

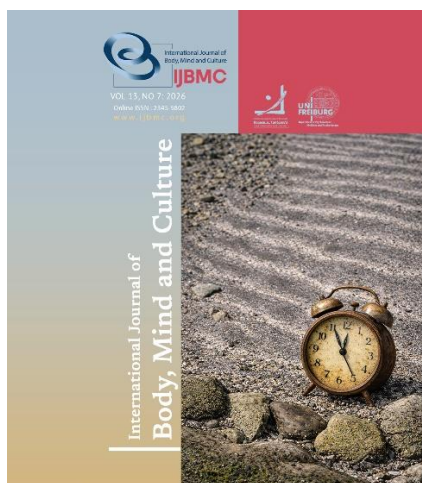
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Self-Reported Reliance on Artificial Intelligence Applications and Academic Stress among University Students: A Cross-Sectional Study

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ABSTRACT

Objective: This study aimed to reveal the relationship between self-reported levels of dependency and levels of academic stress among university students.

Methods and Materials: The study adopted a quantitative cross-sectional correlational approach and was conducted on a sample of 380 male and female students from Diyala University across various disciplines and academic levels. Data were collected using a structured questionnaire to measure the level of reliance on artificial intelligence applications and the level of academic stress.

Findings: The results showed a moderate level of both reliance on AI applications (55.5%) and academic stress (82.1%). Statistical analysis also revealed a statistically significant positive relationship between self-reported reliance on AI applications and academic stress ($r = 0.285$, $p = .001$), indicating that increased academic stress correlated with a higher level of reliance on AI applications.

Conclusion: A significant positive correlation was found between self-reported levels of dependency and academic stress levels among university students. The study recommended guiding the balanced use of these applications and reducing academic stress to improve students' mental health.

Keywords: Artificial Intelligence, Application, Academic Stress, Students.

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Introduction

Artificial intelligence is a technological revolution in academia and educational institutions globally and locally (Ibtihal Asaad Kashmiri, 2024). Its importance is multifaceted, enhancing student participation, teaching efficiency, and academic performance (Vieriu & Petrea, 2025). AI contributes to improved academic results and reduced anxiety and stress from academic pressures by facilitating access to information (Aruna Kalkur T., 2025; Zhou et al., 2024).

Despite the benefits of these applications, other studies have warned of the risks of their intensive use, including behavioral and academic risks, as overusing them may impair self-learning, analytical, and critical thinking. (Forero & Herrera-Suárez, 2023; Jay Marianne L. Redondo, 2025). In addition to ethical risks, data privacy loss, weak academic engagement, and other problems (Abubakar et al., 2025).

In the psychological context, other studies have examined the digital behavioral interactions of university students and their psychological effects (Hassan et al., 2025). Studies have also shown that increased use of these applications leads to higher stress levels and negatively impacts mental health. Furthermore, the relationship between reliance on these applications and academic stress is positive, with increased academic stress being associated with greater dependence on these smart devices (Liu et al., 2026). Other studies have also reported concerns about the use of artificial intelligence and its link to increased stress levels and its impact on academic performance (Aslam, 2025; Wang & Xu, 2026).

If artificial intelligence is used correctly, it reduces errors and improves efficiency; therefore, it is considered a major innovation (Khudur et al., 2025). Other studies have also shown that these smart applications are useful supplementary resources, not replacements for effort, and that students' perceived self-efficacy determines how they use them (Lund et al., 2026; Griffin Pitts et al., 2025). While several of the studies mentioned are published in peer-reviewed journals, some new research remains preliminary; thus, its findings should be approached with caution when making broader inferences.

This study is predicated on the Cognitive Appraisal Theory of Stress (Lazarus & Folkman, 1984), which holds

that stress results from an individual's evaluation of the event rather than the event itself. The student (individual) undergoes two phases of evaluation: the first evaluates their academic responsibilities and requirements, and the second evaluates their resources. Stress levels increase, and the student looks for suitable coping mechanisms when they recognize that these academic demands exceed their ability to handle. Applications of artificial intelligence turn into helpful tools that students use to manage these academic demands. However, using them frequently as a coping strategy causes behavioral dependence. As a result, there may be a correlation rather than a direct cause-and-effect relationship between reliance on these apps and academic stress levels (Folkman, 2020; Lazarus, 2006). This theory was chosen because it is one of the most popular models for describing how academic stress arises and because it emphasizes the connection between an individual's resources and environmental demands. This theory offers a useful conceptual framework for explaining the relationship between academic stress and reliance on artificial intelligence applications without presuming a direct causal relationship, since these applications can be viewed as an adaptive resource students turn to under stress.

Although international studies have addressed the use of artificial intelligence in education, research focusing on self-reported reliance on AI applications and academic pressure remains limited in Iraqi universities. This study at the University of Diyala is of particular scientific importance given the technological challenges and academic stress students face, and it contributes to the provision of local data that helps in understanding this phenomenon within the Iraqi educational environment.

Based on the above, this study aims to determine the level of reliance on artificial intelligence applications and academic stress, and to examine the relationship between self-reported reliance on artificial intelligence applications and academic stress.

Methods and Materials

Study Design

A quantitative approach using a cross-sectional correlation design was employed. This design was chosen to examine the relationship between self-

reported reliance on artificial intelligence applications and academic stress, as it is best suited to assessing this relationship at a specific point in time without experimental intervention. The cross-sectional correlation design is appropriate for the study's objectives, which aim to reveal a statistical correlation between variables rather than a causal relationship. The study was conducted in accordance with the STROBE Statement guidelines for cross-sectional studies.

Study Setting

The study was conducted at Diyala University, a public university in Baquba that comprises several scientific, humanities, and medical colleges. The sample collection process included multiple disciplines and all academic levels. College administrations were contacted to facilitate this task during official working hours. Data collection took place during the first semester of December 2025-26, before final exams, to minimize potential academic stress and to measure it more naturally, as it is a typical academic period.

Sample and Sampling

Samples were collected from female and male students of Diyala University using non-probability convenience sampling. 380 samples were collected from a total of 32,508 students for the academic year 2025-2026 to represent the sample population. Students were reached in lecture halls and on the university campus through cooperation with college administrations. The questionnaire was distributed directly by the researcher to students who wished to participate. While the data collection method was simple, it exposes the results to potential selection bias. Therefore, these results cannot be generalized to other Iraqi universities, but only to the educational institution where the study was conducted. Furthermore, the sample collection process was not based on precise proportional criteria to ensure equal representation across all colleges or academic levels.

Inclusion criteria: To be currently enrolled in studies, aged 18 or older, and to use artificial intelligence applications in an academic context

Exclusion criteria: Having psychological or mental illnesses or problems, and not using artificial intelligence applications.

Inclusion and exclusion criteria were verified through participant self-reporting via direct questioning within the questionnaire, and no official medical records were consulted.

Sample Size: 380 students were selected using Cochrane's formula with a 5% error rate and a 95% confidence level. Because it offers the statistical power to disclose a mean effect size ($r = 0.20-0.30$) at a significance level of 0.05, which is comparable with correlational studies in the behavioral sciences, this size is also statistically adequate for correlation analysis. The sample was not stratified to represent the relative size of each college or academic year within the total population because convenience sampling was used. The appropriateness of the numerical size for correlational statistical analysis is unaffected, although this may restrict the population's structural representation.

Instruments

Sociodemographic and Academic Characteristics of university students were assessed using a 9-item questionnaire. The sociodemographic variables included: age, gender, marital status, area of residence, housing situation, and monthly family income. The academic variables included: academic specialty, academic grade, and working while studying.

These factors were chosen in light of prior research showing a correlation between them and patterns of technology use and psychological stress. Academic specialization, family income, and working while studying are a few examples of socioeconomic factors that may affect a student's vulnerability to stress.

Academic Stress Inventory Scale: This scale, developed by Lin & Chen (2009), measures academic stress among university students. It comprises seven main dimensions. It consists of 34 items, with high internal consistency (Cronbach's $\alpha = .90$) and good validity, as reported in the original study (Lin & Chen, 2009). Items are answered using a five-point Likert scale 1 to 5. After being examined by a linguistic specialist, the scale was translated into Arabic. While maintaining the items' conceptual meaning, the translation was modified to fit the local and cultural context. The study's goal of assessing the overall degree of academic stress was met by using the total score across all seven dimensions, even though the scale has seven dimensions. Stress levels were low, medium, or high based on the sample mean and standard deviation. This classification is merely descriptive and does not represent clinical threshold values.

Dependence on Artificial Intelligence Scale (DIA): Adapted from Morales-García et al. (2024), this is a well-

developed scale with high reliability, showing Cronbach's $\alpha = 0.87$ and Omega = 0.87, along with strong validity. The results showed that all items on the scale measure the same dimension and are clear, demonstrating acceptable reliability for measuring reliance on artificial intelligence among university students. The scale consists of five items, and responses are on a five-point Likert scale (Morales-García et al., 2024). According to this scale's cognitive-behavioral dependency concept, using artificial intelligence applications to complete academic tasks does not necessarily indicate problematic or pathological use. As a result, the scale differentiates between dependency—a pattern of growing reliance on these applications—and use as a tool. After being examined by a linguistic translator to make sure it was appropriate for the local and cultural context before being used in the pilot study, the scale was translated into Arabic while maintaining the conceptual items' meaning. Despite having only five items, the scale is intended to measure a single, distinct dimension. One of the study's limitations is that succinct scales may not capture all the nuanced facets of dependency, so the results should be interpreted accordingly.

To verify the validity of the study tools, a pilot study was conducted with a sample of thirty students who were not included in the main study sample. This was done to ensure that the items were clear and to calculate internal consistency coefficients. Using SPSS (Statistical Package for the Social Sciences) version 2026, the Cronbach's α coefficient—a measure of internal consistency among the items on each scale—was calculated. According to the results, the academic stress scale's reliability coefficient was ($\alpha = 0.799$), and the AI dependency scale's was ($\alpha = 0.763$). These coefficients demonstrate a high degree of internal consistency by recognized statistical standards, suggesting that the scale items measure the intended concepts with reasonable reliability. Because of these results, the final version of the instruments was authorized for use with the primary study sample.

Data Collection

Samples were collected from participating students after obtaining their consent, as well as from the Presidency of Diyala University and the relevant authorities of the colleges included in the study.

Informed consent was obtained from the participating students after confirming the confidentiality of their personal information and that it would be used only for scientific research purposes. Sample collection began on December 7th and continued until December 14th, 2025, during official working hours. Lecture times were set after consulting with the faculty and college administration to ensure that the maximum number of students could attend. Paper questionnaires were distributed to students in classrooms and campus gardens, and they completed them independently without the researcher's help—instructions were provided only when necessary, and they received them directly during the same session. The response time was 6-10 minutes per questionnaire after verifying that the participant had used artificial intelligence applications. "Do you use artificial intelligence applications in your university studies?" was a direct question at the start of the questionnaire to verify students' use of AI applications; questionnaires that did not meet this criterion were not included. Before the data were entered into the statistical analysis program, the completed questionnaires were examined, and those with missing information or that showed a blatant random pattern were eliminated. One of the study's limitations was the brief time frame for sample collection—it took place before the first semester's conclusion. The professors' assistance and the students' eagerness to participate enabled the sample collection to be completed in such a short time.

Ethical considerations

Approval was obtained from the Ethics Committee of the University of Baghdad/College of Nursing, and all necessary approvals were obtained from other relevant authorities, including the Ministry of Planning and the University of Diyala, for the purpose of collecting the sample. A form explaining the study's goals, the type of participation, the deadline for completion, and the fact that participation was entirely voluntary and would not have any academic repercussions in the event of withdrawal or refusal was given to the students. Participants were assured of total confidentiality and their right to withdraw or abstain without consequence. Participating students' identifying information was not included in the questionnaire, and it was used only for statistical analysis and scientific research.

Data Analyses

The data were analyzed using the Statistical Package for Social Sciences SPSS software version 26.0. Descriptive statistics, comprising frequencies, percentages, means, and standard deviations, were employed to summarize the study variables. Due to the ordinal nature of the primary variables, nonparametric statistical tests were used. Spearman's rank-order correlation coefficient (ρ) was employed to analyze the association between academic stress and

dependence on artificial intelligence (DAI). All statistical tests were two-tailed, with a significance threshold established at $\alpha < 0.05$. Results of considerable significance were reported with $p < 0.001$. The strength of the correlation was assessed using standard effect size criteria: 0.10 (weak), 0.30 (moderate), and 0.50 (high). The lack of multivariate analysis is recognized as a weakness of the study.

Findings and Results

The findings in Table 1 display the description of socio-demographic characteristics of university students who participated in the study ($N=380$); the average age

was 22.4 years (± 3.5), with the highest proportions seen in the age group of 20-22 years (43.2%) and 23 years and older (41.3%).

Table 1

Descriptive Results: Sociodemographic Characteristics (N=380)

List	Variables		f	%
1	Age (Years) M$\pm$SD= 22.4$\pm$3.5	≤ 19	59	15.5
		20 – 22	164	43.2
		23 +	157	41.3
2	Sex	Male	223	58.7
		Female	157	41.3
3	Marital status	Married	58	15.3
		Single	304	80
		Divorced and Separated	17	4.5
		Widowed/ Widower	1	.3
4	Residency	Urban	265	69.7
		Rural	115	30.3
5	Living with	Family	244	64.2
		Complex	102	26.8
		Private	32	8.4
		Others	2	.5
6	Perceived monthly income	Satisfied	57	15
		Somewhat satisfied	128	33.7
		Dissatisfied	195	51.3

f: Frequency, %: Percentage, M: Mean, SD: Standard deviation

The distribution of sex indicates that 58.7% of students are male and 41.3% of them are female. The marital status indicates that most students (80%) are single, while 15.3% are married. Regarding residency, 69.7% of university students live in urban areas, while only 30.3% live in rural areas. 64.2% of students live with their families, 26.8% live in university complex

apartments, and a minor proportion live privately. 51.3% of students perceive their family's monthly income as insufficient, while only 15% are satisfied with it.

No missing data were observed for the sociodemographic variables.

Table 2

Descriptive Results Academic Characteristics (N=380)

List	Variables		f	%
1	Academic specialty	Scientific	116	30.5
		Humanistic	144	37.9
		Medical	60	15.8
		Technical/Engineering	60	15.8
2	Academic Grade	First	82	21.6
		Second	101	26.6
		Third	93	24.5
		Fourth	97	25.5
		Fifth	4	1.1
		Sixth	3	.8
3	Working during study	No	256	67.4
		Yes	124	32.6

f: Frequency, %: Percentage, M: Mean, SD: Standard deviation

Table 2 presents the academic variables of university students; participants were distributed across various study specialties: humanistic colleges (37.9%), followed by scientific (30.5%), medical colleges (15.8%), and technical or engineering colleges (15.8%). The participants from college were varied: engineering (16.8%), pure sciences (16.6%), education (15%), sciences (13.4%), law (11.8%), medicine (11.1%), Islamic sciences (10.5%), and dentistry (4.7%).

Regarding academic grade, the higher proportion of university students who participated in the study was from the second grade (26.6%), followed by the fourth grade (25.5%), the third grade (24.5%), and the fifth (1.1%) and sixth (.8%) grades. Regarding working while studying, 32.6% of students reported working, while 67.4% did not.

No missing data were observed for the academic variables.

Table 3

Overall Assessment of Dependence on Artificial Intelligence (DAI) among University Students (N= 380)

Dependence	f	%	M	SD	Assessment
Low	139	36.6	12.89	3.675	Moderate
Moderate	211	55.5			
High	30	7.9			
Total	380	100			

f: Frequency, %: Percentage

M: Mean for total score, SD: Standard Deviation for total score

Low= 5.00 – 11.66, Moderate= 11.67 – 18.33, High= 18.34 – 25.00

*The classification of categories was conducted in accordance with established statistical guidelines as outlined by Pallant, J. (2013)

Table 3 demonstrates that university students exhibit a moderate level of dependency on AI applications, as reported by 55.5%, with a mean score of 12.89 ± 3.675 .

36.6% of students show low dependency, while only 7.9% show high dependency.

Table 4

Overall Assessment of Academic Stress among University Students (N= 380)

Academic Stress	f	%	M	SD	Assessment
Low	43	11.3	100.37	17.226	Moderate
Moderate	312	82.1			
High	25	6.6			
Total	380	100			

f: Frequency, %: Percentage

M: Mean for total score, SD: Standard Deviation for total score,

Low= 34.00 – 79.33, Moderate= 79.34 – 124.67, High= 125.68 – 170.00

*The classification of categories was conducted in accordance with established statistical guidelines as outlined by Pallant, J. (2013)

Table 4 shows that 82.1% of university students have a moderate level of academic stress, with a mean score of

100.37 ± 17.226 ; 11.3% have low stress; and only 6.6% have high academic stress.

Table 5*Relationship between Dependence on AI Application Use (DAI) and Academic Stress among University Students (N= 380)*

Correlation		DAI	AS
Dependence on AI Application Use (DAI)	Spearman's rho	1	
	Sig. (2-tailed)		
Academic Stress (AS)	Spearman's rho	.285**	1
	Sig. (2-tailed)	.001	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5 indicates a significant relationship between DAI and academic stress ($r = .285$, $p = .001$), such that higher academic stress is associated with higher AI use.

Discussion and Conclusion

The study's findings regarding the socio-demographic characteristics of the current sample revealed that the majority of students (84.5%) were in the 20-23 age group, with the average age of this group consistent with other studies conducted on a similar sample of university students (Morales-García et al., 2024; Zhang et al., 2024). Regarding gender, the results showed that the majority of participants were male (58.7%) and female (41.3%), which is consistent with the study by Abubakar et al. (2025). In contrast, Liu et al. (2026) reported higher female participation rates. This difference is attributed to variations in the students' academic specializations, the nature of the sample, cultural differences, and the university environment.

The findings indicated that the majority of unmarried students reside with their families in metropolitan settings, a trend prevalent in the local university context and consistent with research in other academic environments (Acosta-Enriquez et al., 2025; Ivanov, 2023). Nonetheless, comparability is constrained by disparities in cultural and economic circumstances among nations. Regarding monthly family income, 51.3% of students were dissatisfied with it. Huang (2024) and Zhang et al. (2024) reported moderate to high levels of financial and economic pressure among students. The results on specialization, academic year, and employment status during studies accurately reflected students' participation in the sample collection process. Thus, the percentages cannot be interpreted as causal indications, as these variables were not included in a prediction model for the study's primary link.

The results of the current study indicate that the majority of students (55.5%) have a moderate level of

reliance on artificial intelligence applications, with a mean score of 3.68 ± 12.89 . Meanwhile, 7.9% have a high level of reliance, and 36.6% have a low level. This indicates that the reliance falls within the average level of this study. This indicates that the result does not represent an excessive or perilous level of dependency, but rather reflects students' use of these tools to complete academic assignments. This study did not evaluate educational benefits, and it cannot be definitively claimed that the average level indicates strong support for students; it only represents the degree of dependence measured by this scale. This aligns with Morales-García et al. (2024), who indicated a moderate level. The high dependency ratio is similar to that reported by Abubakar et al. (2025), which reports a high reliance rate of 7/9%. In contrast, other studies have indicated high rates of dependency (Huang, 2024; Zhai et al., 2024; Zhang et al., 2024). This difference is due to the nature of the measurement tool used. The tool used in this study measured behavioral dependency, not pathological addiction.

The results of the current study indicate that 82.1% of the students have a moderate level of academic stress, with an arithmetic mean of (17.23 ± 100.37) . 11.3% of students showed a low level of academic stress, and 6.6% had a high level. This shows that academic stress is common among university students, but it remains within a moderate range for most. This finding is consistent with several studies indicating a moderate level of academic stress among university students (Barbayannis et al., 2022; Benítez-Agudelo et al., 2025; Pérez-Jorge et al., 2025). The high level in this study was 6.6%, which is consistent with Kausar (2025). In contrast, other studies have indicated high rates of academic stress (Jin, 2025; Wang & Xu, 2026). However, comparisons of these data should be undertaken with caution because of discrepancies in measurement tools, classification standards, and educational contexts. Certain studies used multidimensional scales to evaluate

specific stressors (such as workload or assessments); nevertheless, the present study relied solely on the overall scale score, neglecting a comprehensive analysis of the sub-dimensions. This study did not analyze the effects of social or residential conditions on academic stress; hence, attributing variance to these factors is not statistically supported. Thus, the academic stress level in the current sample is within the normal range, but the data should be viewed in light of the equipment and analytical procedures.

The results of the current study showed a positive correlation between reliance on artificial intelligence applications and academic stress among university students, as indicated by a statistically significant Spearman's correlation coefficient. However, a correlation value of 0.285 is considered weak to moderate. This suggests that the greater the academic stress, the higher the reliance on artificial intelligence applications. Academic stress cannot be considered a direct factor influencing reliance on artificial intelligence. This is due to the study's partial correlation design; therefore, it relies on a statistical correlation between the two variables rather than a causal relationship, as the design does not allow for causal inference. The possibility of reverse causation may persist. Consequently, increased reliance on artificial intelligence applications may contribute to increased levels of academic stress, particularly regarding academic requirements, due to procrastination and delays. Several studies have corroborated this finding, including those by [Aruna Kalkur T. \(2025\)](#), [Aslam \(2025\)](#), [Liu et al. \(2026\)](#), and [Wang & Xu \(2026\)](#), which indicated a similar positive correlation and confirmed that increased reliance on these applications stems from higher academic stress levels among students. Comparing findings is precarious because of the disparate ideas being assessed. The present study investigated academic behavioral dependence, whereas other studies focused on problematic or addictive usage. Diverse methodologies were employed to assess academic stress, which may have influenced the correlation. A study by [Abbas et al. \(2024\)](#) found that the relationship between artificial intelligence use and mental health is not always negative; sometimes, using these applications can improve academic stress and task performance. In contrast, a study by [Qahtan & Iman Hussein Alwan \(2025\)](#), in a different setting (nurses),

examined anxiety levels towards artificial intelligence applications and found that interaction with these applications was significantly associated with multiple psychological factors. This interaction does not permanently reduce stress. Our data confirm that psychological and contextual factors influence the link between AI use and psychological features, thereby preventing a single explanation despite heterogeneity across samples and environments. This relationship may be mediated by social support, academic ability, and self-control. This study's multivariate analysis made a methodological error by ignoring these factors. Although the exact direction and mechanisms are unknown, the results suggest a weak positive association between academic stress and AI use.

Limitations

The study relied on convenience sampling and was limited to a single university in a specific geographical location. This limits the possibility of generalizing to other universities or educational environments due to their differing academic and cultural characteristics. The study relied on a cross-sectional design and measured only one point in time. This means that variables occurring simultaneously may be influenced by circumstantial factors related to the study period. Furthermore, it is not possible to determine the direction of the relationship between reliance on artificial intelligence applications and academic stress, nor to infer a causal relationship.

Multivariate analysis was not performed to control for confounding variables such as self-regulation or social support, and this may affect the nature of the relationship between the variables. Self-administered questionnaires were used, which may lead to biased responses from participants, especially regarding artificial intelligence applications. The translation and cultural adaptation methods of the AI dependency tool remain untested, potentially compromising measurement accuracy.

The observed sleep deficiency may result from measurement limitations, in contrast to previous studies. Further research employing longitudinal designs, larger, more representative groups, and multivariate analyses is essential to examine AI dependency and academic stress. The study's conclusions must be interpreted within these methodological constraints.

This study aimed to determine whether reliance on artificial intelligence applications and academic stress were within the average range among university students. The results indicated a significant positive correlation between these two variables, with a correlation coefficient of $r = 0.285$. This suggests a weak correlation, indicating limited strength and explaining only a small percentage of the variance between the two variables. Due to the study's cross-sectional design, the direction of the relationship between the two variables could not be precisely determined, nor could a causal relationship be established. The study indicated a statistical correlation between reliance on artificial intelligence applications and academic stress, but did not confirm the nature of their causal relationship. The study recommends future research that uses longitudinal designs or multivariate analyses to control for potential confounding factors and accurately determine the direction of the relationship. It also recommends conducting the study on a sample distributed across different universities and educational contexts to generalize the results. Finally, it recommends a more detailed study of the sub-dimensions of each scale used for the two variables.

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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 Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

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 equally contribute to this study.

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