# Project-Based Digital Entrepreneurship Learning: Its Impact on Students' Adaptability and Opportunity Recognition

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**Abstract**
The rapid growth of the digital economy and e-commerce platforms has opened up significant opportunities for students to engage in digital entrepreneurship. However, many students still lack the adaptability and opportunity recognition needed to respond to the ever-changing dynamics of the digital market. This study aims to analyze the effectiveness of online entrepreneurship learning experiential learning through the use of e-commerce platforms to increase adaptability and opportunity recognition students. This research uses a descriptive approach mixed methods with design project-based action research involving 50 students from the Accounting Education Study Program who were taking the Entrepreneurship Practice course. Quantitative data were collected through measurement pre-test and post-test using the Career Adapt-Abilities Scale (CAAS) and Entrepreneurial Alertness Scale (EAS) instruments, while qualitative data were obtained through interviews and observations. The results of the study showed a significant increase in scores adaptability students from 3.59 to 4.10 and the score opportunity recognition from 3.43 to 4.21. Statistical analysis using paired sample t-test the results showed that the increase was statistically significant ($p < 0.001$). Qualitative findings also indicated that students became more responsive to market trends, more confident in managing digital businesses, and better able to identify and evaluate business opportunities. The results of this study indicate that the integration of e-commerce-based business practices into entrepreneurship learning is effective in strengthening students' entrepreneurial competencies and professional readiness in the digital economy era.

## 1. Introduction

The digital transformation of the past two decades has fundamentally changed the way individuals, organizations, and countries conduct economic activities. The development of internet technology, mobile devices, artificial intelligence, and the integration of digital payment systems have fostered the emergence of a new platform-based economic ecosystem. One of the most visible manifestations of this transformation is the rapid growth of e-commerce. In Indonesia, the value of e-commerce transactions continues to experience significant growth and is projected to exceed US$65 billion by 2025, making it the largest in Southeast Asia (Statista, 2025). This growth is not merely an economic phenomenon; it also structural changes in consumption patterns, distribution, marketing, and business models. Marketplaces, social media, and content-based platforms are now the primary spaces for interaction between producers and consumers.

These developments present enormous opportunities for the younger generation, particularly students, to actively engage in digital entrepreneurship. However, these opportunities can only be optimally utilized if students possess competencies relevant to the dynamics of the digital economy. Research shows that entrepreneurship education integrated with digital literacy and creativity plays a crucial role in shaping students' entrepreneurial intentions and readiness (Liang, Chen, Hong, Li, & Han, 2025). Furthermore, technological developments such as Generative AI also have the potential to strengthen digital entrepreneurship if students possess adequate perceptions of desirability and feasibility of digital opportunities (Nguyen, 2025). Therefore, higher education has a strategic responsibility to design entrepreneurship learning that is not only theoretical, but also contextual and adaptive to technological developments.

The urgency of strengthening entrepreneurship is also increasingly relevant in Indonesia's demographic context. The country is entering a demographic bonus phase, with approximately 64% of the population being


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of productive age, projected to peak in 2030 (Hidayat, 2024). The demographic bonus is often referred to as window of opportunity which can drive economic growth if managed properly. However, without adequate competency readiness and job creation, the demographic bonus has the potential to create problems of educated unemployment and economic inequality. Data shows that Indonesia's entrepreneurship ratio is still around 3.47%, far below the 10–12% in developed countries (Ministry of Cooperatives and SMEs of the Republic of Indonesia, 2023). This figure indicates the need for systematic intervention in education to increase the entrepreneurial capacity of the younger generation.

In modern entrepreneurship literature, adaptability is one of the key competencies that determines an individual's success in facing market uncertainty. Cox et al. (2025) emphasized that cognitive flexibility and the ability to adapt to various task demands are correlated with entrepreneurial intentions. Dheer and Castrogiovanni (2023) also showed that cognitive adaptability influences entrepreneurial intentions through the mediation of passion and self-efficacy. In the highly dynamic digital economy, adaptability becomes increasingly crucial due to rapid and often unpredictable changes in consumer trends, platform algorithms, and monetization models. Students who are not trained to adapt will struggle to maintain the sustainability of their digital businesses.

Besides adaptability, the ability opportunity recognition or opportunity recognition is also a central element in entrepreneurship. Tang, Kacmar, and Busenitz (2012) developed the concept entrepreneurial alertness, this includes scanning and searching, association and connection skills, and evaluation and judgment in identifying business opportunities. Empirical studies show that entrepreneurial self-efficacy and passion contribute to increased opportunity recognition (Helni, Hamdani, & Maulani, 2025). In a digital context, opportunity recognition becomes more complex because opportunities are often hidden in data, social media trends, online consumer behavior, or temporary market gaps. Without systematic, data-based training, experience, students tend to have difficulty identifying and evaluating business opportunities appropriately (Chayo et al., 2022).

Various previous studies have examined the effectiveness of experiential learning and project-based learning approaches in entrepreneurship education. Chopra (2025) and Hadley (2026) demonstrated that experiential learning outside the classroom significantly improves students' business understanding. Sholikhah, Suhartanti and Nastiti (2025) and Al Issa, Thai, and Saad (2025) emphasized that experiential learning plays a role in strengthening entrepreneurial intentions by increasing self-efficacy. Furthermore, the use of digital technology and social media in entrepreneurship education has also been shown to contribute to improving students' business knowledge and performance (Sirait et al., 2025; Swaramarinda, 2025). Wardoyo (2025) identified that Indonesian students' readiness for digital business is influenced by psychological factors and digital literacy.

However, there is still limited research examining the integration of real-world e-commerce practices as a primary learning environment to simultaneously develop students' adaptability and opportunity recognition. Most entrepreneurship learning models still position digital technology solely as a learning tool, rather than as a space for authentic digital market practice. As a result, students often only learn entrepreneurial concepts theoretically without directly experiencing market dynamics such as demand fluctuations, price competition, platform algorithm changes, or real-time consumer responses.

This gap highlights the need for an entrepreneurial learning model that places students directly in a real digital business ecosystem, allowing their adaptability and opportunity recognition skills to develop through authentic learning experiences. Based on these challenges, this study implemented an e-commerce platform-based entrepreneurial project as a learning strategy that places students directly in digital business practices. Students not only develop a business plan but also run the business through marketplaces and social media, conduct digital market research, produce promotional content, interact with consumers, and evaluate sales performance in real time. With this approach, the e-commerce platform serves as an authentic learning laboratory that allows students to experience the dynamics of digital entrepreneurship firsthand.

Therefore, this study aims to analyze the impact of implementing an e-commerce-based entrepreneurial project on the development of students' adaptability and opportunity recognition skills. By integrating experiential learning with hands-on practice in digital marketplaces, this research is expected to contribute to the development of a more practice-based digital entrepreneurship education model.

The novelty of this research lies in the systematic integration of experiential learning, project-based action research, and the use of an e-commerce platform as a real-life business practice environment. Unlike previous research that focused primarily on entrepreneurial intentions, this study specifically highlights how authentic digital business experiences can develop two critical entrepreneurial competencies: adaptability and opportunity recognition.


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# 2. Method

This study employed a mixed methods approach with a project-based action research design that integrates experiential learning principles into e-commerce-based entrepreneurship education. This approach was chosen because it allows students to actively engage in digital business practices while also providing space for reflection and systematic evaluation of their entrepreneurial competency development. The study was conducted on 50 students of the Accounting Education Study Program, who were taking the Entrepreneurship Practices course.

The research process begins with identifying gaps between students' mastery of entrepreneurship theory and their practical skills in a digital context. At this stage, research instruments are developed, digital literacy training is provided, and the concepts of adaptability and opportunity recognition are reinforced. Next, students are divided into project groups to design and run e-commerce platform-based businesses. They conduct digital market research, develop business plans, determine products, manage marketplace or social media accounts, and implement direct promotional and sales strategies.

During the project implementation, researchers conducted participant observation to monitor how students adapted to market dynamics, changing trends, and consumer responses. Monitoring was conducted continuously through mentoring and weekly reflections. At the end of the intervention period, an evaluation was conducted using a pre-posttest design to measure changes in adaptability and opportunity recognition scores. Adaptability was measured using the Career Adapt-Abilities Scale (CAAS) (Hartung & Savickas, 2023; Panjaitan & Sahrah, 2023), while opportunity recognition was measured using the Entrepreneurial Alertness Scale (EAS) (Tang, Kacmar, & Busenitz, 2012).

Quantitative data were analyzed through validity and reliability tests, descriptive analysis, and paired sample t-tests to determine the significance of improvements before and after the intervention. Qualitative data obtained from interviews, student reflections, and digital documentation were analyzed using a thematic approach to identify patterns adaptation and opportunity recognition strategies that emerged during the project. Data triangulation was conducted to ensure the consistency and validity of the findings.

Through this design, the study not only measures changes in scores statistically but also understands the learning transformation process experienced by students. The final results are expected to produce an e-commerce-based entrepreneurial project learning model that is proven effective in significantly improving students' adaptability and opportunity recognition.

# 3. Results and Discussion

## 3.1. Results

This study began with the provision of digital entrepreneurship literacy to students in the Entrepreneurship Practice course. Students received learning materials related to digital platform–based business strategies, including the utilization of social media platforms (Instagram, TikTok, and Facebook) as well as e-commerce platforms (Shopee, Bukalapak, and other marketplaces) as tools for product promotion and distribution. After the literacy stage, students were required to prepare a business plan and present the product ideas they intended to develop.

During the implementation phase, students were assisted in creating social media and e-commerce accounts to operate real business activities. In addition to online selling, students were also required to conduct direct selling practices through door-to-door marketing, participation in car free day events, and sales through booths facilitated in the campus park area. This approach was designed to provide comprehensive entrepreneurial learning experience, both in digital and conventional business contexts.

### 3.1.1. Improvement of Students' Adaptability

The measurement results indicate an increase in students' adaptability scores across all indicators, which include the dimensions of concern, control, curiosity, and confidence. The average pre-test score of 3.59 increased to 4.10 in the post-test, with an average improvement of 0.51 points. The increase is presented in Table 1.

In dimension concern (future planning and awareness), students demonstrated improvements in business planning and preparedness for digital market changes. This indicates that hands-on practical experience empowers students to be more visionary about the sustainability of their businesses control, there is an increase in the ability to manage time, maintain focus, and take responsibility for business decisions. Students begin to demonstrate an awareness that business success depends not only on ideas, but also on discipline and self-control.


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**Table 1. Results of Students' Adaptability Measurement Before and After the Implementation of Project-Based Digital Entrepreneurship Learning**

| No | Adaptability Measurement Instrument | Pre-test | Post-test |
|---|---|---|---|
| Concern (Future Planning & Awareness) | | | |
| 1 | I think about my future entrepreneurial career. | 3.79 | 4.33 |
| 2 | I plan business steps before running a digital business. | 3.60 | 4.20 |
| 3 | I prepare myself to face changes in the online market. | 3.60 | 4.00 |
| 4 | I have clear goals in carrying out a business project. | 3.67 | 4.25 |
| Control (Self-Control & Responsibility) | | | |
| 5 | I take responsibility for the business decisions I make. | 3.93 | 4.33 |
| 6 | I am able to manage my time between studying and running an online business. | 3.33 | 3.92 |
| 7 | I remain focused even when facing business difficulties. | 3.40 | 3.96 |
| 8 | I try to control the direction of my business development. | 3.60 | 4.08 |
| Curiosity (Exploration & Inquisitiveness) | | | |
| 9 | I actively seek information about the latest digital business trends. | 3.67 | 4.25 |
| 10 | I try new features on e-commerce platforms. | 3.33 | 4.08 |
| 11 | I am interested in learning new online marketing strategies. | 3.80 | 4.29 |
| 12 | I explore product ideas that are different from previous ones. | 3.40 | 4.08 |
| Confidence (Self-Confidence & Problem Solving) | | | |
| 13 | I am confident that I can run an online business independently. | 3.67 | 3.71 |
| 14 | I feel confident interacting with customers in a digital environment. | 3.53 | 4.08 |
| 15 | I am able to solve problems in online sales activities. | 3.53 | 3.92 |
| 16 | I am confident that I can improve my business performance. | 3.53 | 4.08 |

Dimensions curiosity showed significant improvements, particularly in exploring new features on e-commerce platforms and researching digital business trends. This demonstrates that project-based learning encourages students to be more active in exploring opportunities and innovations. Meanwhile, in the dimension confidence, there was an increase in confidence in dealing with customers and solving business problems. Although improvements in some items were relatively moderate, overall, students showed improvements in problem-solving skills and confidence in running a business independently.

The results of the paired sample t-test showed a significant difference between students' adaptability scores before and after the implementation of digital project-based entrepreneurship learning. The average score increased from 3.59 in the pre-test to 4.10 in the post-test, with a difference of 0.51 points. The comparison of these scores can be seen in Table 2. The statistical test results produced a t value of 12.88 with $p < 0.001$, indicating that the increase was statistically significant.

**Table 2. Results of the Paired Sample t-test on Students' Adaptability**

| Variable | N | Mean Pre-test | Mean Post-test | Mean Difference | Std. Deviation | t-value | Sig. (p-value) |
|---|---|---|---|---|---|---|---|
| Students' Adaptability | 16 | 3.59 | 4.10 | 0.51 | 0.159 | 12.88 | 0.000 |

These findings indicate that the implementation of project-based digital entrepreneurship learning through e-commerce-based business practices effectively improved students' adaptability, particularly in aspects of future planning, self-control in running a business, exploring digital business opportunities, and confidence in facing entrepreneurial challenges. Thus, the experiential learning approach based on real projects has been proven to have a positive impact on the development of students' adaptive competencies in facing the dynamics of the digital market.

## 3.1.2. Improvement of Students' Opportunity Recognition

The results of the opportunity recognition measurement also indicate improvements across all indicators. Students showed development in the following aspects: scanning and search (the ability to monitor trends and the needs of the digital market), association and connection (the ability to connect information and business ideas), and evaluation and judgment (the ability to assess the feasibility and risks of business opportunities). The measurement data are presented in Table 3.

The most significant improvement was seen in the ability to monitor marketplace trends and consider risks before starting a new venture. This demonstrates that students are not only motivated to sell but also beginning to think strategically and analytically about existing opportunities.


ISSN: 2797-3174

**Table 3. Results of Students' Opportunity Recognition Measurement Before and After the Implementation of Project-Based Digital Entrepreneurship Learning**

| No | Opportunity Recognition Measurement Instrument | Pre-test | Post-test |
|---|---|---|---|
| Scanning & Search (Information Searching) | | | |
| 1 | I actively monitor product trends in marketplaces. | 3.27 | 4.21 |
| 2 | I observe consumer needs through social media. | 3.60 | 4.25 |
| 3 | I look for business inspiration from online competitors. | 3.67 | 4.38 |
| 4 | I follow changes in digital customer behavior. | 3.33 | 4.08 |
| Association & Connection (Linking Information) | | | |
| 5 | I combine various ideas to create new products. | 3.33 | 4.13 |
| 6 | I am able to see opportunities from consumer problems. | 3.32 | 3.88 |
| 7 | I connect market trends with my business ideas. | 3.33 | 4.25 |
| 8 | I discover new opportunities from my selling experiences. | 3.53 | 4.29 |
| Evaluation & Judgment (Opportunity Assessment) | | | |
| 9 | I am able to assess whether a business idea is feasible to implement. | 3.20 | 4.25 |
| 10 | I consider risks before starting a new business. | 3.40 | 4.38 |
| 11 | I analyze the potential profit of business opportunities. | 3.60 | 4.17 |
| 12 | I evaluate sales results for business development. | 3.60 | 4.25 |

The results of the paired sample t-test showed a significant difference between students' opportunity recognition scores before and after the implementation of digital project-based entrepreneurship learning. The average score increased from 3.43 in the pre-test to 4.21 in the post-test, an average increase of 0.78 points, as shown in Table 4. The statistical test results produced a t value of 16.58 with $p < 0.001$, which indicates that the increase is statistically significant. This finding indicates that the implementation of e-commerce-based entrepreneurial projects can improve students' abilities in recognizing business opportunities, including monitoring digital market trends (scanning & search), connecting various information to generate business ideas (association & connection), and evaluating the feasibility and risks of business opportunities (evaluation & judgment).

**Table 4. Results of the Paired Sample t-test on Students' Opportunity Recognition**

| Variable | N | Mean Pre-test | Mean Post-test | Mean Difference | Std. Deviation | t-value | Sig. (p-value) |
|---|---|---|---|---|---|---|---|
| Students' Opportunity Recognition | 16 | 3.43 | 4.21 | 0.78 | 0.159 | 16.58 | 0.000 |

These findings indicate that hands-on experience managing business accounts and interacting with consumers helps students develop a sense of market opportunities and the ability to evaluate business potential more realistically.

### 3.1.3. Interview and Observation Findings

Interviews showed that students felt that e-commerce-based learning provided them with a better understanding of the dynamics of digital marketing, including promotional strategies through social media and transaction mechanisms on marketplace platforms. They also stated that they felt that business opportunities were becoming more open because businesses could be run flexibly without the constraints of space and time.

The results of observations during practice show that students are relatively more comfortable and adaptive in running digital-based businesses compared to direct selling. They feel that online communication is more effective because there is a time gap for responding to customers, increasing self-confidence because they are not face-to-face, and are more in line with the characteristics of a generation that is used to interacting through digital devices.

Furthermore, students appeared to adapt more quickly to changing product trends and consumer responses on digital platforms. This demonstrates that e-commerce project-based learning not only improves technical digital marketing skills but also fosters mental readiness and adaptability to market changes.

Overall, e-commerce platform-based entrepreneurship learning has been proven to increase adaptability and opportunity recognition students. The integration of digital practices and direct sales experiences provides authentic experiences that strengthen students' readiness to face the dynamics of the business world. These findings confirm that digital-based experiential entrepreneurship learning has a significant contribution to shaping students' entrepreneurial competencies in the digital economy era.

## 3.2. Discussion

The results of the study show that entrepreneurship learning is based on experiential learning through the use of e-commerce platforms, students' adaptability and opportunity recognition significantly increased. The


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increase in the average adaptability score from 3.59 to 4.10 indicates that students not only gained technical knowledge but also experienced development in the psychological dimensions of their careers, such as concern, control, curiosity, and confidence. These findings suggest that a learning environment involving hands-on digital business practices not only serves as a medium for developing entrepreneurial skills but also as a mechanism for strengthening students' psychological readiness to face the dynamics and uncertainties of careers in the digital economy era.

This finding is in line with the theory career construction which emphasizes the importance of adaptability as an individual's capacity to manage career transitions and changes in the work environment (Rudolph, Lavigne, & Zacher, 2017). In the context of digital entrepreneurship, adaptability becomes increasingly crucial because the technology-based business environment is highly dynamic and full of uncertainty (Autio et al., 2018). Improvements in the dimensions concern and control this finding indicates that students are beginning to develop more focused career planning and take responsibility for their business decisions. This is consistent with research that suggests that experiential entrepreneurship learning can strengthen students' career readiness and self-regulation (Lubis et al., 2025; Prasetyaningtyas, 2025). From a theoretical perspective, these findings broaden the application of career construction theory in the context of digital entrepreneurship education by showing that the development of adaptability occurs not only through conceptual learning, but also through direct experience in authentic digital business practices.

Dimensions curiosity and confidence there has also been an increase, indicating that students are more actively exploring market trends and are more confident in solving business problems. Recent research confirms that authentic project-based learning experiences encourage students to develop problem-solving skills and professional self-confidence (Petrov, 2025; Hariyanto et al., 2026). A learning environment that requiring students to run a real business through social media and marketplaces creates a contextual learning situation that strengthens the formation of an entrepreneurial identity (Ratten, 2023; Muhammad & Soebagyo, 2024).

In the opportunity recognition aspect, increasing scores across all dimensions (scanning and search, association and connection, evaluation and judgment) indicate that students are increasingly able to identify, connect, and evaluate business opportunities. This supports the view that opportunity recognition is a core competency in entrepreneurship that can be developed through experiential learning (Ardichvili, Cardozo, & Ray, 2003). The process of exploring marketplace trends and analyzing digital consumer behavior allows students to build entrepreneurial alertness, namely sensitivity to new opportunities (Fellnhofer, 2022; Wijayanti & Rohmah, 2023). These findings contribute to entrepreneurship literature by providing empirical evidence that opportunity recognition skills can be developed through direct interaction with digital markets, particularly through student involvement in market data analysis, consumer feedback interpretation, and online business experimentation.

Interview findings corroborate the quantitative findings, where students stated that e-commerce practices made it easier for them to understand market dynamics and business opportunities. The literature shows that the integration of digital technology in entrepreneurship education increases the relevance of learning to the needs of Industry 4.0 (Chotisarn & Phuthong, 2026). Digital platforms are not only a medium for transactions but also a means of reflective and experimental learning that accelerates the process of developing entrepreneurial competencies. Practically, these findings suggest that universities need to develop entrepreneurship learning designs that integrate real-life digital business platforms as learning laboratories, so students have the opportunity to interact directly with market dynamics and consumer behavior in the digital ecosystem.

Furthermore, students' preferences for online communication compared to direct selling this study demonstrates a match between the characteristics of the digital generation (Gen-Z) and online business models. Recent studies explain that the digital generation tends to have high technological literacy and is more adaptable to platform-based business models (Pranata et al., 2025; Saputra & Fahlia, 2025). Therefore, learning designs that utilize social media and marketplaces are not only pedagogically relevant but also contextually relevant to the characteristics of today's students. This alignment emphasizes the importance of integrating digital entrepreneurship practices into higher education curricula to ensure learning approaches remain adaptive to the characteristics of the digital generation and the increasingly rapid technological developments.

Overall, the results of this study strengthen the argument that entrepreneurship education based on experiential learning and e-commerce can improve students' adaptability and opportunity recognition. This learning model contributes to the development of employability skills and professional readiness of students to face the dynamics of the digital job market (Park & Kim, 2025; Hidayah, Sulisworo, & Widodo, 2026).

## 3.3. Implications

From a theoretical standpoint, this study enriches the discussion on digital entrepreneurship education by linking experiential learning, adaptability development, and opportunity recognition within a single integrated


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learning framework. Practically, the results suggest that higher education institutions need to systematically integrate digital business projects, marketplace engagement, and social media marketing activities into entrepreneurship curricula to better prepare students for the evolving digital economy.

## 3.4. Limitations

While this study provides important findings, several limitations should be noted. First, the study involved a relatively limited number of respondents from only one study program, so generalizing the findings to a broader context requires caution. Second, the implementation period of the digital entrepreneurship project in this study lasted only one semester, so it does not fully reflect the long-term development of students' entrepreneurial competencies. Therefore, future research is recommended to involve a broader sample, a longer observation period, and examine other entrepreneurial variables to gain a more comprehensive understanding of the effectiveness of digital practice-based entrepreneurship learning.

# 4. Conclusion

This study concludes that experiential learning-based entrepreneurship education through the use of e-commerce platforms has proven effective in improving students' adaptability and opportunity recognition. Hands-on practice managing a business through social media and marketplaces provides authentic experiences that encourage students to be more responsive to changing market trends, more structured in decision-making, and better prepared to face business challenges. These findings confirm that real-life project-based learning not only strengthens cognitive aspects but also shapes students' psychological and professional readiness in the context of digital entrepreneurship. Furthermore, improvements in the opportunity recognition dimension indicate that students are increasingly able to monitor market trends, connect various pieces of information into business ideas, and evaluate the feasibility and risks of business opportunities more systematically. Interview and observation results show that an e-based approach commerce is relevant to the characteristics of the digital generation, which is adaptable to technology and online communication. Therefore, integrating digital business practices into the entrepreneurship curriculum can be an effective strategy to strengthen students' entrepreneurial competencies and work readiness in the digital economy era. Future research can be conducted using an experimental design involving a control group to more comprehensively test the model's effectiveness, expand research subjects across universities, and examine the long-term impact on student business sustainability and the formation of an entrepreneurial career identity.

# Author Contributions

All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

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# Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/ or publication of this article.

# Data Availability

The datasets generated during and/ or analyzed during the current study are available from the corresponding author on reasonable request.

# Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript. AI were used only to improve readability and language under strict human oversight; no content, ideas, analyses, or conclusions were generated by AI.

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