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# Application of artificial intelligence by university students: Chinese case

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**ABSTRACT**

The problem of artificial intelligence (AI) use is crucial for understanding how AI creates new opportunities in education. It is proposed an approach designed to elicit precise responses regarding the students' practical application of AI. The purpose of the research is to investigate Chinese students' attitude to using AI that affect learning activities. The research design employed the methods of questionnaire and calculating. The questionnaire consisted of questions about using AI for different tasks, assignments, activities. The study was conducted in 2024. The research participants were 187 bachelor students from Shangqiu Normal University in China. A sampling technique was used as the students were selected based on their willingness to participate in the survey. The key findings are: over half of Chinese students use AI for presentations, essays, and projects, while a notable minority do not. More students use AI for professors' tasks. The highest AI use is for homework. Fewer than half rely on AI for exam preparation, favoring traditional study methods. The conclusion is students in China tend to rely more on AI for routine or repetitive tasks. It is recommended to focus on developing AI literacy programs that guide students in the effective use of AI.



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## 1. INTRODUCTION

Artificial intelligence (AI) is creating new opportunities in the field of education. It is also experiencing AI increasingly enhancing teaching and learning. This adaptability improves the effectiveness and accessibility of education, fostering a more inclusive and tailored approach. As a result, learning outcomes can better align with the diverse abilities and potential of each student [1], [2].

Therefore, the central scientific question this research addresses: how do Chinese university students utilize AI tools across various academic tasks, and what patterns emerge in their adoption of these technologies? Given the rapid proliferation of AI tools and their potential to revolutionize educational practices, it is imperative to understand how these technologies are being utilized by students in diverse educational contexts. This research delves into the practical applications and impacts of AI on student learning by focusing on Chinese university students, recognizing China's position as a prominent adopter of

AI within its large-scale education system. This study's novelty lies in its empirical, task-specific investigation of AI adoption within China's unique, large-scale university system, offering valuable insights for both educators and policymakers globally. Particularly, the study considers a large-scale education system offering insights into AI adoption within China's extensive higher education system, a context with significant global implications; examines task-specific AI usage delivering empirical evidence on how students utilize AI for particular activities like presentations, essays, homework, and exam preparation, revealing nuanced adoption patterns; identifies areas of high and low AI integration highlighting the discrepancy in AI usage across different academic tasks, with a high adoption rate for routine tasks and low adoption for cognitively demanding ones.

Despite some specificities in China, such as controlled or limited access to world global technological tools, AI has been rapidly advancing and becoming a key component of the country's education system [3], renowned as one of the largest and most dynamic worldwide. As this technology continues to evolve and digital tools are adopted at an accelerated pace, Chinese students are increasingly leveraging AI to enhance their learning experiences, prepare effectively for different tasks, and refine their professional competencies [1], [4]. Moreover, with China's education system encompassing over 200 million students, understanding the nuances of AI adoption within this large-scale system holds significant implications for educators and policymakers worldwide. By identifying successful practices and challenges, this research aims to provide valuable insights that can be adapted and applied in other countries seeking to integrate AI into their educational frameworks.

Since China is one of the leaders in implementing AI in education, and the country's education system covers over 200 million students, researching the use of AI in such a large-scale system is extremely relevant, as it allows to identify successful practices that can be adapted for other countries. Existing research lacks specific insights into AI tool adoption patterns among Chinese university students across diverse academic tasks. This study provides empirical evidence on task-specific AI use by Chinese students, informing targeted educational interventions. This research offers educators and policymakers a nuanced understanding of AI adoption in China, enabling effective AI integration strategies.

## 2. THE COMPREHENSIVE THEORETICAL BASIS

At the beginning of studying any phenomena, a researcher has to clear up its definition. Speaking about AI, firstly, it is necessary to find out the notion "intelligence" as it is the main term in the mentioned word combination. So, according to the Cambridge Dictionary, "intelligence is the ability to learn, understand, and make judgments or have opinions that are based on reason" [5]. We are used to relating this term to human beings or at least alive creatures when it goes about realizing facts, connections, significance, and beyond. In the case of AI, we deal with the field of computer science focused on developing machines and systems capable of carrying out tasks typically requiring human intelligence, including reasoning, learning, decision-making, perception, and natural language processing. Its primary goal is to enable computers to simulate human intelligence and replicate cognitive processes [6].

The development of AI has been ongoing for more than half a century, but its historical roots go deeper into the past, including the era of antiquity. The ideas related to the automation of intellectual processes have always been of interest to humanity, as they reflect the desire to understand and ultimately reproduce the nature of thought and mind. These ideas combine philosophical, mathematical and technical aspects that gradually formed the basis for modern research in the field of AI.

One of the main thinkers whose works influenced the creation of concepts of AI was the ancient Greek philosopher Aristotle. He developed the foundations of formal logic, in particular, syllogisms, which became the basis for future logical-mathematical research [7]. Formal logic made it possible to create universal rules for deriving truths, which are the basis of algorithms for modern computer systems. Aristotle proposed a framework for analyzing thought, which later influenced the development of programming and algorithms [8]. Another ancient thinker, Heron of Alexandria, created the first automatic devices that, while based on mechanical principles, reflected a desire to automate tasks. The mechanical innovations became the forerunners of modern robots and engineering systems [9].

In the Middle Ages, the ideas of antiquity received a new development thanks to the work of Arab scientists. So, Al-Khwarizmi developed the foundations of algorithmic thinking. His work gave its name to the algorithms that are key to the development of modern AI systems [10]. Later periods, especially the renaissance, led to the creation of the first computing devices, such as Pascal's mechanical calculator [11] or Charles Babbage's "analytical engine" [12]. Modern AI is thus the result of a long evolution of ideas that have been designed over millennia. From philosophical concepts of thought to the mathematical foundations of logic and technical innovation, each era has contributed to the creation of modern systems capable of automating intellectual processes and solving complex tasks.

In the 20th century, specific mathematical foundations for building AI appeared. In particular, the works of Alan Turing, John von Neumann, and Norbert Wiener became key milestones in the development of this science. In 1936, Turing proposed the concept of a "universal machine" that became the basis for modern computers, and in 1950 a test known as the "Turing Test" was offered that is still used today to assess the intelligence of machines [13].

In approaching the problem under study, it is useful to make a brief overview of several aspects of the problems that are close to our investigation. They are AI utilization in the sphere of education in terms of benefits for students, AI and university students, and utilization of AI tools by Chinese university students. Young generation demonstrates a high level of technological proficiency and adaptability to new devices, digital tools, and innovations, including AI. Students are quick to adopt and integrate different AI-powered applications into their daily lives and study. A number of manuscripts address students' attitude towards AI utilization as a learning tool. The authors evaluated students' perceptions of personalized learning platforms, virtual learning assistants, and language translation tools.

Ajlouni *et al.* [14] advised to integrate generative AI into curricula as well as teaching and learning practices. Fošner [15] emphasized the necessity of further investigations in this sphere as authors could find worries about AI tools' effect on the quality of education and adherence to academic ethics. Yüzbaşıoğlu [16] underlined positive students' attitude towards using AI technologies for future professional development. Asio and Gadia [17] revealed that students' AI literacy determines the effectiveness of its use for educational purposes. Sumakul *et al*. [18] found out that students' familiarity with AI technologies enabled them to leverage its capabilities for developing various skills.

Analyzing the utilization of AI tools by Chinese students, it was noticed that mostly scholars study this problem on the basis of secondary school. There are papers devoted to the tertiary level, they consider status of the utilization of AI programs by students [4], the potential of AI to develop students' critical thinking skills [19], the key elements shaping students' perceptions, satisfaction levels, and intended behaviors toward AI chatbots [20]. As well as the connection between self-effectiveness, attitudes toward learning, learning practices, and academic performance among university students who have incorporated AI technology into their education [21], the impact of AI on enhancing university students' English language speaking skills [22] are highlighted. However, our investigation focuses more on students' attitude to AI usage in everyday learning activities in China and makes a novel contribution to the field by providing an empirical examination into the specific patterns of AI tool adoption among Chinese university students across a range of academic tasks. So, the purpose of the research is to investigate Chinese students' attitude to using AI that affects learning activities such as making presentations, writing essays, answering professors' questions, doing homework, making projects, exam preparation, and making reports.

## 3. METHOD

### 3.1. Research design

The study employed a quantitative research design, focusing on gathering numerical data to analyze patterns in AI tool usage among university students. A structured questionnaire was used to collect data on the frequency and nature of AI usage for academic tasks. The questionnaire included seven specific questions aimed at measuring the frequency and nature of AI use. The approach involved distributing a structured questionnaire, designed to elicit precise responses regarding the students' practical application of AI.

### 3.2. Participants

The research involved 187 third-year Chinese bachelor students from Shangqiu Normal University, where the authors worked as visiting professors in 2024. The sample size was determined based on a convenience sampling approach. This sampling method was chosen to reflect a homogeneous group of students (third-year university students from one university) with similar academic backgrounds and experiences, ensuring consistency in the data. As it is well known by Creswell [23], for quantitative survey studies, a sample size of 100–200 participants is generally adequate when the goal is to estimate proportions or detect general patterns, so 187 participants falls within this recommended range, making the sample size appropriate for descriptive statistical analysis. A convenience sampling technique was used, selecting students based on their availability and willingness to participate, students were invited to complete the survey during their regular academic schedule. Inclusion criteria included being a third-year student at the university and actively using AI tools for academic purposes, while first and second-year students were excluded as they have less experience of using AI. The study was conducted in 2024.

### 3.3. Instrument of the study

The instrument was a researcher-made structured questionnaire consisting of seven questions targeting AI usage for different tasks, assignments, activities for learning, such as the usage of AI for making presentations, writing essays, answering professors' questions, doing homework, making projects, exam preparation, and making reports. The evidence provided in this study is quantitative in nature, derived from the students' responses to the structured questionnaire. To ensure validity, the questionnaire was validated through expert review and pilot testing with a small group of students to ensure clarity and relevance. Reliability was established confirming internal consistency. To control for confounding variables, the study limited its participants to third-year students who actively used AI tools for learning purposes, thereby excluding those with less exposure or experience (such as first- and second-year students), and ensuring more uniform responses and minimizing external influences related to academic level or unfamiliarity with AI.

### 3.4. Statistical analysis

The data were analyzed using calculation methods, including computing percentages and creating charts to illustrate the distribution of students' responses, providing a clear and measurable representation of AI tool adoption patterns as well as to identify trends and patterns in AI tool usage. This approach provided measurable insights into how students integrate AI into their academic work. So, in the figures the answers were sorted of separate questions, the calculations were performed and the charts were created based on the results.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

It was investigated the frequency and nature of AI tool usage among university students for various academic tasks. The study explored how students at Shangqiu Normal University use AI for making presentations, writing essays, answering professors' questions, completing homework, working on projects, preparing for exams, and creating reports. All the students' answers (yes, no) are presented in figures. The questions were:

i) Do you use AI for making presentations?
ii) Do you use AI for writing essays?
iii) Do you use AI for answering your professors' questions?
iv) Do you use AI for doing homework?
v) Do you use AI for making projects?
vi) Do you use AI for exam preparation?
vii) Do you use AI for making reports?

The students' answers about using AI for making presentations and for writing essays are presented in Figures 1 and 2. Students do not totally use AI for making presentations and for writing essays, 57.22% of them use AI for making presentations, 42.78% do not use AI for making presentations. The same answers are about writing essays, 57.22% of students use AI for writing essays, 42.78% do not. The students' answers about using AI for answering professors' questions and doing homework are presented in Figures 3 and 4.

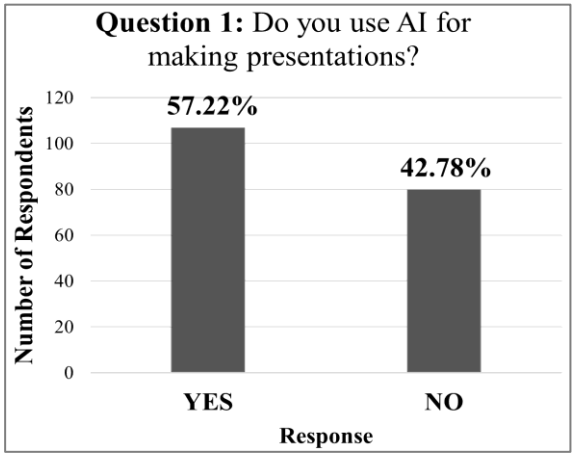


Figure 1. The students' answers about using AI for making presentations

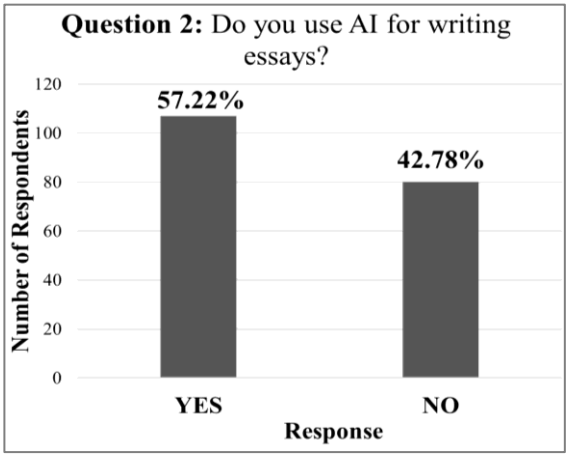


Figure 2. The students' answers about using AI for writing essays

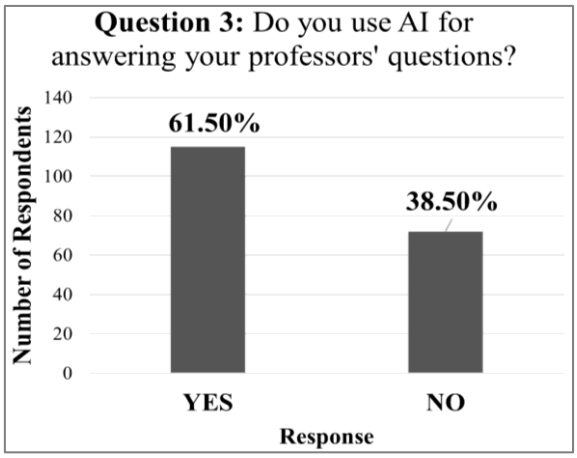


Figure 3. The students' answers about using AI for answering professors' questions

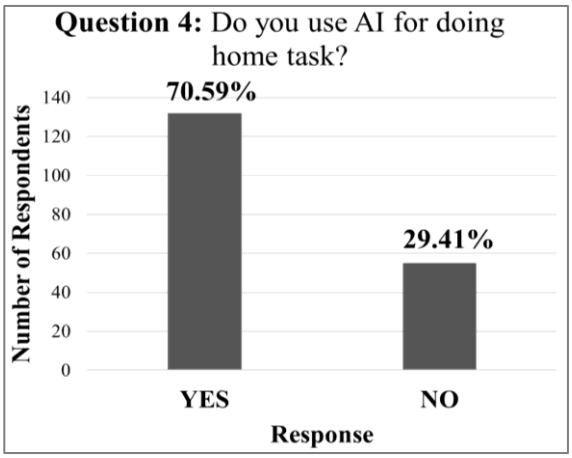


Figure 4. The students' answers about using AI for doing homework

In this case, students use AI more for answering professors' questions and doing home task. A total of 61.5% use AI for answering professors' questions and 38.5% do not. The students use mostly AI for doing home task as 70.59% of them use AI for doing homework and 29.41% do not. The students' answers about using AI for making projects and for exam preparing are presented in Figures 5 and 6.

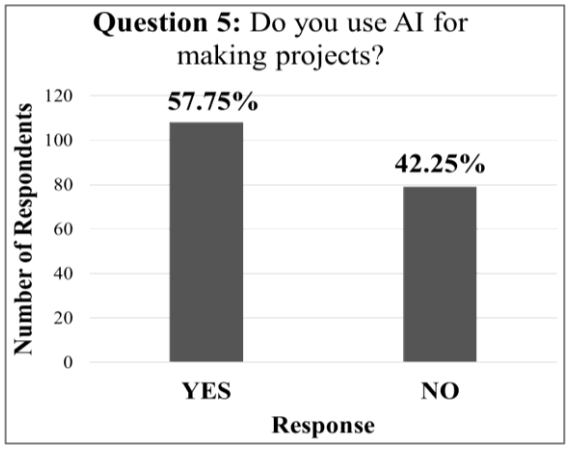


Figure 5. The students' answers about using AI for making projects

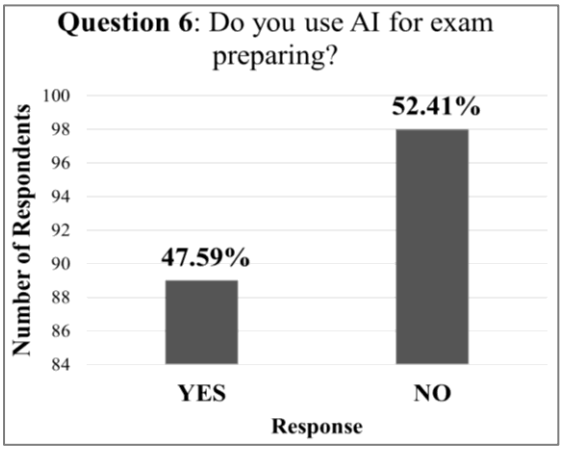


Figure 6. The students' answers about using AI for exam preparation

So, students use AI less for making projects and for exam preparation. Almost a half (57.75%) of them use AI for making projects and 42.25% do not. The students use even less AI for exam preparation, as less than a half use AI, 47.59% of them only use AI for exam preparation, 52.41% do not use AI. Furthermore, the students' answers about using AI for making reports are presented in Figure 7.

The students use AI for making reports. Most students (64.17%) use AI for making reports, while 35.83% do not. Thus, just over half of the students use AI for both making presentations and writing essays, while a significant minority still prefer not to. A larger portion of students rely on AI for answering professors' questions compared to presentations and essays. The highest percentage in the survey is for doing homework, indicating that most students find AI particularly useful for homework tasks. The usage of AI for making projects is similar to presentations and essays, suggesting moderate reliance on AI for project work. The usage AI for exam preparation is the only category where fewer than half of the students use of AI, indicating a preference for traditional study methods in China (reading coursebooks and memorizing the info) during exam preparation. Many students use AI for creating reports, though not as frequently as for homework tasks.

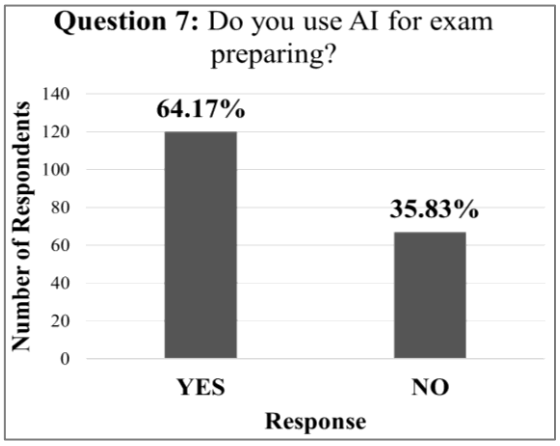


Figure 7. The students' answers about using AI for making reports

In summary, the key finding that directly answers the research question is that Chinese university students demonstrate a task-specific adoption of AI tools. Specifically, the highest utilization is observed for homework assistance (70.59%) and answering professors' questions (61.5%), while the lowest utilization is seen in exam preparation (47.59%). This highlights a continued reliance on traditional study methods in the context of exam preparation.

### 4.2. Discussion

The findings of this study, which revealed a nuanced pattern of AI adoption among Chinese university students, align with broader trends observed in the integration of AI within Chinese higher education. Specifically, this results indicated a preference for AI in tasks perceived as routine or repetitive, such as homework and report generation, while more complex tasks like exam preparation saw lower AI utilization. This suggests that students perceive AI as a tool for enhancing efficiency and productivity in certain areas, but may still rely on traditional methods for tasks requiring deeper cognitive engagement.

The observations are consistent with existing research that highlights Chinese students' strong motivation to integrate AI into their education, particularly in areas like design, communication, and critical thinking [4], [19], [24]. For instance, previous study have shown that design-college students leverage AI for data collection, brainstorming, and concept generation, recognizing its potential to boost personal skills and work efficiency [18]. This aligns with our finding that students are open to using AI for tasks that streamline their workflow.

Furthermore, the importance of fostering critical thinking skills in conjunction with AI usage is a recurring theme in the literature [19]. Students are motivated to balance the benefits of AI with an awareness of potential risks, indicating a growing understanding of the need for responsible AI integration [20]. This is particularly relevant given our finding that students use AI more for answering professors' questions, requiring them to evaluate and integrate information.

The satisfaction and continued use of AI tools, such as chatbots, are also influenced by perceived "somewhat self-efficiency" and "self-competence" [21], usefulness and personal innovativeness, as evidenced by research on graduate students [22]. This underscores the importance of designing AI tools that are both effective and user-friendly, catering to the diverse needs and preferences of students. Moreover, self-efficacy, learning attitudes, and behaviors play a crucial role in achieving positive learning outcomes with AI integration [25]. This highlights the need for educators to provide adequate support and guidance to students as they navigate the use of AI in their studies.

While AI's potential to enhance language learning, as demonstrated by its use in improving spoken English, is evident [26], there is a clear need for ongoing refinement and development of AI applications. This aligns with our finding that AI usage varied significantly across different academic tasks, suggesting that students are selective in their adoption of AI based on its perceived utility and effectiveness. In summary, our study's findings, when contextualized within the existing literature, demonstrate that Chinese students are motivated by AI's potential to enhance skills, efficiency, and critical thinking [24], [26]–[29]. However, it is essential to acknowledge that the observed patterns of AI adoption are task-specific, indicating a need for well-designed AI education programs that promote a balanced and effective integration of AI into diverse learning activities. It is important to remember that our results are from a survey, and only gives a snapshot of student opinions.

## 5. CONCLUSION

The research investigated Chinese students' attitude to using AI in learning activities such as making presentations, writing essays, answering professors' questions, doing homework, making projects, exam preparation, and making reports. Students in China tend to rely more on AI for routine or repetitive tasks like homework, answering questions, and making reports. Thus, the conducted research has shown that Chinese students' openness to experimenting with AI fosters innovation and contributes to the rapid dissemination of these technologies across various domains in learning. As AI becomes increasingly prevalent, the younger generation's ability to navigate and utilize AI effectively positions it as a key driver of technological and educational transformation.

This study significantly informs AI adoption in large-scale systems like China's. It aids educators and policymakers in integrating AI, fostering AI literacy, and preparing students for AI-driven futures. In conclusion, this study demonstrates that while Chinese university students are generally receptive to integrating AI into their academic workflows, their adoption patterns vary significantly across different tasks. Specifically, the data suggests that AI is most readily embraced for tasks perceived as less cognitively demanding, indicating a potential for further exploration into how AI can be effectively utilized for more complex learning activities. The implications of this research highlight the need for targeted interventions and educational strategies to maximize the benefits of AI in higher education. Significantly, this research reveals task-specific AI adoption, enabling targeted strategies for higher-order thinking with AI. It provides empirical evidence for AI's role in Chinese education, serving as a global model.

It is recommended for educators to focus on developing AI literacy programs that guide students in the effective and ethical use of AI across diverse academic tasks. It is offered longitudinal studies tracking the long-term impact of AI integration on students' learning outcomes and skill development that will be crucial for informing educational policy and practice. Targeted interventions are proposed to maximize the benefits of AI in higher education.

Further research, perhaps with a mixed methods approach, would be beneficial. Educators should focus on developing AI literacy programs that guide students in the effective and ethical use of AI across diverse academic tasks. Future research should focus on developing pedagogical frameworks that promote the responsible and effective integration of AI, ensuring that students develop the necessary skills to navigate and leverage AI in their academic and professional lives. In the future, longitudinal studies tracking the long-term impact of AI integration on student learning outcomes will be crucial for informing educational policy and practice. The study is limited by its use of a convenience sampling technique, which may reduce the generalizability of the findings to a broader student population. Additionally, the sample included only third-year Chinese bachelor students from a single university, which may not reflect the experiences of students from different academic levels or cultural backgrounds.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

## CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

## INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

## ETHICAL APPROVAL

The research related to human use has been complied with all the relevant national regulations and institutional policies in accordance with the tenets of the Helsinki Declaration and has been approved by the authors' institutional review board.

## DATA AVAILABILITY

Derived data supporting the findings of this study are available from the corresponding author [LH], on request.

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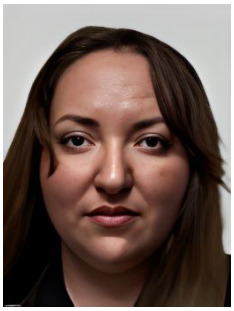

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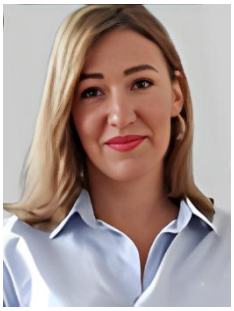

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