

The Effect of the Fun Learning Method on Fourth-Grade Students' Reading Comprehension of Short Story Texts

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Article history: Received January 20, 2026; revised February 22, 2026; accepted March 24, 2026

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ABSTRACT

This study was motivated by the low learning outcomes in reading comprehension of short stories among fourth-grade students at SD Negeri 114 Pagaran Sigatal. The use of monotonous and conventional teaching methods made students passive and unenthusiastic during the reading comprehension process. To address this issue, this study investigated the effect of the fun learning method on students' reading comprehension outcomes. This quasi-experimental research used a control group pre-test post-test design involving 50 students, consisting of 25 in the experimental class and 25 in the control class. The pre-test results showed that the average score of the experimental class was 69.2, while that of the control class was 69.72. After the treatment, the post-test average score of the experimental class increased to 80.2, while that of the control class reached only 75.4. The maximum score in the experimental class increased from 75 to 95, and the minimum score from 55 to 70. In contrast, the maximum score in the control class reached only 85, and the minimum was 68. The hypothesis test using the t-test showed that the t-value (2.668) was greater than the t-table (1.677) at the 0.05 significance level, indicating that H_0 was rejected and H_a was accepted. This means that there is a significant effect of using the fun learning method on improving students' learning outcomes. Furthermore, this method increased students' active participation, stimulated enthusiasm, and strengthened collaboration through singing and guessing-game activities. The advantage of this method is its ability to create an enjoyable learning atmosphere, motivate students to engage actively, and enhance their ability to comprehend texts more deeply. Therefore, the fun learning method is a worthy alternative instructional strategy for improving learning outcomes, particularly in reading comprehension skills at the elementary school level.

Keywords: Instructional Method, Fun Learning, Reading Comprehension, Short Story Texts

I. INTRODUCTION

Reading comprehension at the primary level plays a critical role in students' academic success across subjects. In the Indonesian curriculum, Bahasa Indonesia is a core subject through which learners are expected to develop fundamental literacy skills, including understanding narrative texts such as short stories. Short story texts are particularly important because they offer meaningful content in a relatively simple and concise format that is aligned with children's cognitive and emotional development. Nevertheless, many primary school students continue to experience substantial difficulties in comprehending such texts, as reflected in their low test scores and passive engagement during reading lessons (Sirulhaq et al., 2021).

At SD Negeri 114 Pagaran Sigatal, Mandailing Natal Regency, preliminary observations and a pre-survey conducted in March 2025 highlighted several pressing issues in fourth-grade Bahasa Indonesia classes. Daily test results in the topic of reading comprehension of short story texts revealed that only 11 out of 28 students, or approximately 39.3%, achieved the school's Minimum Mastery Criterion (Kriteria Ketuntasan Minimal, KKM) of 75. In contrast, 17 students, or approximately 60.7%, did not meet this standard. These figures indicate that the majority of students had not yet mastered the targeted competencies related to understanding short story texts (Nadhira, 2026).

Qualitative information from interviews with the Bahasa Indonesia teacher further illuminated the classroom situation. The students were described as reluctant to ask questions, hesitant to express their opinions, and often inattentive during lessons. Some did not complete assigned tasks, whereas others engaged in off-task behaviors, such as talking with peers about unrelated topics. These patterns suggest not only cognitive challenges but also motivational and behavioral issues that hinder effective learning during reading activities (Choden, 2025).

One contributing factor to these problems is the predominance of conventional teacher-centred instructional practices. Instruction in the observed classes was dominated by lecturing and the exclusive use of textbooks. In such a setting, the teacher explains the content while the students listen, occasionally answering questions or copying information. This approach tends to create a rigid and monotonous classroom climate, with limited opportunities for interaction, exploration, or creative engagement with texts. Students are positioned as passive recipients of information rather than active constructors of meaning (Ariza Arsul et al., 2025).

In the specific context of reading comprehension, this teacher-centred approach has several weaknesses. First, it does not sufficiently scaffold students' comprehension processes, such as predicting content, making inferences, or connecting stories to their own experiences. Second, it fails to capitalize on children's natural curiosity, imagination, and desire for play, which are powerful drivers of engagement, especially in the upper primary grades. Third, a monotonous classroom environment can lead to boredom, which in turn reduces attention and effort, reinforcing low achievement in a negative cycle.

If left unaddressed, these conditions can have long-term consequences. Persistent difficulties in reading comprehension may undermine students' confidence, decrease their general interest in learning, and limit their ability to access content in other subjects. Over time, students may adopt an apathetic attitude towards school, perceiving learning as a burden rather than an opportunity for growth and self-expression. From a broader educational perspective, such outcomes are contrary to the goals of the national curriculum, which emphasizes active, joyful, and meaningful learning experiences (Zahra et al., 2025).

To break this cycle, instructional methods are needed that not only enhance cognitive understanding but also revitalize students' motivation and participation. One promising approach is fun learning. Fun learning is designed to create a positive, relaxed, and engaging learning atmosphere in which students can actively participate without feeling pressured or anxious. Rather than relying solely on verbal explanations, fun learning integrates various playful and creative activities,—such as games, singing, role-playing, and group competitions,—to support targeted learning objectives (Zainal Widyanto et al., 2025).

Theoretically, fun learning is grounded in constructivist and humanistic views of education, which hold that learners build knowledge through active engagement and that emotions and motivation are integral to learning. When applied to reading comprehension of short story texts, fun learning has the potential to transform the learning process from a tedious decoding task into an enjoyable exploration of narratives. For example, students can act out scenes from a story, sing songs related to the story's themes, or participate in guessing games that require them to recall and interpret textual information (Muftadi'in, 2025).

In addition to its theoretical appeal, fun learning is highly compatible with the developmental characteristics of fourth-grade students, who typically enjoy physical movement, social interaction, and imaginative play. Incorporating these elements into reading lessons can help sustain their attention and make the abstract aspects of comprehension more concrete. Furthermore, working in groups during fun learning activities can cultivate collaboration, communication skills, and mutual support among peers, which further enriches the learning environment (Eryang et al., 2025).

Despite these potential benefits, the adoption of fun learning in Indonesian primary schools has been uneven, and empirical evidence of its effectiveness in specific domains, such as reading comprehension, remains limited. Many teachers may agree in principle that learning should be enjoyable; however, they lack concrete models for integrating fun activities with curricular demands and assessment standards. Consequently, rigorous research is needed to examine whether fun learning can yield measurable improvements in students' academic performance, not only in their attitudes and behaviors (Wahyuni et al., 2025).

Responding to this gap, the present study focuses on the effect of the fun learning method on learning outcomes in reading comprehension of short story texts among fourth-grade students at SD Negeri 114 Pagaran Sigatal. The research addresses the following question: "Does the implementation of the fun learning method significantly improve students' reading comprehension of short story texts compared with conventional instruction?" By employing a quasi-experimental design with control and experimental groups, this study aims to provide robust evidence regarding the method's impact on students' test scores (Devinna Riskiana Aritonang, 2024).

This study also has practical significance for teachers, school leaders, and curriculum developers. For classroom teachers, the empirical findings on fun learning can serve as a reference for designing more engaging reading lessons that remain aligned with learning standards. For schools, the successful implementation of fun learning can support broader initiatives to improve literacy and overall school quality. At the system level, evidence-based practices, such as those examined in this study, can inform professional development programs that encourage pedagogical innovation (Makhsin et al., 2025).

In summary, the introduction outlines the problem of low reading comprehension outcomes in short story texts, teacher-centred and monotonous instructional practices that contribute to this issue, and the potential of the FL method as a solution. It has also highlighted the theoretical and practical rationale for empirically testing the effectiveness of FL. The subsequent sections of this article present a concise review of the relevant literature, describe the research methodology, report the findings, and discuss their implications for primary school literacy instruction.

II. METHODS

A. Research Design

This study employed a quantitative approach using a quasi-experimental design, specifically, a control group pre-test–post-test design. In this type of design, two groups are compared: an experimental group that receives the treatment and a control group that does not, while both groups are measured before and after the intervention. Such a design is appropriate in school settings where random assignment of individual students to groups is often impractical or unethical.

In the present study, the independent variable was the instructional method, which was operationalized as the use of the fun learning method in the experimental class and conventional teaching in the control class. The dependent variable was students' learning outcomes in reading comprehension of short story texts, which were measured through test scores. Both groups completed the same pre-test before the intervention and the same post-test after the instructional period. This design allowed the researcher to examine both within-group gains and between-group differences (Sugiyono, 2019).

B. Research Context and Participants

This study was conducted at SD Negeri 114 Pagaran Sigatal, a public primary school located in Mandailing Natal Regency, Indonesia. At the time of the research, the school offered two parallel classes at the fourth-grade level, with a total population of 50 students. Both classes followed the same national curriculum for Bahasa Indonesia and were taught in similar physical environments.

Given that the population size was fewer than 100 students, the entire population of fourth-grade students was included in the study. One class (Class IV A, 25 students) was designated as the control group, and the other class (Class IV B, 25 students) served as the experimental group. A purposive sampling technique was used to select the classes, ensuring that they were comparable in terms of grade level and subject matter coverage. Both groups were mixed-ability classes and reflected the typical range of academic performance found in the school.

Variables and Operational Definitions

The independent variable, fun learning, is an instructional method that emphasizes enjoyable, varied, and interactive activities closely aligned with lesson objectives. In this study, fun learning in reading comprehension included learning through songs, guessing games (*tebak gaya*), and cooperative group activities based on short story texts. The method was designed to create a positive emotional climate, encourage active participation, and support comprehension processes.

Reading comprehension of short story texts was defined as students' ability to understand, interpret, and respond to narrative texts in Bahasa Indonesia. Operationally, it was measured through performance on written test items assessing comprehension of short stories, including the identification of main ideas, characters, plot elements, and moral messages, as well as the ability to summarize and infer meaning (Arikunto, 2017).

Instruments

The primary data collection instrument was a reading comprehension test developed by the researcher based on the fourth-grade Bahasa Indonesia curriculum. The test comprised short-answer and essay items that required students to read short story texts and respond to questions about them. The test blueprint (*kisi-kisi*) covered four main indicators: understanding the meaning and structure of short stories, drawing conclusions from texts, analyzing characters and conflicts, and evaluating linguistic features.

Initially, 15 items were constructed and piloted. Validity testing using item-total correlations (with 25 students and $\alpha = 0.05$) resulted in 10 items meeting the criterion.

$r_{hitung} \geq r_{tabel} = 0.396$. Items 1, 2, 3, 4, 6, 8, 9, 10, 12, and 15 were deemed valid and retained, while items 5, 7, 11, 13, and 14 were discarded. The reliability analysis, using Cronbach's alpha, yielded a coefficient of 0.524, which exceeded the critical value, indicating that the instrument was sufficiently reliable for group-level research purposes.

In addition to the test, documentation was used to gather supplementary information, such as class lists, previous test scores, and school documents related to the curriculum and KKM. These data helped contextualize the findings and ensure that the sampled classes were comparable at baseline.

Procedures

The study was implemented in three main phases: pre-test administration, instructional intervention, and post-test administration.

Pre-test phase

Before any instructional differences were introduced, a reading comprehension pre-test was administered simultaneously to both the control and experimental classes. The test was conducted under standardized conditions to ensure fairness. The pre-test provided baseline data on students' initial reading comprehension abilities and was later used to assess equivalence between the two groups prior to the intervention.

Instructional intervention phase

After the pre-test, the control and experimental classes received different instructional treatments over a series of lessons on reading comprehension of short story texts (Creswell, 2021).

Control class (Conventional Method):

In the control class, the teacher followed usual practice, which was largely teacher-centred. The teacher introduced the topic, read or asked students to read the text, explained the content, and then asked questions individually. Interactions were predominantly in the form of teacher questions and student responses. Students worked mainly individually with their textbooks, and activities did not include structured games, songs, or cooperative tasks.

Experimental class (Fun Learning Method):

In the experimental class, the teacher implemented the fun learning method as planned. Each lesson began with an engaging activity, such as a song related to the story's theme, sung to a familiar tune. The students were then divided into small groups to read and discuss the short story. A key component of the fun learning intervention was the "tebak gaya" (guess-the-gesture) game, in which one student mimed a scene or concept from the story while group members guessed the intended meaning. If the group failed to guess correctly, they repeated the song, reinforcing both enjoyment and recall of the story. These activities encouraged movement, laughter, and collaboration while remaining tied to the comprehension objectives (Moleong, 2022).

Throughout the intervention, the teacher in the experimental class acted as a facilitator, guiding discussions, clarifying misunderstandings, and providing feedback, while allowing students greater autonomy in constructing meaning from the text.

Post-test phase

At the conclusion of the instructional period, the same reading comprehension test administered as a pre-test was administered again as a post-test to both classes. Using identical test content ensured that any observed differences between the pre-test and post-test scores could be confidently attributed to the instructional treatments rather than to differences in test difficulty.

C. Data Analysis

Data analysis proceeded in several steps. First, descriptive statistics were computed for the pre-test and post-test scores in both groups, including total scores, minimum and maximum values, and mean scores. These statistics provided an overview of students' performance and initial evidence of any improvements.

Second, assumption checks were conducted. The normality of score distributions was tested using the Kolmogorov–Smirnov test, whereas the homogeneity of variance between groups was assessed using Levene's test. Both tests were conducted with a significance level of $\alpha = 0.05$. The results confirmed that the data met the assumptions required for parametric testing.

Third, hypothesis testing was conducted using an independent samples t-test to compare the post-test means of the experimental and control groups. The null hypothesis stated that there would be no significant difference in reading comprehension outcomes between students taught using fun learning and those taught using conventional methods. The alternative hypothesis stated that there would be a significant difference, with fun learning leading to higher scores. The obtained t-value was then compared with the critical value from the t-distribution table at $\alpha = 0.05$. Where $T_{hitung} > t_{tabel}$, the null hypothesis was rejected in favour of the alternative. Through these procedures, this study sought to determine whether the FL method exerted a statistically significant and educationally meaningful effect on students' reading comprehension of short story texts.

III. RESULTS AND DISCUSSION

A. Descriptive Results

Prior to the main analysis, the quality of the reading comprehension test was examined. Item analysis showed that 10 out of 15 items had item-total correlation coefficients exceeding the critical value, $r_{table} = 0.396$ at $\alpha = 0.05$, indicating acceptable validity. The remaining five items, which did not meet this threshold, were excluded. Reliability testing using Cronbach's alpha produced a coefficient of 0.524, which was greater than the required minimum for exploratory classroom research, suggesting that the instrument was sufficiently consistent in measuring students' reading comprehension outcomes.

These preliminary analyses ensured that subsequent comparisons between the control and experimental classes were based on an instrument that produced stable and interpretable scores.

Table 1 summarizes the pre-test and post-test scores for the control and experimental groups.

Table 1. Summary of Pre-test and Post-test Scores in Control and Experimental Classes.

Group	Test	n	Total Score	Minimum	Maximum	Mean
Control	Pre-test	25	1743	61	77	69.72
Experimental	Pre-test	25	1730	55	75	69.20
Control	Post-test	25	1885	68	85	75.40
Experimental	Post-test	25	2005	70	95	80.20

The pre-test results show that the two groups were comparable before the intervention. The control class had a mean pre-test score of 69.72, while the experimental class had a mean of 69.20. The difference of 0.52 points is negligible and does not indicate any systematic advantage for either group. Moreover, both groups' scores were clustered around the same performance level, with no student in the "very good" category (80–100) and the majority of students falling into the "good" and "fair" ranges.

The distribution of pre-test scores also indicates that many students in both classes had not yet reached the KKM of 75. In the control class, 14 students were categorized as "not yet complete," while in the experimental class, 17 students fell into this category. These findings confirm the preliminary observation that reading comprehension of short story texts in fourth grade was generally low and required targeted instructional intervention.

After the instructional period, both classes showed improvement in their post-test scores. The mean of the control group increased from 69.72 to 75.40, representing a gain of approximately 5.68 points. The minimum score increased from 61 to 68, whereas the maximum score increased from 77 to 85. These changes suggest that, even under conventional instruction, exposure to the material and teacher explanations can contribute to better comprehension.

However, the experimental group exhibited more substantial improvements. Its mean score increased from 69.20 to 80.20, a gain of 11 points, almost double the gain observed in the control group. The minimum score increased from 55 to 70, thus bringing all students above the KKM threshold, and the maximum score increased markedly from 75 to 95. This expansion of the score range at the upper end indicates that fun learning not only helped lower-achieving students reach basic mastery but also enabled higher-achieving students to excel.

These descriptive results point to a positive impact of the fun learning method on students' reading comprehension outcomes.

Further insight can be gained by examining the distribution of students across grading categories. Based on the school's grading system, scores are categorized as follows: 80–100 (A, very good), 70–79 (B, good), 60–69 (C, fair), 50–59 (D, poor), and 0–49 (E, fail).

In the pre-test, neither class had students in the "very good" category. Most students fell into the "good" and "fair" categories, with a small number in the "poor" category in the experimental group. This distribution reflects a general pattern of moderate performance with a few high achievers and some students at risk.

After the intervention, the post-test distributions changed notably, especially in the experimental class. In the control class, the number of students achieving "good" and "very good" grades increased; however, a few students remained in the "fair" category, and gains were modest. In contrast, in the experimental class, a substantial proportion of students moved into the "good" and "very good" categories, and none remained in the "fair" or "poor" categories. In other words, the Fun Learning method shifted the entire performance distribution upwards, raising the floor and extending the ceiling of achievement.

From a pedagogical standpoint, these changes are important because they indicate that fun learning can promote equity as well as excellence. By lifting low-performing students above the mastery threshold and simultaneously providing challenges that enable high-performing students to reach very high scores, the method supports a broad range of learners within the same classroom context.

To determine whether the observed differences between the control and experimental groups were statistically significant, an independent samples t-test was conducted on the post-test scores. The analysis yielded a t-value of 2.668, which exceeded the critical value $t_{\text{tabel}} = 1.677$ at the 0.05 significance level. Because $t_{\text{hitung}} > t_{\text{tabel}}$ the null hypothesis of no difference between groups was rejected, and the alternative hypothesis was accepted.

This result confirms that the FL method had a significant positive effect on students' reading comprehension outcomes compared with conventional teaching. The magnitude of the difference in mean scores (80.20 vs. 75.40) also suggests that the effect is educationally meaningful, corresponding to a shift from a borderline passing level to a solid "good" performance for the average student in the experimental class.

B. Discussion

The findings of this study align with theoretical perspectives that emphasize the roles of motivation, emotion, and active engagement in learning. According to brain-based learning models, a positive and enjoyable learning environment can stimulate the limbic system, enhancing students' emotional involvement and facilitating the flow of information to the neocortex, where higher-order thinking processes occur. In this study, fun learning activities, —such as singing, guessing games, and group collaboration, —appear to have created such an environment.

Students in the experimental class were observed to be more enthusiastic, willing to participate, and confident in expressing their ideas. These behavioral changes likely contributed to their improved comprehension. When students are emotionally engaged and socially supported, they are more inclined to attend closely to texts, discuss interpretations, ask questions, and clarify misunderstandings—all of which are crucial processes for deep reading comprehension (Susilowati et al., 2025).

Moreover, fun learning embodies key principles of constructivist pedagogy. Rather than passively receiving explanations, students in the experimental class actively constructed meaning by connecting story content with songs, gestures, and group discussions. The guessing game required them to recall specific story details and infer meaning from their peers' performances, thereby reinforcing memory and understanding. The collaborative aspect of these activities also allowed for peer scaffolding: stronger readers could support weaker ones, and all students could benefit from different perspectives on the text (Michael Angelo A. Legarde et al., 2025).

The results also align with previous empirical findings that innovative, student-centred instructional models can improve learning outcomes in primary education. While prior studies have often focused on problem-based or cooperative learning in subjects such as science and mathematics, this research demonstrates that an similarly active and enjoyable approach can be successfully applied to reading comprehension of literary texts. This broadens the evidence base for joyful learning methods in literacy instruction.

Meanwhile, the modest improvement in the control group indicates that exposure to the material and teacher explanations alone are not entirely ineffective. Conventional teaching does lead to some gains in comprehension, which is consistent with the idea that direct instruction can support basic understanding. However, the smaller gains and the persistence of some students at below-mastery levels suggest that such methods may not be sufficient to fully engage all learners or to address diverse needs within the classroom (Marchwicka et al., 2025).

The stronger effect observed in the experimental group suggests that fun learning adds value over and above what can be achieved through traditional lecturing. Importantly, this added value seems to come not from diluting academic content but from embedding it in activities that are more compatible with children's natural ways of learning—through play, movement, and social interaction. The findings therefore counter any misconception that "fun" in learning necessarily compromises rigor; instead, they illustrate how well-designed fun activities can deepen and stabilize comprehension.

This study has several practical implications for classroom practice. First, teachers of Bahasa Indonesia at the primary level are encouraged to integrate fun learning components into their reading lessons, especially when teaching narrative texts such as short stories. Simple strategies, such as selecting or composing story-related songs, designing guessing games based on key story elements, and organizing students into small cooperative groups, can substantially increase engagement and improve outcomes.

Second, the study highlights the importance of careful planning to ensure that fun learning remains aligned with learning objectives. In the experimental class, activities were not random entertainment but were deliberately structured to support specific comprehension skills: identifying characters and events, recalling details, inferring meaning, and summarizing the story. Teachers seeking to adopt fun learning should similarly ensure that each fun activity has a clear pedagogical purpose and that students understand its connection to the learning goals.

Third, the findings suggest that school leaders and policymakers should support professional development opportunities that help teachers design and implement fun learning approaches. Many teachers may initially feel uncertain about managing active and noisy classrooms or assessing learning in such environments. Training and collaborative lesson planning can help teachers build the necessary skills and confidence (Chowdhury et al., 2025)s.

Although the study produced positive and statistically significant results, several limitations should be acknowledged. The research was conducted in a single school with a relatively small sample of 50 students, which may limit the generalizability of the findings. Future studies could replicate the design in different schools and regions to examine whether similar effects are observed in diverse contexts.

Additionally, the study focused on short-term outcomes measured immediately after the intervention. It did not investigate whether the gains in reading comprehension were maintained over time. Longitudinal research could explore the durability of Fun Learning's effects and whether repeated exposure across multiple units or subjects yields cumulative benefits.

Finally, this research concentrated on cognitive outcomes (test scores) and reported behavioral observations informally. Subsequent work could incorporate more systematic measures of affective and motivational variables, such as students' attitudes towards reading, self-efficacy, and intrinsic motivation, to provide a more comprehensive picture of how fun learning influences the broader learning experience.

IV. CONCLUSIONS

This study examined the effect of the fun learning method on fourth-grade students' reading comprehension of short story texts at SD Negeri 114 Pagaran Sigatal. Using a quasi-experimental control group pre-test-post-test design with 50 students, the research found that both the control and experimental groups improved after instruction, but the experimental group taught through fun learning achieved significantly higher gains. The experimental class's mean score increased from 69.20 to 80.20, compared with an increase from 69.72 to 75.40 in the control class. An independent samples t-test yielded a t-value of 2.668, exceeding the critical value at $\alpha = 0.05$, indicating a significant positive effect of fun learning on reading comprehension outcomes. Beyond the quantitative results, classroom observations suggested that fun learning fostered higher levels of student engagement, enthusiasm, and collaboration. Activities such as singing, guessing games, and group discussions transformed reading lessons into enjoyable and meaningful experiences, encouraging students to participate actively and construct understanding together. In conclusion, the fun learning method can be considered an effective and pedagogically sound alternative to conventional instruction for improving reading comprehension of short story texts in primary schools. It supports not only cognitive achievement but also affective and social development by creating a joyful and interactive learning environment. Teachers are therefore encouraged to adopt and adapt fun learning strategies in their literacy instruction, while school leaders and policymakers should facilitate training and support for such innovative practices. Future research is recommended to extend this work to other schools, grade levels, and subject areas, and to investigate the long-term impact of fun learning on students' literacy development and broader educational outcomes.

Funding Statement

" This study received no external funding."

Ethical Compliance

All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committees and the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Data Access Statement

A data access statement is a section in a scientific publication or research report that explains how the data used or generated in the study can be accessed by readers or other researchers. This statement aims to promote transparency, support research reproducibility, and comply with applicable open access policies.

Common Elements in a Data Access Statement:

1. Data Location: Specifies where the data are stored, for instance, in online repositories (e.g., Zenodo, Dryad, or institutional repositories).
2. Access Instructions: Provides information on how to access the data, such as direct links, DOI (Digital Object Identifier), or contact details.
3. Data Availability: This section indicates whether the data are publicly accessible, available upon request, or restricted due to ethical, legal, or privacy considerations.
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 - "The data supporting this study are openly available in Zenodo at [DOI:10.xxxx/zenodo.xxxx]."
2. Restricted Data:
 - "The data that support the findings of this study are available upon request from the corresponding author. Owing to privacy concerns, the data are not publicly available."
3. No Data Available:
 - "No datasets were generated or analyzed in the current study."
4. Conditional Access:
 - "The data supporting this study are available under restricted access and can be obtained from the corresponding author upon reasonable request, with permission from the ethics committee."

Purpose of a Data Access Statement:

- Reproducibility: Enables other researchers to replicate or verify the findings.
- Collaboration: Encourages further collaboration by sharing data.
- Compliance: Adherence to the policies of funding agencies or journals that require open access to data.

Conflict of Interest Declaration

The authors declare that they have no affiliations with or involvement in any organization or entity with any financial interest in the subject matter or materials discussed in this manuscript.

ACKNOWLEDGEMENTS

The authors thank all people and institutions in most cases and provide acknowledgments sponsors and financial support.

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