

Teachers' Perceptions Toward Science and Their Implications for Effective Science Teaching in Montalban

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Abstract: This study examined teachers' perceptions of science and their implications for effective science teaching in selected public elementary schools in the Nagtipunan District during the School Year 2018–2019. Specifically, it determined the profile of the respondents and assessed their perceptions regarding the objectives of teaching science, science teaching practices, instructional methods and strategies, science learning, students' attitudes toward science, gender comparisons in science classes, and perceptions of science as meaningful work and its societal role. The study employed a descriptive survey research design involving twenty-nine (29) Grade 4 to Grade 6 teachers selected through total enumeration sampling. Data were gathered using a structured questionnaire and analyzed using frequency counts, percentages, and weighted means. The findings revealed that the respondents generally held positive perceptions toward science and science teaching, with an overall grand mean of 3.58, interpreted as agree. Teachers perceived the objectives of science teaching as realized, frequently utilized various instructional methods and strategies, and viewed science as meaningful and relevant to their everyday lives. They also demonstrated positive perceptions of science learning and students, particularly regarding gender equity, indicating that male and female learners possess similar capabilities and interests in science. However, the results highlighted the need for continuous professional development to strengthen teachers' content knowledge, pedagogical competence, and participation in advanced training. Based on the findings, an enhanced approach to science teaching was proposed, emphasizing continuous professional development, inquiry-based and learner-centred instruction, technology integration, and gender-responsive teaching practices. These initiatives may contribute to improving the quality of science instruction, increasing student engagement, and enhancing learning outcomes in elementary science education.

Keywords: *Science education, teacher perceptions, science teaching, elementary teachers, and professional development.*

INTRODUCTION

Science education holds global significance in cultivating scientific literacy and essential 21st-century skills, such as critical thinking and problem-solving, which are vital for societal advancement and innovation. It plays a crucial role in preparing future scientists, engineers, and technology professionals to address complex global challenges (Han et al. 2021). However, there is growing concern worldwide regarding students' declining interest in science-related careers, which threatens future STEM workforce sustainability. Research consistently shows that teachers' attitudes profoundly influence students' academic motivation and achievement in the sciences. Positive teacher perceptions foster effective science instruction and increase student engagement, whereas negative attitudes can undermine learning outcomes (Ateş and Köroğlu 2024; Han et al. 2021). Internationally, there is a heightened emphasis on improving STEM education through inquiry-based and integrative pedagogies to enhance student participation in the field. The relationship between teacher beliefs, classroom practices, and student learning outcomes is a key focus, with global initiatives promoting inclusive, gender-equitable science learning environments identified as critical for broadening participation (Chengere et al., 2025; Mehmood et al., 2025). Moreover,

international studies have highlighted that teachers' positive attitudes toward science correlate strongly with students' attitudes and motivation toward science subjects, underscoring the importance of nurturing supportive teacher dispositions (Iwuanyanwu, 2022).

In the Philippine context, science education is integral to the K–12 curriculum and aims to elevate the scientific literacy of Filipino learners. Despite these efforts, Filipino students' performance in national and international science assessments remains varied, reflecting challenges such as limited resources and science teacher preparedness (Caingcoy et al., 2022). Teacher competence and positive attitudes toward science are deemed essential for effective curriculum delivery and fostering students' interest in the subject. Government initiatives focus on professional development to enhance the quality of science teaching and address persistent issues, including gender stereotypes and the need for equitable participation in science fields (Bongco and Ancho, 2021). Existing research in the Philippines underscores the critical influence of teachers' beliefs and attitudes on science learning outcomes, advocating targeted support to strengthen teachers' capacity and motivation (Bongco & Ancho, 2021; Caingcoy et al., 2022). Specifically, elementary teachers, particularly those teaching grades 4–6, play a vital role in shaping students' early attitudes toward science and their interest in learning science. Teachers' perceptions of science, scientific careers, and the relevance of science to everyday life influence their instructional approaches, student engagement, and motivation to teach. Gender perceptions among teachers may also impact science teaching practices and student participation, highlighting the need to assess and enhance teachers' attitudes toward science. Recognizing areas for improvement in science instruction and expanding professional development can contribute to more positive science learning experiences and outcomes at this foundational stage (Ikpat, 2025; Tan and Wei, 2024).

Previous studies have predominantly focused on students' attitudes toward science, neglecting the critical role of elementary teachers' perceptions. Limited research has explored Grades 4–6 teachers' attitudes toward science teaching, especially in rural Philippine contexts like the Nagtipunan District. Additionally, few studies have examined the link between teachers' beliefs and their classroom practices or investigated how these attitudes affect gender-related perceptions in science education. There is also a scarcity of research on teachers' views of scientists and the nature of science. This study addresses these gaps by focusing on elementary teachers' perceptions to inform improved science instruction and professional development.

RESEARCH QUESTIONS

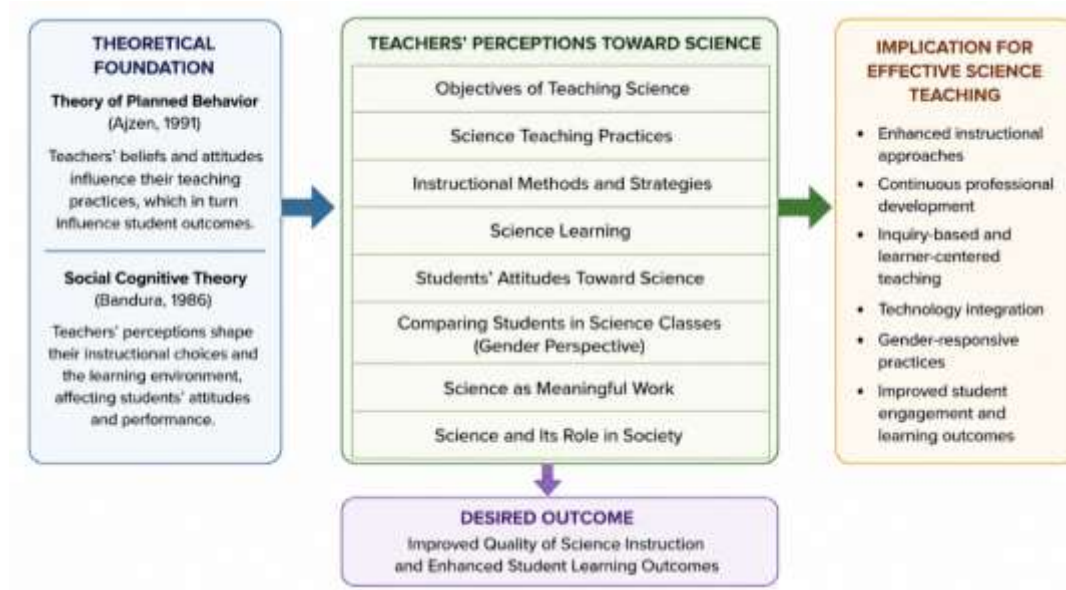
This study aimed to determine teachers' attitudes toward science and the teaching of science in selected public elementary schools in the Nagtipunan District. Specifically, this study sought to answer the following questions:

1. What is the profile of the respondents in terms of age, gender, civil status, present position, highest educational attainment, and level of training?
2. What is the level of respondents' perceptions toward Science and Science teaching with respect to:
 - a. objectives of teaching Science;
 - b. teaching of science;
 - c. methods, strategies, and approaches in teaching Science;
 - d. learning of science;
 - e. students' attitudes toward science;
 - f. comparing students in science classes;
 - g. perception of science as meaningful work; and
 - h. perceptions of science on how people work?
3. Based on the findings of the study, what enhanced approach to teaching science may be

proposed?

Theoretical and Conceptual Mapping

The theoretical and conceptual map illustrates that the study is grounded in the Theory of Planned Behavior (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1986), which explain that teachers' beliefs, attitudes, and perceptions influence their instructional decisions and classroom practices, ultimately affecting students' learning outcomes. Guided by these theories, the study examines teachers' perceptions toward Science through several key dimensions: the objectives of teaching Science, Science teaching practices, instructional methods and strategies, Science learning, students' attitudes toward Science, gender perspectives in Science classes, Science as meaningful work, and the role of Science in society. These perceptions are expected to influence the implementation of effective Science teaching by promoting enhanced instructional approaches, continuous professional development, inquiry-based and learner-centred instruction, technology integration, and gender-responsive teaching practices. Ultimately, these improvements are expected to achieve the desired outcome of improving the quality of Science instruction and enhancing students' engagement and learning outcomes.



METHODS

Research Design

This study employed a descriptive survey research design to examine teachers' perceptions toward science and their implications for effective science teaching in selected public elementary schools in Montalban during the school year 2018–2019. The descriptive design was appropriate because it systematically described the respondents' demographic characteristics and assessed their perceptions regarding science teaching, science learning, instructional practices, and the role of science in society without manipulating any variables. The findings served as the basis for proposing an enhanced approach to improve science instruction.

Locale of the Study

The study was conducted in selected public elementary schools in Montalban (Rodriguez), Rizal, during the school year 2018–2019. The schools were selected because they offered Grades 4 to 6 Science classes and provided an appropriate setting for investigating teachers' perceptions of science

teaching.

Respondents of the Study

The respondents consisted of twenty-nine (29) Grade 4 to Grade 6 public elementary school teachers who were actively teaching Science during the conduct of the study. These teachers were considered appropriate respondents because of their direct involvement in planning, delivering, and evaluating Science instruction.

Sampling Technique

The study employed total enumeration sampling, in which all qualified Grade 4 to Grade 6 science teachers in the selected schools were included as respondents. Since the target population was relatively small, total enumeration ensured complete representation of the study population and minimized sampling bias.

Research Instrument

Data were collected using a structured questionnaire adapted from previous studies on teachers' perceptions toward science and modified to suit the objectives of the present investigation. The instrument consisted of two sections. The first section gathered the respondents' demographic profile, including age, gender, civil status, teaching position, highest educational attainment, and seminars or training attended. The second section measured teachers' perceptions regarding the objectives of science teaching, science teaching practices, instructional methods and strategies, science learning, students' attitudes toward science, gender-related perceptions, science as meaningful work, and the societal role of science.

The questionnaire used a five-point Likert scale, where 5 = Strongly Agree, 4 = Agree, 3 = Moderately Agree, 2 = Disagree, and 1 = Strongly Disagree. Prior to data collection, the instrument underwent content validation by experts in Science education and educational research. A pilot test was likewise conducted, and the instrument demonstrated acceptable reliability (Cronbach's $\alpha \geq 0.70$), indicating satisfactory internal consistency.

Data Gathering Procedure

Permission to conduct the study was secured from the Schools Division Office and the school heads of the participating schools. After obtaining the necessary approvals, the researcher explained the purpose of the study to the respondents and obtained their informed consent. The questionnaires were personally distributed and collected after completion. All completed questionnaires were checked for completeness, coded, and prepared for statistical analysis.

Statistical Treatment of Data

The collected data were analyzed using appropriate descriptive statistics. Frequency counts and percentages were used to describe the demographic profile of the respondents. Weighted mean was utilized to determine the level of teachers' perceptions toward science and science teaching across the identified dimensions. The computed weighted means were interpreted using the established verbal interpretation scale to facilitate meaningful analysis of the findings.

RESULTS AND DISCUSSION

Table 1. Profile of the Respondents (n = 29)

Variable	Category	Frequency	Percentage (%)
Gender	Male	9	31.00
	Female	20	69.00
Civil Status	Single	5	18.00
	Married	23	79.00

	Others	1	3.00
Position	Teacher I	18	62.00
	Teacher II	2	7.00
	Teacher III	9	31.00
Highest Educational Attainment	Bachelor's Degree	24	83.00
	Master's Degree	5	17.00
Seminars and Trainings Attended	School Level	29	100.00
	Division Level	29	100.00
	Regional Level	20	68.97
	National Level	10	34.48
	International Level	8	27.59

Table 1 presents the demographic and professional profiles of the 29 teacher participants included in this study. The data reveal that most respondents were female (69.00%), while only 31.00% were male, indicating that elementary science teaching in the study area is predominantly represented by women. In terms of civil status, most respondents were married (79.00%), followed by single teachers (18.00%), with only a small percentage classified under other statuses (3.00%). Regarding teaching position, the majority were Teacher I (62.00%), while 31.00% were Teacher III and only 7.00% were Teacher II, suggesting that most respondents were still in the early stages of their professional advancement.

Regarding educational attainment, a large proportion of the teachers held a bachelor's degree (83.00%), whereas only 17.00% had completed a master's degree. This finding highlights the need to encourage teachers to pursue graduate studies to enhance their professional qualifications. In terms of professional development, all respondents had attended school- and division-level seminars and training (100.00%), while fewer had participated in regional (68.97%), national (34.48%), and international (27.59%) training programs. These findings suggest that while teachers actively engage in local professional development activities, opportunities for broader exposure through national and international training remain limited in the study area. Overall, the profile indicates that the respondents possessed varied professional backgrounds and experiences that may have influenced their perceptions of Science and Science teaching.

Table 2. Teachers' Perceptions Toward Science Teaching

Dimension	Average Mean	Weighted	Interpretation
General Objectives of Grade 6 Science	3.68		Realized
Teaching Grade 6 Science	3.55		Agree
Methods and Strategies Used in Teaching Science	3.69		Often
Overall Mean	3.64		Positive Perception

The data presented in Table 2 reflect teachers' perceptions of science teaching, indicating an overall positive attitude across multiple dimensions. Teachers generally agree with the general objectives of Grade 6 science, demonstrated by an average weighted mean of 3.68, interpreted as "Realized." This suggests that educators perceive curriculum objectives as clear and attainable, reinforcing the importance of defined learning goals in fostering effective instruction in the classroom. The perception of teaching Grade 6 science scored slightly lower at 3.55, categorized as "Agree," reflecting a positive but more cautious endorsement of their teaching practice efficacy. Notably, the dimension regarding methods and strategies used in teaching science scored the highest (3.69, "Often"), highlighting the frequent application of varied instructional techniques in classrooms.

This aligns with research emphasizing the significant impact of diverse teaching methods on teacher competence and student engagement. For instance, studies have demonstrated that employing multiple strategies, such as inquiry-based learning, project-based tasks, and hands-on activities, fosters teacher confidence and enhances student learning engagement and overall performance in science education (He & Jen, 2025; Zhang et al., 2024). The overall mean of 3.64 signifies a generally positive perception among teachers towards science teaching, indicating a favorable disposition that can facilitate pedagogical innovations. This is consistent with evidence highlighting the role of teachers' attitudes in implementing effective instructional strategies and promoting inquiry-based practices in science classrooms (Evitasari et al., 2025; Ogegbo et al., 2024). Consequently, this positive perception underscores the potential for continuous professional development to leverage teachers' readiness and enhance the quality of science education at the elementary level.

Table 3. Teachers' Perceptions Toward Science Learning and Students

Dimension	Average Weighted Mean	Interpretation
Learning of Science	3.18	Somewhat Sufficient
Students' Attitudes toward Science	3.20	Somewhat Agree
Comparing Students in Science Class	4.36	Strongly Agree
Overall Mean	3.58	Agree

Table 3 shows teachers' perceptions of science learning and students. The respondents perceived science learning as somewhat sufficient (AWM = 3.18), indicating that they possessed a moderate level of understanding and appreciation of science. Likewise, students' attitudes toward science were rated as somewhat agree (AWM = 3.20), suggesting that learners generally demonstrate a positive interest and engagement in science-related activities. The highest-rated dimension was comparing students in science class (AWM = 4.36), interpreted as strongly agree, indicating that teachers believe male and female students have similar levels of interest, motivation, and capability in learning science. This finding supports the promotion of gender equity in science education (Bongco & Ancho, 2021; Iwuanyanwu, 2022). Overall, the grand mean of 3.58, interpreted as agree, suggests that teachers hold positive perceptions of science learning and students, which may contribute to improved student engagement and achievement in science (Han et al., 2021; Tan & Wei, 2024).

Table 4. Teachers' Perceptions Toward Science and Scientific Work

Dimension	Average Weighted Mean	Interpretation
Science as Meaningful Work	3.82	Agree
Science on How People Work	3.20	Agree
Overall Mean	3.51	Agree

Table 4 illustrates teachers' perceptions of science and scientific work, revealing generally positive attitudes that reflect their acknowledgment of the importance and relevance of science. The dimension "Science as Meaningful Work" scores the highest with an average weighted mean of 3.82, interpreted as "Agree." This suggests that teachers recognize science not only as an academic subject but also as valuable and purposeful work, which may enhance their motivation to teach effectively. Such perceptions are crucial for fostering teacher enthusiasm and commitment, which can positively influence student engagement and learning outcomes. The dimension "Science on How People Work," with a mean of 3.20, also registers an "Agree" interpretation, indicating that teachers perceive science as a tool to understand human functioning and mechanisms. This recognition highlights the interdisciplinary nature of science and its connection to real-world phenomena, which can support teachers in contextualizing lessons to make content more relatable to students. The overall mean of 3.51 confirms a general agreement with the value and applicability of science and scientific work.

among the teachers. This positive perception may serve as a foundation for implementing more inquiry-based and student-centered science teaching strategies, as teachers who value the meaning and function of science are more likely to integrate innovative pedagogies (Evitasari et al., 2025; Ogegbo et al., 2024). Consequently, these attitudes are promising for promoting scientific literacy and inquiry skills in the classroom and supporting broader educational goals in science education.

Table 5. Teachers' Overall Perceptions Toward Science and Science Teaching

Dimension	Average Weighted Mean	Interpretation
Science Teaching	3.64	Positive Perception
Science Learning and Students	3.58	Agree
Science and Scientific Work	3.51	Agree
Grand Mean	3.58	Agree / Positive Perception

Table 5 presents teachers' overall perceptions of science and science teaching. Among the three dimensions, science teaching obtained the highest mean (AWM = 3.64), indicating a positive perception of science instruction and teaching practice. This was followed by science learning and students (AWM = 3.58), suggesting that teachers generally hold favorable views regarding students' learning and engagement in science subjects. Meanwhile, science and scientific work obtained an average weighted mean of 3.51, indicating a positive perception of the value and relevance of science in society. The overall grand mean of 3.58, interpreted as Agree/Positive Perception, demonstrates that teachers generally possessed positive attitudes toward science and science teaching. Positive teacher perceptions are important because they contribute to effective instructional practices and improved student learning outcomes in science (Han et al., 2021; Tan and Wei, 2024).

Table 6. Proposed Enhanced Approach for Effective Science Teaching Based on Teachers' Perceptions Toward Science

Key Findings	Identified Need	Proposed Approach	Enhanced	Expected Outcome
Teachers perceived the objectives of science teaching as being realized (AWM = 3.68).	Sustaining the alignment of instruction with curriculum goals	Strengthen science instruction through curriculum enrichment activities	outcome-based instruction curriculum	Improved attainment of science learning competencies
Teachers agreed with their science teaching practices (AWM = 3.55) but reported limited confidence in their expertise and training.	Enhancement of content knowledge and pedagogical competence	Continuous professional development programs, workshops, and mentoring on science content and pedagogy should be conducted.		Increased teacher confidence and instructional effectiveness
Methods and strategies in science teaching were often utilized (AWM = 3.69), with visual presentations, cooperative learning, and laboratory activities rated as highly important.	Greater use of learner-centred and inquiry-based strategies is also recommended.	Integrate inquiry-based learning, collaborative activities, laboratory investigations and technology-enhanced instruction.		Enhanced student engagement and scientific inquiry skills
Teachers perceived	Improve students'	Implement hands-on		Increased student

students' attitudes toward science as only somewhat positive (AWM = 3.20).	interest and motivation in science.	activities, real-life applications, STEM projects, and science enrichment programs.	interest, motivation, and participation in science learning.
Teachers strongly agreed that male and female students have similar capabilities in science (AWM = 4.36).	Sustaining gender-equitable learning opportunities.	Promoting inclusive and gender-responsive science instruction and participation in classroom activities.	Equal opportunities and participation among learners
Teachers viewed science as meaningful work and recognized its societal value (mean = 3.82).	Strengthening the appreciation of science careers and scientific literacy	Integrate career awareness activities, research projects, and community-based science programs.	Greater appreciation of science and science-related careers
Participation in national and international training was low.	Expansion of professional learning opportunities	Encourage and support teachers to attend regional, national, and international seminars and conferences.	Enhanced professional growth and exposure to innovative teaching practices

Table 6 presents the proposed enhanced approach for effective science teaching based on the study's findings. The proposed strategies focus on strengthening teachers' content knowledge and pedagogical competence through continuous professional development, mentoring, and participation in advanced training programmes. The table also emphasizes the use of learner-centred and inquiry-based approaches, such as laboratory activities, collaborative learning, and technology-enhanced instruction, to improve student engagement and scientific inquiry skills. Furthermore, the proposed approach promotes gender-responsive teaching practices and the integration of career awareness activities to strengthen students' appreciation of science and related careers. These recommendations are consistent with studies highlighting the importance of teacher professional development, inquiry-based instruction, and inclusive learning environments in improving science-education outcomes (Ogegbo et al., 2024; Chengere et al., 2025; Evitasari et al., 2025). Overall, the proposed enhanced approach aims to improve the quality of science instruction and foster greater student interest, participation, and achievement in the subject.

CONCLUSION

This study concluded that Grade 4 to Grade 6 teachers generally possess positive perceptions of science and science teaching. The respondents recognized the importance of science education in developing learners' scientific knowledge, critical thinking skills, and understanding of the environment. They reported favorable attitudes toward the objectives of science teaching and the use of various instructional strategies, particularly visual presentations, cooperative learning, and laboratory activities. The findings also revealed that teachers perceive both male and female students as equally capable of learning and succeeding in science, reflecting support for gender-inclusive education. Furthermore, teachers viewed science as meaningful work that significantly contributes to society and human development. Despite these positive perceptions, the study highlights the need for continuous professional development and increased participation in advanced training programmes to further enhance teachers' competence and effectiveness in science instruction. Therefore, strengthening teacher development initiatives and promoting learner-centred, inquiry-based approaches are essential for improving science teaching and fostering greater student engagement and achievement in science.

RECOMMENDATIONS

Based on the findings of this study, it is recommended that school administrators and education leaders strengthen professional development programs that enhance teachers' content knowledge, pedagogical skills, and confidence in teaching science. Teachers should be encouraged to participate in regional, national, and international seminars, workshops, and conferences to broaden their professional competencies and stay updated on current trends and innovations in science education. Furthermore, science teachers should continue to employ learner-centred, inquiry-based, and hands-on teaching approaches, such as laboratory activities, cooperative learning, and the use of visual instructional materials, to increase students' interest and engagement in science. Schools should also provide adequate instructional resources and learning materials to support effective science instruction. In addition, efforts should be made to sustain gender-inclusive classroom practices that promote equal participation and opportunities for all learners. Finally, future researchers may conduct similar studies involving larger populations and different educational settings to validate and expand the findings of the present study and explore other factors that may influence teachers' perceptions and effectiveness in science teaching.

LIMITATIONS OF THE STUDY

This study had several limitations that should be considered when interpreting the findings. First, the study was limited to teachers from selected schools in Montalban (Rodriguez), Rizal, which may limit the generalizability of the results to other municipalities or regions with different educational contexts. **Second, the study relied primarily on self-reported data gathered through questionnaires and interviews.** As a result, responses may have been influenced by social desirability bias or participants' subjective perceptions.

FUTURE RESEARCH DIRECTIONS

Future studies may expand the scope of this research by including teachers from other municipalities, provinces, or regions to enable broader comparisons and improve the generalizability of the findings. Researchers may also employ longitudinal research designs to examine how teachers' perceptions of science evolve over time, particularly after participating in professional development programs. Additionally, future researchers may explore the influence of variables such as teaching experience, educational qualifications, school resources, access to laboratory facilities, technological integration, and administrative support on teachers' perceptions and instructional effectiveness. Intervention studies evaluating the impact of professional development, mentoring programs, and innovative teaching strategies on science-teaching effectiveness are also recommended.

ETHICS STATEMENT

This study adhered to the accepted ethical standards throughout the research process. Participation was entirely voluntary, and all respondents were informed about the purpose, procedures, potential benefits, and minimal risks associated with the study before providing their informed consent. Participants were assured that they could decline participation or withdraw from the study at any point without penalty. The confidentiality and anonymity of all participants were maintained by excluding personally identifiable information from the collected data and research reports. The information obtained was used solely for academic and research purposes and stored securely to prevent unauthorized access. The study complied with institutional ethical guidelines and respected the rights, dignity, and privacy of all participants.

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AI DISCLOSURE STATEMENT

Artificial intelligence (AI)-assisted writing tools were used solely to support language refinement, grammar checking, sentence organization, and formatting during the preparation of this manuscript. AI tools were not used to generate the research data, conduct statistical analyses, interpret the findings, or formulate the conclusions of the study. All research designs, data collection, analyses, interpretations, and final content were completed, reviewed, and verified by the researchers. The researchers assume full responsibility for the accuracy, originality, integrity, and ethical conduct of this study.

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