



The Effect of Self-Concept and Achievement Motivation on Students' Biology Learning Outcomes in Public Senior High Schools

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Abstract: Quality education plays a crucial role in developing adaptive, innovative, and competitive individuals. In biology learning, students' achievement is influenced not only by instructional factors but also by psychological aspects, particularly self-concept and achievement motivation. This study aims to examine the effect of self-concept and achievement motivation on the biology learning outcomes of students in public senior high schools in Sidenreng Rappang (Sidrap) Regency. This research used a quantitative ex post facto design. The population consisted of 2,361 students, with a sample of 160 selected through stratified random sampling. Data were collected using questionnaires and documentation, then analyzed through descriptive and inferential statistics, including regression analysis at a 0.05 significance level. The results indicate that self-concept and achievement motivation are generally at a moderate level, while biology learning outcomes are relatively good. Self-concept has a significant effect ($R = 0.763$; 58.2%), and achievement motivation also shows a significant effect ($R = 0.772$; 59.6%). Simultaneously, both variables contribute 60.8% ($R = 0.780$), with achievement motivation being slightly more dominant. These findings highlight the importance of strengthening students' self-concept and motivation to improve biology learning outcomes through supportive and student-centered learning environments.

Keywords: Achievement Motivation; Biology; Learning Outcomes; Self-Concept; Students

Introduction

Quality education is a fundamental goal in national development, as it plays a crucial role in shaping individuals who are capable of adapting to rapid changes, innovating in various fields, and competing at both national and global levels. In the modern era, education is not only expected to produce individuals who master knowledge, but also those who possess critical thinking skills, problem-solving abilities, and strong character. The quality of education, therefore, is not solely determined by curriculum design or government regulations, but also by how learning

processes are implemented effectively in classrooms, how teachers facilitate meaningful learning experiences, and how well students are prepared to collect, interpret, and process information critically and systematically. In the context of Biology learning at the senior high school level, educational quality is reflected in students' ability to understand complex biological concepts, demonstrate scientific attitudes such as curiosity and objectivity, and achieve learning outcomes that are aligned with established competency standards. Consequently, achieving quality education requires a deep and comprehensive understanding of various internal student factors that influence academic achievement,

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particularly those related to psychological aspects (Syerlita & Siagian, 2024).

Biology learning outcomes, as one of the key indicators of educational quality, are strongly influenced by students' psychological conditions, particularly biology self-concept and achievement motivation (Marsh & Scalas, 2011). Biology self-concept refers to how students perceive and evaluate their own abilities in understanding Biology as a subject. A positive self-concept encourages students to develop confidence in their abilities, take initiative in learning, persist when facing difficulties, and demonstrate a willingness to solve complex problems. On the other hand, a negative self-concept often leads students to doubt their capabilities, hesitate in participating during learning activities, and avoid engaging with challenging tasks. Previous studies have consistently shown that academic self-concept is directly related to Biology learning outcomes (Putri & Rahman, 2022). For instance, Laia (2023) reported that self-concept contributes 38.44% to students' academic achievement, highlighting its significant role as a psychological determinant of learning success. Furthermore, Sinarsi (2020) identified a strong correlation between self-concept and learning motivation ($r = 0.720$), indicating that students with a more positive self-concept tend to exhibit higher levels of motivation in their learning processes.

In addition to self-concept, achievement motivation plays an equally important role in determining students' efforts and persistence in achieving academic success. Achievement motivation drives students to study diligently, set high academic standards, and strive to master learning materials beyond the minimum requirements (Rahmawati et al., 2023). Students who possess high achievement motivation tend to utilize additional learning resources, actively ask questions during classroom interactions, and demonstrate persistence and resilience when completing challenging academic tasks (Lee & Kim, 2024). Prior research has also confirmed that achievement motivation contributes significantly to Biology learning outcomes across various instructional approaches, including project-based learning, inquiry-based worksheets, guided discussions, and digital-assisted learning environments. Empirical evidence further supports this relationship, such as the study conducted by Nasution et al. (2016), which reported a positive correlation between achievement motivation and academic performance in Biology ($r = 0.536$, $p < 0.05$), suggesting that increased motivation is associated with improved learning outcomes.

The success of the biology learning process does not solely depend on cognitive abilities but is also strongly driven by students' psychological conditions, with

motivation being one of its primary foundations. Learning motivation acts as an essential driver that activates, directs, and determines the intensity of students' behavior to achieve learning objectives optimally (Jufri et al., 2024). In the context of academic achievement, this drive manifests more specifically as achievement motivation. Students with high achievement motivation do not merely follow the learning flow but possess the desire, needs, and future aspirations to achieve the best possible results. The presence of this motivation enables students to study harder, be more resilient, persistent, and maintain full concentration during the biology learning process (Andriani et al., 2022). Thus, the absence of achievement motivation directly results in passive learning activities. Conversely, the drive of achievement motivation combined with a positive self-concept creates a conducive learning environment and habits, which ultimately lead to the improvement of students' biology learning outcomes.

In the context of public senior high schools in Sidrap Regency, Biology learning outcomes can be categorized as relatively moderate. Data collected from several schools indicate that the average Biology scores range between 74–78, with a minimum competency standard (KKM) set at 75. However, only approximately 48–55% of students are able to achieve scores at or above this standard, while the remaining 45–52% fall below the expected level. This variation in learning outcomes cannot be fully explained by differences in teaching methods, as teachers across schools have implemented relatively similar instructional strategies, including the use of LKPD (student worksheets), learning media, teaching modules, and active learning models. This condition suggests that internal student factors, particularly psychological aspects, play a significant role in influencing variations in academic achievement.

Supporting this argument, Putri et al. (2021) found a positive relationship between learning motivation and Biology learning outcomes in online learning settings ($r = 0.301$), indicating that motivation contributes meaningfully to academic improvement. Similarly, Hasniar et al. (2024) reported a very strong correlation between learning motivation and Biology achievement among senior high school students in Makassar ($r = 0.809$), emphasizing that motivation is one of the dominant psychological factors influencing academic success. Observations from Biology teachers further reinforce these findings, as students who achieve high academic performance tend to exhibit characteristics associated with a positive self-concept and high achievement motivation. These students are generally confident, actively participate in discussions, frequently ask questions, and demonstrate strong initiative in

independent learning. In contrast, students with lower academic performance tend to be passive, less confident, and often engage in learning activities only to fulfill obligations rather than to achieve deep understanding (Hasanah & Wulandari, 2023).

These findings are consistent with broader research indicating that self-concept and achievement motivation significantly influence academic performance. Previous studies have reported that self-concept contributes up to 50.2% and achievement motivation contributes 22.5% to Biology learning outcomes (Hasanah & Wulandari, 2023). Despite the strong evidence supporting the importance of these variables, there has been no empirical study specifically examining the relationship between biology self-concept, achievement motivation, and Biology learning outcomes among students in public senior high schools in Sidrap Regency. This gap highlights the novelty of the present study, which lies in integrating these two important psychological variables within a specific regional context to provide localized and context-based empirical evidence that has not been previously explored.

The importance of this study lies in its potential to provide valuable insights for Biology educators in designing more effective and targeted instructional strategies. The findings are expected to assist teachers in developing engaging learning materials such as LKPD, selecting appropriate and interactive learning media, and implementing teaching approaches that foster students' confidence and enhance their achievement motivation. Ultimately, this study is expected to contribute to improving the overall quality of Biology education, particularly in Sidrap Regency. Therefore, this research is necessary to provide strong empirical evidence on how biology self-concept and achievement motivation influence Biology learning outcomes, and to support the development of more meaningful, effective, and student-centered learning processes.

Method

This study employed a quantitative approach using an *ex post facto* research design, which examines events that have already occurred to identify the factors influencing them. The research was conducted over a period of three months during the second semester of the 2025/2026 academic year at public senior high schools in Sidenreng Rappang Regency.

The population of this study consisted of all students enrolled in public senior high schools in Sidenreng Rappang Regency, totaling 2,361 students. The sample was determined using a stratified random sampling technique, ensuring that each class had an equal opportunity to be selected proportionally. The

sample size was calculated using the Taro Yamane formula with a 4% margin of error, resulting in 160 respondents distributed proportionally across several schools.

The research design applied was correlational, aiming to examine the influence of independent variables on the dependent variable. The independent variables in this study were self-concept (X1) and achievement motivation (X2), while the dependent variable was students' biology learning outcomes (Y).

Self-concept was defined as an individual's perception and evaluation of themselves in the context of learning biology. Achievement motivation refers to the internal drive of students to attain academic success, whereas biology learning outcomes represent the level of students' cognitive achievement obtained from test scores or report cards.

The research instruments included questionnaires and documentation. The questionnaires were used to measure students' self-concept and achievement motivation using a four-point Likert scale, consisting of 30 items for each variable. Meanwhile, data on learning outcomes were obtained from documented cognitive biology scores.

Data were collected through the distribution of questionnaires to respondents and by retrieving students' learning outcome data from school records. The collected data were analyzed using both descriptive and inferential statistics. Descriptive analysis was used to present the data in terms of mean, standard deviation, and variable categorization. Inferential analysis was conducted using simple linear regression to determine the effect of each independent variable on the dependent variable, and multiple linear regression to examine the simultaneous effect of both independent variables on the dependent variable. All analyses were performed using SPSS with a significance level of 0.05.

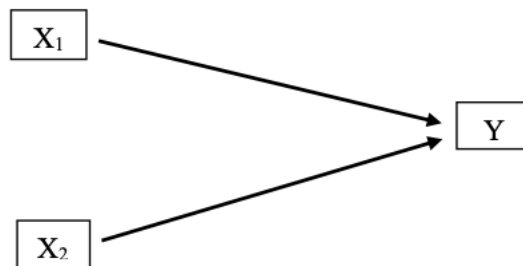


Figure 1. The Relationship Among Research Variables

Result and Discussion

This study aims to determine the influence of self-concept and achievement motivation on the biology learning outcomes of students in public senior high schools across Sidenreng Rappang Regency. Data processing was carried out using Microsoft Excel and

SPSS 21.0 for Windows. The findings are presented through descriptive analysis to provide an overview of each variable, as well as inferential analysis to examine the relationships and effects among the variables in greater depth.

Description of Students' Self-Concept

The self-concept of students shows a mean score of 94.59 with a standard deviation of 12.45. The lowest score obtained is 47, while the highest score reaches 120 from a total of 160 respondents. This average value indicates that, in general, students have a high level of self-concept. It suggests that most students possess a positive perception of themselves, particularly in the context of biology learning, including their confidence in their abilities, attitudes toward the learning process, and expectations regarding academic achievement.

However, the relatively wide range of scores and the fairly large standard deviation indicate significant variation among students. This reflects that not all students have the same level of self-concept. Some students demonstrate high self-confidence, while others are still at a lower level. This condition highlights the diversity of individual differences in self-perception, learning attitudes, and beliefs about academic ability.

The distribution of categories shows that most students fall into the moderate category, followed by high and low categories with relatively balanced proportions. Only a small number of students are in the very high and very low categories. This distribution pattern indicates that students' self-concept generally remains at a moderate level. In other words, although some students already have a positive self-perception, it has not yet reached an optimal level for all. To provide a clearer illustration of this distribution, the self-concept data are presented in the Figure 2.

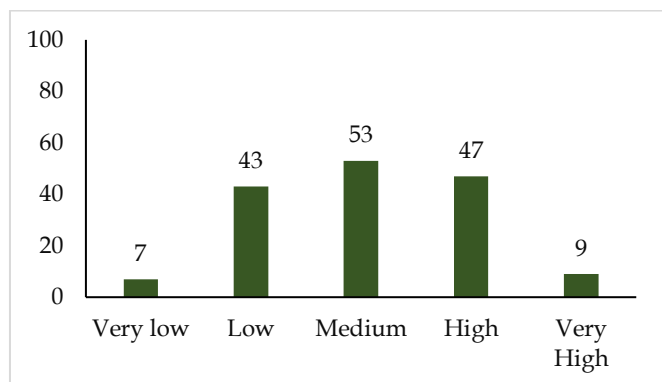


Figure 2. Frequency Distribution of Students' Self-Concept in Public Senior High Schools in Sidenreng Rappang Regency

This condition indicates that efforts to strengthen students' self-concept are still necessary, particularly through learning strategies that enhance students' self-

confidence. Providing positive feedback, teacher support, and creating a conducive learning environment are essential factors in helping students develop a more positive and stable self-concept.

Description of Students' Achievement Motivation

Students' achievement motivation has a mean score of 89.69 with a standard deviation of 14.71, with a minimum score of 44 and a maximum score of 120. This average indicates that, in general, students' achievement motivation falls into the moderate category. It suggests that students already have the drive to achieve academic success, although the level of motivation has not yet reached its optimal state.

The relatively large variation in scores indicates differences in the level of achievement motivation among students. Some students demonstrate high enthusiasm for learning, characterized by persistence and a strong desire to achieve the best results, while others still exhibit relatively low motivation. These differences may be influenced by various factors, such as the learning environment, social support, and prior learning experiences.

The category distribution shows that most students are in the moderate category, followed by the low and high categories. Meanwhile, only a small proportion of students fall into the very high and very low categories. This pattern indicates that although there are students with high motivation, a considerable proportion still have less optimal motivation levels. To provide a clearer understanding of this distribution, the achievement motivation data are also presented in the Figure 3.

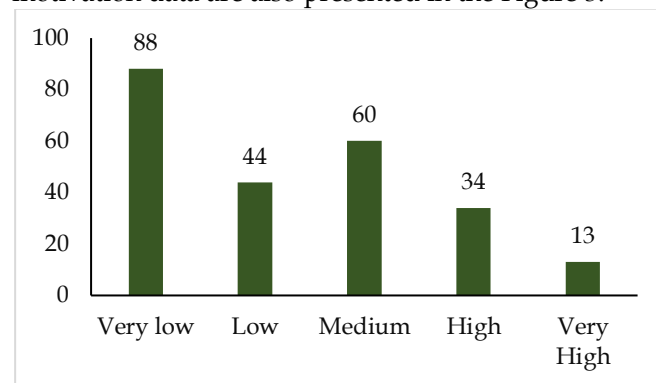


Figure 3. Frequency Distribution of Students' Achievement Motivation in Public Senior High Schools in Sidenreng Rappang Regency

Overall, this condition indicates that students' achievement motivation still needs to be improved. Efforts to enhance motivation can be carried out through the implementation of more innovative and participatory learning strategies, such as problem-based learning, inquiry-based approaches, and the provision of rewards for student achievements. In addition,

support from teachers and a positive learning environment play a crucial role in fostering students' motivation to achieve higher academic success.

Description of Students' Biology Learning Outcomes in Public Senior High Schools in Sidrap Regency

The biology learning outcomes of students indicate a relatively good level of achievement, with a mean score of 7.11 and a standard deviation of 0.60. The scores obtained by students range from 5.10 to 8.52, based on a total of 160 respondents. This average score suggests that, in general, students have a fairly good understanding of the biology material studied. It reflects that the biology learning process has been able to support students in comprehending fundamental concepts adequately, although there is still room for improvement among some students.

The relatively small variation in scores is indicated by the moderate standard deviation, suggesting that differences in learning outcomes among students are not highly pronounced. However, the presence of relatively low minimum scores indicates that some students still experience difficulties in fully understanding the learning material. This condition implies the need for special attention toward students with lower academic achievement through more adaptive and supportive learning approaches.

The distribution of learning outcome categories shows that most students fall within the moderate to high levels. The moderate category is the most dominant, followed by the high and low categories with considerable proportions. Meanwhile, the very high and very low categories are only represented by a small number of students. This pattern indicates that the majority of students have reached a fairly good level of understanding, although it has not yet been evenly optimized across all students. To provide a clearer illustration of this distribution, the data are presented in the Figure 4.

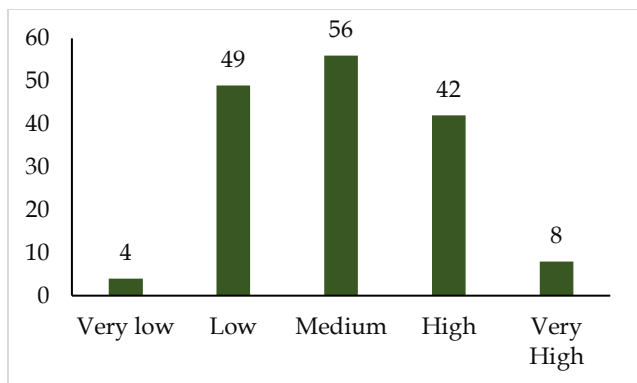


Figure 4. Frequency Distribution of Students' Biology Learning Outcomes in Public Senior High Schools in Sidrap Regency

The distribution shows that more than half of the students fall within the moderate to high categories, indicating that overall academic achievement is relatively good. However, some students are still categorized as low to very low, requiring more intensive instructional interventions. Improvement efforts can be carried out through strengthening instructional strategies, providing constructive feedback, and offering more focused learning guidance so that all students can achieve optimal learning outcomes.

Analysis of the Significance of the Effect of Self-Concept on Biology Learning Outcomes

Inferential analysis indicates that self-concept has a highly significant effect on students' biology learning outcomes. This is evidenced by a significance value lower than 0.05, meaning that the regression model used is statistically valid in explaining the relationship between the two variables. The high F-value indicates that self-concept plays a strong role in influencing variations in biology learning outcomes.

The contribution of self-concept to learning outcomes is relatively high, accounting for 58.2%. This means that more than half of the variation in students' learning outcomes can be explained by differences in their self-concept. The remaining variation is influenced by other factors outside the scope of this study. The strength of the relationship between self-concept and learning outcomes is also considered strong, indicating that improvements in self-concept tend to be followed by improvements in learning outcomes.

The regression model demonstrates a positive relationship between the variables, where an increase in self-concept is associated with an increase in biology learning outcomes. This finding confirms that self-concept is an important psychological factor in supporting students' academic success. Students with high self-confidence, positive attitudes toward learning, and strong beliefs in their abilities tend to achieve better learning outcomes.

These findings emphasize the importance of developing students' self-concept in the learning process. Teachers play a crucial role in fostering students' self-concept through motivation, positive reinforcement, and creating a supportive learning environment that enhances students' confidence.

Analysis of the Significance of the Effect of Achievement Motivation on Biology Learning Outcomes

Achievement motivation also shows a highly significant effect on students' biology learning outcomes. The significance value below 0.05 indicates that the relationship between achievement motivation and learning outcomes is statistically significant. The high F-value suggests that achievement motivation has

a strong ability to explain variations in learning outcomes.

The contribution of achievement motivation to learning outcomes reaches 59.6%, indicating that motivation is one of the dominant factors in determining students' academic success. The relationship between achievement motivation and learning outcomes is also strong, suggesting that higher levels of motivation are associated with better academic performance.

The regression equation demonstrates a positive relationship, where an increase in achievement motivation leads to an increase in biology learning outcomes. This indicates that students who are highly motivated, persistent in learning, and have clear academic goals tend to achieve better results.

Therefore, achievement motivation is a crucial factor that needs to be developed in the learning process. Efforts to enhance motivation can be implemented through engaging teaching methods, reward systems, and creating a healthy competitive learning environment.

Analysis of the Significance of the Effect of Self-Concept and Achievement Motivation on Biology Learning Outcomes

Multiple regression analysis shows that self-concept and achievement motivation simultaneously have a significant effect on students' biology learning outcomes. The very small significance value indicates that the model effectively explains the relationship between the independent variables and learning outcomes in a strong and convincing manner.

The combined contribution of both variables reaches 60.8%, indicating that the interaction between self-concept and achievement motivation plays a substantial role in influencing variations in learning outcomes. This suggests that academic success is not determined by a single factor but is the result of the interaction of multiple psychological factors.

The regression model shows that both variables have a positive effect on learning outcomes. However, achievement motivation has a greater contribution compared to self-concept, indicating that internal drive plays a more dominant role in determining students' academic success.

Overall, the findings of this study indicate that higher levels of self-concept and achievement motivation are associated with higher biology learning outcomes. Therefore, the development of these two aspects should be a priority in the learning process, both through pedagogical approaches and supportive learning environments, in order to improve students' academic achievement optimally.

Discussion

This study examines the effect of self-concept and achievement motivation on the biology learning outcomes of students in public senior high schools in Sidrap Regency. The discussion aims to provide a comprehensive description of the findings based on the research results, particularly regarding the influence of self-concept, achievement motivation, and students' biology learning outcomes.

The findings indicate that the self-concept of students is generally in the moderate category. This suggests that most students possess a relatively positive perception of themselves, although it has not yet reached an optimal level. Self-concept plays an important role in enhancing students' confidence, overcoming learning barriers, and increasing academic engagement (Santos et al., 2023). As a psychological aspect, self-concept significantly influences students' academic achievement. Azhari et al. (2024) defines self-concept as an individual's perception of themselves, shaped by personal views, others' judgments, and personal aspirations. In the educational context, a well-developed self-concept helps students face academic challenges, complete tasks, and achieve learning objectives effectively. Furthermore, self-concept encompasses students' attitudes, beliefs, and understanding based on their intellectual abilities and academic performance. A positive academic self-concept enables students to better recognize their potential and competencies, thereby motivating them to achieve their goals (Rodiah et al., 2020).

However, instability in self-concept may negatively affect both the learning process and learning outcomes (Saputra et al., 2021). The moderate level of self-concept observed in this study may be influenced by several factors, particularly low self-confidence in learning biology. This is reflected in the confidence indicator, which has the lowest average compared to other indicators such as attitudes toward biology learning, expectations, and emotional responses to the subject. Low confidence may stem from internal factors, such as immature emotional conditions, including anxiety, unstable emotions, inappropriate emotional responses, self-criticism, and low self-sympathy (Aini, 2021). External factors such as family environment, learning conditions, teacher support, and peer relationships also contribute to students' self-concept. Positive and constructive feedback from teachers can enhance students' confidence, whereas repeated failure without adequate support may reduce academic self-concept (Ya'lu et al., 2024).

Therefore, strengthening students' self-concept requires supportive learning strategies. For instance, the implementation of Problem-Based Learning (PBL)

combined with Inquiry-Based Stress Reduction (IBSR) has been shown to reduce anxiety and improve self-efficacy and metacognitive skills in biology learning (Salsabila et al., 2024). Similarly, Discovery Blended Learning is effective in enhancing students' self-efficacy by encouraging independent problem-solving and collaboration (Ningsih & Jayanti, 2022). Previous studies also confirm a significant relationship between self-concept and biology learning outcomes (Watimury & Bahalwan, 2019).

In terms of achievement motivation, the results show that students' motivation is also in the moderate category. This indicates that students have the drive to achieve, but its intensity and consistency are not yet optimal. Achievement motivation is a crucial factor influencing both the learning process and academic performance. Higher motivation leads to better academic outcomes, whereas lower motivation results in weaker performance (Aulia & Susanti, 2022). Students with strong achievement motivation tend to be more confident in trying new things and developing curiosity toward learning materials (Wahyuni et al., 2024). They also have clearer and more measurable academic goals. Achievement motivation is often reflected in consistent study duration and frequency, where longer and more study habits increase the likelihood of optimal achievement (Manik et al., 2024).

Further analysis reveals that the achievement qualification indicator has the highest average, indicating that students set relatively high standards for their performance in biology. However, without sufficient study duration and persistence, these expectations may not be realized. This aligns with goal-setting theory proposed by Locke and Latham (2002), which emphasizes that challenging and specific goals enhance performance when supported by commitment, ability, and feedback. On the other hand, the lowest average is found in the study duration indicator, suggesting that students struggle to maintain consistent learning habits. This may be due to poor time management, extracurricular activities, distractions from social media and technology, and lack of disciplined study routines. Rahman & Fuad (2024) highlight that time management discipline and adherence to consistent schedules can improve academic achievement. To enhance achievement motivation, innovative and engaging teaching methods such as Problem-Based Learning, inquiry learning, cooperative learning, recitation, and brainstorming have proven effective (Ariyanti et al., 2021; Lestari, 2021; Masrikah & Kartijono, 2024; Novitasari et al., 2016). Additionally, rewards and positive reinforcement can strengthen intrinsic motivation (Hafiz, 2025), while a

healthy competitive environment encourages students to set and achieve personal goals (Kulakow, 2020).

The analysis of biology learning outcomes shows that students' achievement is generally in the moderate category. This indicates that students have achieved basic competencies but have not yet reached optimal mastery. Learning outcomes represent changes in knowledge, attitudes, and skills after the learning process (Ulfah et al., 2021). In biology, learning outcomes involve not only conceptual understanding but also the ability to apply knowledge in real-life contexts, think scientifically, and conduct experiments (Restudila et al., 2025). The moderate level of achievement may be influenced by internal factors such as health, concentration, and fluctuating motivation, as well as external factors such as teaching methods, learning materials, media use, and social support (Ferry, 2024). The complexity of biology concepts, including abstract ideas and scientific terminology, also contributes to learning difficulties. Moreover, self-concept and achievement motivation play crucial roles in determining learning outcomes. Students with low self-concept tend to lack confidence, while those with low motivation are less persistent and more likely to give up when facing challenges.

To improve biology learning outcomes, a transformation in instructional practices is necessary. Student-centered approaches such as inquiry-based learning, problem-based learning, deep learning, and project-based learning are recommended (Afdania et al., 2025). The integration of information and communication technology can also enhance creativity and collaboration (Impron, 2025). Furthermore, formative assessment with continuous feedback helps students monitor their progress (Abdullah & Hanifah, 2025), while teacher professional development improves pedagogical competence and subject mastery (Sukaesih et al., 2025).

The regression analysis results indicate that self-concept has a positive and significant effect on biology learning outcomes ($p < 0.05$), with a correlation coefficient (R) of 0.763 and a contribution of 58.2%. This confirms that self-concept is an important predictor of academic success, although other factors also contribute. The regression equation shows that an increase in self-concept leads to an increase in learning outcomes. These findings are consistent with previous studies by Afriani (2020); Watimury & Bahalwan (2019), which also found significant effects of self-concept on biology learning outcomes. Similar findings were reported by Wahyuni et al. (2024). A positive self-concept strengthens students' confidence and influences their academic performance. Therefore, support from family, school,

and community environments is essential in developing students' self-concept (Watimury & Bahalwan, 2019).

Achievement motivation also shows a positive and significant effect on learning outcomes, with a correlation coefficient (R) of 0.772 and a contribution of 59.6%. This indicates that achievement motivation is a strong predictor of academic success, even slightly stronger than self-concept. The regression analysis shows that increased motivation leads to improved learning outcomes. These findings align with Manullang (2020); Shidik (2020); Wahyuni et al. (2024), who found that achievement motivation significantly influences academic performance. Students with high motivation tend to be persistent, resilient, and capable of overcoming challenges. Motivation also enhances students' engagement, curiosity, and learning satisfaction (Ayu, 2025; Febriyanti et al., 2024). Support from teachers and the learning environment, including recognition and positive feedback, plays a crucial role in strengthening students' motivation (Frangki, 2024).

Simultaneously, self-concept and achievement motivation have a significant combined effect on biology learning outcomes, with a correlation coefficient (R) of 0.780 and a contribution of 60.8%. This indicates that both psychological and motivational factors jointly play a substantial role in determining academic success. The regression model shows that both variables positively influence learning outcomes, with achievement motivation contributing more dominantly. These findings are supported by studies conducted by Nwosu & Samuel (2022); Shidik (2020). Understanding these variables allows educators and parents to better support students who face difficulties in learning biology.

However, the moderate levels of self-concept, achievement motivation, and learning outcomes indicate that improvement is still needed. Several factors contributing to low self-concept include student-related, teacher-related, school-related, parental, and social factors (Hassan & Surat, 2024), as well as negative social comparisons and feedback (Trautwein & Möller, 2016). Low self-concept can also reduce motivation, as it is a significant predictor of learning motivation. Additionally, low motivation may result from unclear interests, health issues, limited social interaction, learning distractions, and insufficient teacher support (Ihsani & Nurfarhanah, 2024). The low score in study duration further indicates a lack of consistent learning habits due to time management issues and technological distractions.

In conclusion, improving biology learning outcomes requires strengthening both self-concept and achievement motivation. A positive self-concept enhances confidence and independence in learning, while achievement motivation drives students to set and

achieve higher academic goals. Both factors are interconnected and play a crucial role in improving students' academic performance (Wahyuni et al., 2024). Therefore, educators must identify students' learning difficulties and provide appropriate support to address these challenges effectively (Ramadhani & Muhroji, 2022).

Conclusion

Based on the results and discussion of the study, it can be concluded that self-concept and achievement motivation have a positive and significant influence on the biology learning outcomes of students in public senior high schools in Sidenreng Rappang Regency. Descriptively, students' self-concept and achievement motivation are categorized as moderate, as are their biology learning outcomes, which indicate fairly good but not yet optimal achievement. The results of inferential analysis show that self-concept contributes 58.2% to biology learning outcomes, while achievement motivation contributes 59.6%. This indicates that both variables are important factors in determining students' academic success, with achievement motivation having a slightly more dominant influence than self-concept. Simultaneously, self-concept and achievement motivation contribute 60.8% to the variation in biology learning outcomes. This suggests that academic success is not determined by a single factor, but rather by the interaction of psychological and motivational factors within students. Thus, the higher the students' self-concept and achievement motivation, the higher their biology learning outcomes. Therefore, efforts to improve the quality of biology learning should focus on strengthening these two aspects through innovative teaching strategies, the provision of motivation, and the creation of a supportive and student-centered learning environment in order to achieve more optimal learning outcomes.

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Author Contributions

Each stage of the research was carried out simultaneously by all authors.

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Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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