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Predicting Women's Psychological Flourishing Using XGBoost: The Relative Importance of Self-Compassion, Resilience, Emotional Intelligence, and Social Support

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1. Round 1

1.1. Reviewer 1

Reviewer:

In the Abstract conclusion, the sentence “Relationship commitment, communication patterns, attachment security, and emotional regulation represent critical determinants of marital satisfaction” should be revised because the cross-sectional predictive design cannot establish determinants in a causal sense. The manuscript can state that these variables were “important predictors” or “strongly associated predictive features,” but “determinants” implies causal influence. This is especially important because the same abstract also describes the study as cross-sectional. I recommend replacing deterministic language throughout the abstract and conclusion with predictive terminology, such as “the model identified relationship commitment, communication patterns, attachment security, and emotion regulation as the most influential predictors in this dataset.” This would preserve the strength of the findings without exceeding what the design permits.

In the Measures section, the paragraph on the Revised Dyadic Adjustment Scale states that “The RDAS has demonstrated strong psychometric properties across different cultural settings,” but the manuscript does not report psychometric evidence for the present Taiwanese sample. Because the study is conducted in Taiwan, the authors should specify the language version used, whether translation/back-translation was performed, whether the scale has been validated in Taiwanese or Chinese-speaking married populations, and what internal consistency coefficient was observed in the present sample. The same concern

applies to the ECR-R, ERQ, Commitment Inventory, and CPQ-SF. Without sample-specific reliability and construct validity evidence, it is difficult to judge whether the features used in the model represent valid and reliable constructs in this population.

Authors revised the manuscript and uploaded the document.

1.2. Reviewer 2

Reviewer:

In the first Introduction paragraph, the manuscript begins with a formatting error: "1. MIntroduction" followed by "arital satisfaction is one of the most extensively studied indicators of relationship quality and family functioning." This should be corrected to "1. Introduction" and "Marital satisfaction…" The error appears to result from a dropped capital letter or layout artifact, but it is highly visible and occurs at the beginning of the main text. Because the manuscript is being presented as a scientific article, such formatting problems should be corrected throughout the document. The authors should carefully proofread all headings, page breaks, hyphenation artifacts, and broken words, especially because several sections contain typographical irregularities such as "Study design and Participant," which should be "Study Design and Participants."

In the Introduction, the paragraph stating that "Machine learning algorithms are capable of identifying complex nonlinear patterns, high-order interactions, and subtle predictive relationships that may remain undetected using traditional methods" needs stronger methodological support and more precise framing. The manuscript currently presents this claim generally but does not adequately explain why CatBoost is specifically preferable to linear regression, elastic net, random forest, support vector regression, XGBoost, or LightGBM for the present dataset. Since the predictors appear to be a small set of continuous scale scores, the advantage of CatBoost is not self-evident. The authors should provide a more explicit rationale for using CatBoost, including whether the data included categorical variables, nonlinear effects, interaction structures, missingness patterns, or other properties for which CatBoost is especially advantageous.

In the final Introduction gap paragraph, the sentence "relatively few studies have employed advanced machine learning approaches to examine marital satisfaction among women" is plausible but insufficiently substantiated. The authors should make the research gap more specific by clarifying whether the novelty concerns the target population, the Taiwanese context, the use of CatBoost, the combination of four relational predictors, or the incorporation of SHAP explanations. The current gap statement remains broad and could apply to many studies in relationship science. A stronger gap paragraph should identify precisely what prior regression, SEM, or machine learning studies have not done, and why the present model advances theoretical or applied knowledge beyond simply producing a high R^2. The rationale would also benefit from a direct explanation of why married women in Taiwan constitute a theoretically meaningful or understudied population.

In the Methods section, the sentence "Participants were recruited through community centers, family counseling services, women's associations, social media platforms, and online survey distribution networks" requires substantially more detail about sampling procedures. The manuscript does not specify whether recruitment was convenience-based, stratified, purposive, snowball, or quota-based; how many individuals were invited; how many declined; what the response rate was; or whether duplicate online responses were prevented. These details are essential because the study relies on a large nonclinical community sample and uses predictive modeling, where sample representativeness directly affects generalizability. The authors should report recruitment procedures separately for offline and online sources, describe consent procedures for each modality, and clarify whether IP checks, attention checks, completion-time filters, or duplicate-response detection were used.

In the Methods paragraph stating "A total of 742 married women participated in the study," the manuscript should explain how this sample size was determined. No a priori power analysis, precision analysis, or machine-learning sample-size justification is presented. Although 742 participants may be adequate for a model with a small number of predictors, the authors should still justify the sample size in relation to the planned train-test split, cross-validation, expected effect sizes, number of predictors, and model complexity. In predictive modeling, sample adequacy should be discussed not only in terms of statistical power but also in terms of stability of feature importance, generalization error, and variance of performance metrics. A brief rationale would strengthen the methodological rigor of the study.

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In the eligibility criteria paragraph, the sentence “Women who reported severe psychiatric disorders, ongoing divorce proceedings, or incomplete questionnaire responses exceeding 10% of total items were excluded from the final analysis” requires clarification. The authors should specify how severe psychiatric disorders were assessed: by self-report, screening tool, medical diagnosis, medication history, or clinical interview. They should also clarify why ongoing divorce proceedings were treated as an exclusion criterion, as this may systematically remove women with low marital satisfaction and restrict the outcome range, potentially inflating prediction accuracy and limiting external validity. The 10% missing-data exclusion rule should also be accompanied by the number of excluded participants and a comparison between included and excluded cases, if available.

Authors revised the manuscript and uploaded the document.

2. Revised

Editor’s decision: Accepted.
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