the role of the anterior cingulate cortex in

error monitoring and adaptive behavioral adjustment (Vrtička et al., 2012). The presence of strong psychometric properties in this domain further reinforces its relevance in understanding marital dynamics.

The deep limbic system, which was represented by factors such as paranoia and emotional numbness, also showed substantial explanatory power in the model. The findings indicated that emotional dysregulation, heightened sensitivity to negative stimuli, and reduced emotional responsiveness are key contributors to marital conflict. These results are in line with existing literature suggesting that the limbic system plays a central role in emotional processing and the formation of affective responses to interpersonal stimuli. Dysregulation in this system has been linked to increased emotional reactivity, negative attribution biases, and difficulties in maintaining emotional stability within relationships (Teicher et al., 2016). Moreover, the strong association between the deep limbic domain and marital conflict underscores the importance of emotional processes in shaping relational outcomes.

The basal ganglia and temporal cortex domains, although represented as single-factor structures, also demonstrated significant contributions to the overall model. The basal ganglia domain was associated with anxiety-related and psychosomatic features, reflecting the role of this system in regulating stress responses and habitual behaviors. The observed relationships between this domain and marital conflict suggest that chronic anxiety and avoidance tendencies may exacerbate relational tensions. This finding is consistent with research indicating that anxiety-related processes can interfere with effective communication and conflict resolution in intimate relationships (BakhshiPour et al., 2024). The temporal cortex domain, on the other hand, was linked to social-emotional processing deficits, including misinterpretation of emotional cues and difficulties in communication. These findings align with previous studies highlighting the role of temporal regions in social cognition and the interpretation of interpersonal signals (Godfrey et al., 2022).

Another important finding of the study was the strong convergent validity of the developed instrument with established measures of marital conflict and marital satisfaction. The positive correlations between the neuropsychological domains and marital conflict, as well as the negative correlations with marital satisfaction, provide robust evidence for the construct validity of the questionnaire. These results suggest that higher levels of neuropsychological dysfunction are associated with increased conflict and decreased satisfaction in marital relationships. This pattern is theoretically consistent with the broader literature on relational functioning, which emphasizes the interplay between cognitive, emotional, and behavioral processes in determining relationship quality (Bahramian et al., 2025; Paydari-Niam & Jadidian, 2025).

The strongest associations were observed between the deep limbic system and temporal cortex domains and the emotional components of marital conflict, such as negative emotional reactions and reduced intimacy. This finding is particularly noteworthy, as it highlights the central role of emotional and social processing systems in shaping the quality of marital interactions. It is also consistent with research demonstrating that neural synchronization and emotional attunement between partners are key predictors of marital satisfaction (Li et al., 2022). The relatively weaker associations observed for domains such as financial conflict further suggest that some aspects of marital conflict may be more strongly influenced by contextual and environmental factors rather than neuropsychological processes.

The discriminant validity findings further strengthen the utility of the instrument. The significant differences observed between couples with and without marital conflict across all neuropsychological domains indicate that the questionnaire is capable of effectively distinguishing between different levels of relational functioning. This suggests that the instrument can be used not only for assessment but also for diagnostic and intervention purposes. The higher scores observed in the conflict group across domains such as impulsivity, emotional dysregulation, and cognitive rigidity provide empirical support for the hypothesis that maladaptive neuropsychological patterns are more prevalent in distressed relationships. These findings are consistent with studies on interpersonal violence and relational dysfunction, which have identified similar neuropsychological correlates in individuals involved in high-conflict relationships (Godfrey et al., 2022).

From a theoretical perspective, the findings of this study contribute to the growing body of literature that integrates neuroscience and relationship science. The results support the complexity-based view of marital behavior, which conceptualizes relationships as dynamic systems influenced by multiple interacting components. The identification of distinct yet interconnected neuropsychological domains aligns with the theory of brain complexity, which emphasizes the nonlinear and emergent nature of human behavior (Nikrahan, 2023). This perspective provides a more

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comprehensive framework for understanding marital conflict, moving beyond reductionist models that focus on isolated variables.

The role of attachment processes in shaping the observed patterns should also be considered. The associations between neuropsychological domains and relational outcomes are likely mediated by attachment-related mechanisms, as attachment styles influence both emotional regulation and interpersonal behavior. Neuroimaging studies have shown that attachment styles modulate neural responses in regions associated with mentalizing and emotional processing, further supporting the link between neuropsychology and relationship dynamics (Schneider-Hassloff et al., 2015; Zhang et al., 2018). In this context, the developed questionnaire may also serve as an indirect measure of attachment-related functioning in marital relationships.

Furthermore, the findings can be interpreted in light of developmental and environmental influences. Early life experiences, particularly exposure to stress and trauma, have been shown to affect brain development and increase vulnerability to emotional and interpersonal difficulties in adulthood (Teicher et al., 2016). The presence of neuropsychological dysfunctions in individuals with marital conflict may therefore reflect the cumulative impact of these experiences. Additionally, broader contextual factors such as social support, cultural norms, and environmental stressors play a role in shaping both neuropsychological functioning and relational dynamics (Almuhtaseb et al., 2021; Liu & Vazsonyi, 2024).

Finally, the study highlights the importance of developing culturally sensitive assessment tools. The integration of qualitative data from couples and experts ensured that the questionnaire reflects the lived experiences and cultural context of the target population. This approach enhances the ecological validity of the instrument and increases its applicability in both research and clinical settings. In an era where relational dynamics are increasingly influenced by technological and social changes, including emerging forms of human interaction, the need for comprehensive and adaptive assessment tools is more critical than ever (Zhang et al., 2025).

5. Conclusion

Overall, the findings of this study provide strong evidence for the validity and reliability of the neuropsychological marital conflict questionnaire and underscore the importance of considering brain-based processes in the assessment and understanding of marital conflict. By integrating insights from neuroscience, psychology, and relationship science, the study offers a novel and comprehensive framework for examining the complexities of marital relationships.

6. Limitations & Suggestions

The study is subject to several limitations. First, the use of convenience and purposive sampling may limit the generalizability of the findings to broader populations. Second, the cross-sectional design restricts the ability to draw causal inferences regarding the relationships between neuropsychological factors and marital conflict. Third, reliance on self-report measures may introduce response biases, including social desirability and subjective interpretation of items. Fourth, although the sample size was adequate for factor analysis, further validation in more diverse and larger samples is necessary. Finally, the study did not incorporate direct neurobiological measures, such as neuroimaging or physiological indicators, which could provide additional validation of the proposed constructs.

Future research should aim to address these limitations by employing longitudinal designs to examine the causal pathways between neuropsychological functioning and marital conflict over time. The use of multimethod approaches, including behavioral observations, physiological measures, and neuroimaging techniques, could provide a more comprehensive understanding of the underlying mechanisms. Additionally, future studies should explore the applicability of the questionnaire across different cultural contexts and relationship types to enhance its generalizability. Investigating the role of moderating variables such as gender, socioeconomic status, and personality traits may also yield valuable insights into the variability of marital conflict patterns.

From a practical perspective, the findings of this study have important implications for clinical practice and intervention. The developed questionnaire can serve as a valuable tool for assessing neuropsychological patterns associated with marital conflict, enabling clinicians to identify underlying mechanisms and tailor interventions accordingly. Incorporating neuropsychological assessments into couple therapy may enhance the effectiveness of existing approaches by addressing cognitive and emotional processes at a deeper level. Moreover, the results highlight the importance of interventions focused on improving emotional regulation, cognitive flexibility, and

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communication skills, which are central to healthy marital functioning.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. For this study, an ethics approval code was issued by the National Committee for Ethics in Biomedical Research with the identifier IR.IAU.TNB.REC.1404.074.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors have equally contributed to the research process and the development of the manuscript.

Declaration

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