

Factors influencing undergraduates' ethical use of ChatGPT: a reasoned goal pursuit approach

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Abstract

The widespread use of large language models, such as ChatGPT, has changed the learning behaviours of undergraduate students, raising issues of academic dishonesty. This study investigates the factors that influence the ethical use of ChatGPT among undergraduates using the recently proposed Theory of Reasoned Goal Pursuit. Through a qualitative elicitation procedure, 26 salient beliefs were identified, representing procurement and approval goals, advantages and disadvantages, the social influence, and factors facilitating and hindering ethical use of ChatGPT. A subsequent, two-wave quantitative survey provided promising evidence for the theory, revealing that positive attitudes and subjective norms emerged as key antecedents of motivation to use ChatGPT ethically. Likewise, motivation and perceived behavioural control were strong predictors of intentions to do so. The study discusses the implications for future research regarding this timely issue. It emphasizes the potential of these findings in developing effective interventions that encourage ethical use of large language models within tertiary education. Additionally, it highlights the usefulness of the TRGP in investigating educational-related intentions and behaviours.

1. Introduction

Large language models (LLM), such as ChatGPT, are greatly influencing how students approach academic tasks (Kikalishvili, 2024). LLM are examples of generative artificial intelligence that creates new content, including text, images, code, among others. It therefore offers a platform for accessing information and receiving guidance by processing and generating text in multiple languages. Likewise, it can understand human language and provide useful answers to users' prompts. Unlike conventional chatbots, LLM are not constrained to predetermined and simplistic conversational structures (Dwivedi et al., 2023; Kuhail et al., 2023). For instance, the use of ChatGPT in education has shown alignment with key research themes, assisting in the creation of evidence-based teaching units, rubrics, and quizzes (Cooper, 2023). Likewise, the LLM were found to improve argumentation skills and task motivation when integrated into classroom debates (Guo et al., 2023). Yet, all that glitters is not gold. The use of LLM has also increased academic dishonesty (Kasneci et al., 2023; Milano et al., 2023). Students now have easier access to engage in unethical practices, such as plagiarism and ghost writing (Farrokhnia et al., 2024). Against this background, it is crucial to examine the factors that influence the ethical use of LLM like ChatGPT.

This study explores the application of the Theory of Reasoned Goal Pursuit (TRGP, Ajzen & Kruglanski, 2019) to understand what drives undergraduates, specifically prospective teachers, to ethically use ChatGPT for professional development rather than engaging in academic fraud. The investigation focuses on ChatGPT, as it is the fastest-growing app in the history of web applications (Gordon, 2023). The TRGP is a newly developed framework that combines elements from the Theory of Planned Behaviour (TPB, Ajzen, 1991) and the Goal System Theory (GST, Kruglanski et al., 2002). To the best of the authors' knowledge, this is the first study to use such a framework in the context of LLM use, and also in the educational domain. By examining the factors that influence students' intentions to ethically use ChatGPT, with a focus on goals and motivation, this study aims to pave the way towards effective interventions that promote ethical learning practices in the context of LLM like ChatGPT. Therefore, this study is both novel and timely. It addresses a pressing issue: the growing use of LLM in education and the need to avoid academic fraud behaviours (Cotton et al., 2023). Specifically, the following research questions were addressed:

- RQ1. What are the determinants that influence the ethical use of ChatGPT?
- RQ2. How does the theory of reasoned goal pursuit predict intentions and behaviours related to the ethical use of ChatGPT?

2. Theoretical underpinnings: the theory of reasoned goal pursuit

The TRGP is a newly developed comprehensive framework that aims to predict and change behaviours (Ajzen & Kruglanski, 2019). The theory focuses particularly on behaviours that involve making intentional choices, and it integrates elements from Ajzen's (1991) TPB and Kruglanski et al.'s (2002) goal systems theory (GST) to account for the influence of individuals' goals. In short, the TPB suggests that an individual's behaviour is determined by their intentions, which are influenced by three constructs. First, attitudes toward the behaviour, defined as evaluation of a specific behaviour. Second, subjective norms, which entails the social pressure to perform a specific behaviour. Finally, perceived behavioural control, which considers the aspects that either facilitate or hinder the ability to perform a specific behaviour (Ajzen, 2020; Fishbein & Ajzen, 2010). In contrast, GST assumes that behaviours are driven by individuals' goals. Hence, goals play a significant role in driving and explaining behaviours (Kruglanski et al., 2023).

The TRGP integrates both perspectives (Figure 1, Ajzen & Kruglanski, 2019). Consistent with the GST, it posits that behaviours are typically motivated by two types of goals: (1) procurement goal beliefs and (2) approval goal beliefs. Procurement goal beliefs refer to the outcomes that individuals want to achieve through their behaviour; they act as determinants of attitudes. Approval goal beliefs, on the other hand, represent the significant others whose approval is sought by performing the behaviour. Hence, such approval goal beliefs are antecedents of subjective norms. In line with the TPB, the TRGP does not exclude behavioural and normative beliefs (Hamilton et al., 2022). Instead, this theory suggests that procurement goal beliefs have a greater impact on attitudes compared to behavioural beliefs. Similarly, approval goal beliefs have a stronger influence on subjective norms than normative beliefs. Hence, individuals are more likely to adopt a behaviour if it will help achieve procurement and approval goals. To illustrate, students may want to complete university assignments quickly (procurement goal) and gain approval from their classmates (approval goal). Other positive beliefs about using ChatGPT (e.g. improved understanding of the material) may not persuade them to use it if their procurement goal is not satisfied. Similarly, normative beliefs regarding significant others whose approval would not be sought (e.g. professors), may not influence their behaviour.

There are also differences between the TRGP and the TPB in terms of how they posit the effect of attitudes, subjective norms, and perceived behavioural control on intentions (Concari et al., 2023). The TPB assumes a direct effect of these constructs on intention. The TRGP, however, suggest that attitudes and subjective norms form the basis for motivation to engage in the behaviour.

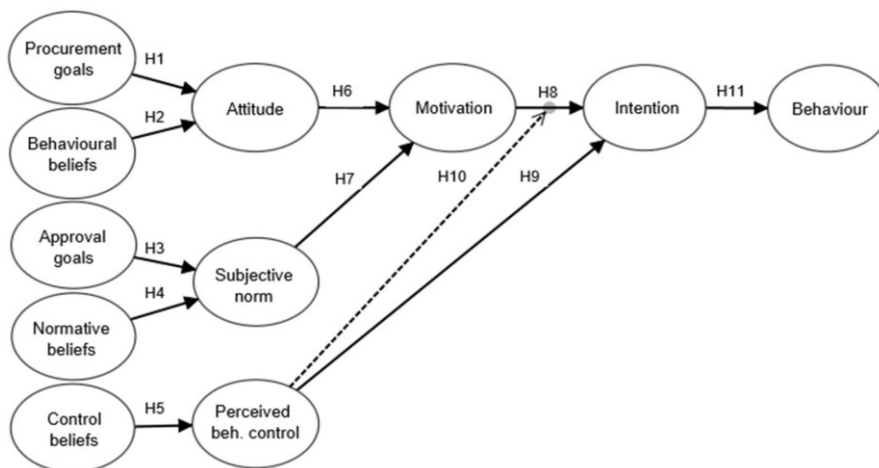


Figure 1. The theory of reasoned goal pursuit.

Motivation, in the TRGP framework, refers to “a strong desire to perform the behaviour” (Ajzen & Kruglanski, 2019, p. 775). A higher level of motivation is expected to lead to the formation of intentions, which in turn would predict and affect behaviour. Additionally, perceived behavioural control moderates motivations and also affect intentions. Following the example above, students who have positive attitudes towards the ethical use of ChatGPT and strong subjective norms will be more motivated to use ChatGPT. This motivation will be further enhanced and moderated insofar as their perceived behavioural control over this behaviour is likewise high.

Different theoretical frameworks, such as the TPB (Ajzen, 1991) and the Unified theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2012), have been used to study numerous educationally relevant behaviours or adoption of technology. For instance, regarding the adoption of ChatGPT, Lai et al. (2024) applied the UTAUT model to predict ChatGPT adoption for assessment support. Similarly, Habibi et al. (2024) combined UTAUT and TPB to examine the adoption of ChatGPT to improve learning performance. However, none have focused on the ethical aspects, which require different frameworks. TPB predicts behavioural intentions based on attitudes, norms, and control but does not address long-term goals or ethics. On the other hand, UTAUT focuses on technology adoption but lacks a focus on ethics and goal-directed behaviour. In contrast, TRGP integrates goal-directed processes. This allows for examining how undergraduates align ChatGPT use with broader goals like academic integrity. Therefore, given the aims of the present study, the TRGP offers a stronger foundation for studying ethical ChatGPT use.

3. The present study

To the best of the authors' knowledge, the TRGP has been tested only twice. Hamilton et al. (2022) were the first to provide empirical evidence supporting the theory in predicting and explaining physical activity among 109 undergraduates. Concari et al. (2023) later used the theory to explain waste separation behaviours. However, there have been no applications of TRGP in the context of education-related behaviours, like its use for professional development. Given the potential of TRGP, this investigation analyses the ethical use of ChatGPT within the context of professional development in education, using TRGP as a framework. Specifically, it first identifies and explains pre-service teachers' determinants of ethical use of ChatGPT. Then, it explores the application of the TRGP in predicting pre-service teachers' intentions and behaviours. Understanding students' attitudes, subjective norms, perceived behavioural control, motivations, procurement goals, and approval beliefs can lead to the development of effective strategies and interventions that promote an ethical learning culture with LLM, like ChatGPT.

The behaviour under investigation was defined as "using ChatGPT ethically for university studies during this semester". An accepted definition for ethical use of LLM in education remains elusive. However, academic misconduct includes different behaviours, such as plagiarism, cheating on an exam, or data falsification; all potentially exacerbated by the easy access to LLM like ChatGPT (Farrokhnia et al., 2024). Consequently, this study operationalizes ethical use as using ChatGPT for seeking information, clarifying concepts, or generating ideas that serve as inspiration, while fraudulent use involves plagiarism of ChatGPT-generated content or assignment completion by the LLM and presented on student behalf.

This investigation adopted an exploratory, mixed-method design (Creswell & Plano Clark, 2018). It started with a qualitative phase, followed by a quantitative one (Figure 2). Consistent with recommended practices (Ajzen, 2006, 2020; Francis et al., 2004; Hamilton et al., 2022), in the first phase, an elicitation study was conducted to identify active procurement and approval goal beliefs and readily accessible behavioural, normative, and control beliefs. In the second phase, a main study was conducted to test the TRGP in predicting the ethical use of ChatGPT. The protocol used in this study was reviewed and approved by the bio-ethics committee of the University of Burgos.

This research focuses on the hypotheses proposed within the TRGP theory. Justification and rationale for these hypotheses were briefly explained above; for a comprehensive account, readers are referred to Ajzen and Kruglanski (2019). Figure 1 presents the specific hypotheses tested in this study:

- H1: Procurement goal beliefs predict attitudes and are more strongly related to attitudes than behavioural beliefs.
- H2: Behavioural beliefs predict attitudes.
- H3: Approval goal beliefs predict subjective norms and are more strongly related to subjective norms than normative beliefs.
- H4: Normative beliefs predict subjective norms.
- H5: Control beliefs predict perceived behavioural control.
- H6: Attitude predicts motivation.
- H7: Subjective norm predicts motivation.
- H8: Motivation predicts intention.

- H9: Perceived behavioural control predicts intention.
- H10: Perceived behavioural control moderates the effect of motivation on intention.
- H11: Intentions predict behaviour.

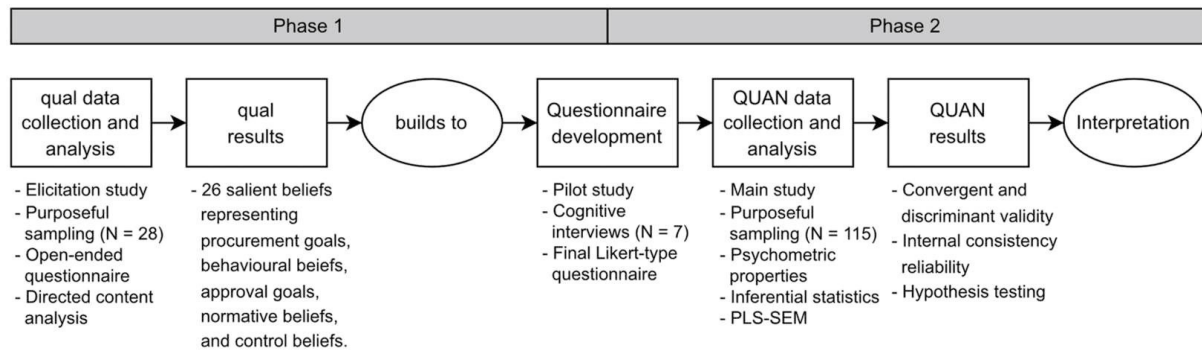


Figure 2. Exploratory, mixed-method design.

4. Qualitative strand: elicitation study

4.1. Participants and procedure

Extant studies suggest that beliefs play a significant role in intentions and behaviours (de Leeuw et al., 2015; Fishbein & Ajzen, 2010). Using a predefined list may include beliefs that participants do not endorse. Likewise, scales developed in different countries or contexts may not accurately represent the key beliefs of the target population. Instead, researchers should identify the beliefs that participants hold about the behaviour of interest (Ajzen, 2006). Therefore, in line with recommended practices, an elicitation study was conducted to determine such readily accessible beliefs. Participants were identified using purposive sampling techniques to ensure that they had experience using ChatGPT ethically (Cohen et al., 2018). The recruitment criteria were as follows: (1) the participants had to be undergraduate students; (2) were required to attend an in-person university course; (3) needed to be willing to create a ChatGPT account and take part in the study; (4) should have extensive experience in understanding and practising the ethical use of ChatGPT. To ensure the fourth recruitment criteria, eligible students engaged in an intervention aimed at exploring how ChatGPT could be used ethically to learn how to teach science to children (Toma & Yáñez-Pérez, 2024).

The elicitation study recruited 37 first-year university students pursuing a teaching degree at the University of Burgos, in Spain. A total of nine students were excluded from the study. Six of them did not meet the second inclusion criteria, as five were retaking the course and only had to take the final exam without attending classes and one student was a distance learning student. Additionally, three students failed to meet the fourth inclusion criteria. Two of them did not attend all the intervention sessions, while one student did not actively complete the tasks. Therefore, the valid sample comprised 28 students. Most participants identified as female (89.3%), and their mean age was 21.93 (SD = 1.80). Regarding university entrance studies, 19 (67.9%) pursued a bachelor in social sciences, 5 (17.9%) pursued a bachelor in science, and 4 (14.3%) students pursued vocational training. Following the intervention, participants completed the elicitation questionnaire. It should be noted that this elicitation study meets the recommended sample size of 20–25 participants (Francis et al., 2004).

4.2. Measures

The elicitation questionnaire used standardized protocols from relevant literature (Fishbein & Ajzen, 2010; Francis et al., 2004; Hamilton et al., 2022). It consisted of eight open-ended questions, with participants first being provided with a definition of the ethical use of ChatGPT: “ChatGPT is an AI tool that can be used ethically or fraudulently. Ethical use involves seeking information, clarifying concepts, or generating ideas that serve as inspiration, as we have done in this course. On the other hand, fraudulent use would entail copying content generated by ChatGPT and presenting it as your own or asking it to complete academic assignments on your behalf.”

Next, they were asked to list their most salient active procurement goal beliefs (“What is the most important personal goal you could achieve by using ChatGPT ethically during this semester?”) and their most salient active approval goal

beliefs (“Would you consider using ChatGPT ethically for university studies during this semester as a way to gain the approval of particular individuals or groups important to you? Please list any such individual or group whose approval you would be seeking”).

Following that, their behavioural beliefs were elicited by listing the advantages and disadvantages of using ChatGPT ethically (“What do you see as the advantages of using ChatGPT ethically for university studies during this semester? What do you see as the disadvantages of using ChatGPT ethically for university studies during this semester?”). Regarding their normative beliefs, participants were asked to list those who would approve and disapprove of their behaviour (“Are there any individuals or groups important to you who would approve of ChatGPT being used ethically for university studies during this semester? Are there any individuals or groups important to you who would disapprove of your ethical use of ChatGPT for university studies during this semester?”). Finally, to identify control beliefs, participants were required to write the factors facilitating and hindering the ethical use of ChatGPT (“What are the factors and circumstances that would make it easier for you, or would enable you to use ChatGPT ethically for university studies during this semester? What are the factors and circumstances that would make it difficult for you, or would prevent you from using ChatGPT ethically for university studies during this semester?”).

4.3. *Data analysis*

Following Francis et al. (2004) and Ajzen (2006), directed content analysis was used to analyse students’ responses to the predefined set of TRGP belief categories (Hsieh & Shannon, 2005). Using a directed content approach, the analysis starts with a theory as guidance for initial codes (Cohen et al., 2018). Two researchers independently coded sentences into categories of personal goal, positive/advantages and negative/disadvantages type of behavioural beliefs, gain approval individuals, approval and disapproval type of normative influences, and easier/difficult type of control beliefs (see Table 1). Inter-rater percentage agreement was above 80%, indicating a high degree of consistency among raters. Any discrepancies were addressed until a consensus was reached. Modal salient beliefs were identified using frequency counts, retaining beliefs elicited by at least 30% of participants.

4.4. *Results*

A total of 26 beliefs were elicited from the sample: 2 personal goals, 4 advantages, 3 disadvantages, 2 referents to gain approval from, 4 normative referents that would approve behaviour, 2 normative referents that would disapprove, 4 factors that would make it easier to adopt behaviour and 5 factors that would make it more difficulty to use ChatGPT ethically (Table 1).

Table 1. The elicited salient beliefs.

TPB Construct	Belief category	Belief	N	%
Procurement goal	Personal goal	Pass course	24	85.7
		Save time on assignments	18	64.3
Behavioural beliefs	Advantages	Pass course assignments with less effort	26	92.9
		Improve grades	19	67.9
		Creative ideas for assignments	16	57.1
	Disadvantages	Improve understanding of course material	10	35.7
		Crashed/inoperative	22	78.6
		Risk of plagiarism	18	64.3
Approval goal	Gain approval	Generic/unhelpful answers	11	39.3
		University professors	19	67.9
		Classmates	11	39.3
Normative	Approve	Classmates*	23	82.1
		Parents	16	57.1
		University professors*	11	39.3
	Disapprove	Employers	9	32.1
		University professors*	20	71.4
		Employers	12	42.9

TPB Construct	Belief category	Belief	N	%
Control beliefs	Easier	Supportive professors/allowing its use	25	89.3
		Clear regulation for use	17	60.7
		Learn prompts/guidance for ethical use	12	42.9
		Relevant/useful assignments	9	32.1
	Difficult	Time constraints	22	78.6
		Unrealistic/challenging assignments	19	67.9
		Excessive assignments	16	57.1
		Ambiguity about ethical vs. unethical use	14	50
		Assignments with a low-grade contribution	11	39.3

*Referents mentioned in the Approval belief construct were not used to compute the salient normative belief to avoid potential issues regarding discriminant validity.

Many participants had two key goals when using ChatGPT ethically. They wanted to pass the course and save time on assignments. The advantages elicited were diverse. Most students thought it would make their assignments easier to complete and pass. They also believed that using ChatGPT could lead to better grades. Over half of the participants also mentioned that ChatGPT could generate creative ideas for their assignments. Finally, participants agreed that ethically using ChatGPT can improve their understanding of the course material by clarifying complex concepts and providing additional explanations.

However, participants also mentioned several disadvantages. They were worried about possible malfunctions of the tool (e.g. not being able to log in, being at capacity, or inaccuracies in the information it provides) and that such issues could result in submitting incorrect assignments. They also acknowledged the risk of plagiarism, even when used ethically. Students also mentioned that ChatGPT tends to give generic and unhelpful answers, which makes it less useful.

Regarding referents and approval, an interesting pattern was found. Classmates were seen as potential supporters of ethical usage. They were also seen as important others whose approval for behaviour is important. University professors were seen as both potential approvers and disapprovers, and as referents to gain approval from. Employers such as schools or tutoring academies were seen as disapproving. Notably, parents were identified as potential approvers. It is important to mention that several students, including those who mentioned their classmates and professors in the approval goal questions, stated that they would not use ChatGPT ethically just to gain approval from anyone.

Several control beliefs influencing the ethical use of ChatGPT were elicited. Supportive professors who allow its use, along with clear regulations, were identified as facilitators for ethical usage. Learning prompts and guidance for ethical use were also considered valuable resources for students to use ChatGPT ethically. Moreover, students indicated that they would be more likely to use ChatGPT ethically if the assignments were relevant and useful to their learning and professional development. On the other hand, several factors were identified as potential barriers to ethical use. Time constraints and excessive assignments could lead to students resorting to unethical practices, such as relying heavily on AI-generated content. Additionally, ambiguity about what constitutes ethical and unethical use of ChatGPT could create confusion for students. Finally, assignments with low-grade contributions (e.g. accounting for a very small portion of the final grade, but which are still mandatory) were identified as a barrier to ethical use; students might misuse ChatGPT just to ensure task completion.

4.5. Conclusion

The elicitation study suggests that pre-service teachers believe ChatGPT can help them succeed in their studies and manage their workload effectively. The advantages noted imply that ChatGPT is perceived as a valuable tool for academic tasks and enhanced academic performance. ChatGPT was valued for offering novel perspectives and insights; hence, students perceived ChatGPT as a source of inspiration for their coursework.

Regarding referents that would approve or disapprove of using ChatGPT, findings suggest that classmates, university professors and parents play a major role. This underscores the influence of family support and peer collaboration on students' behaviour regarding the use of ChatGPT. Another interesting finding was that ChatGPT was perceived to not

align with professional standards or expectations in certain workplaces. Students elicited that ChatGPT, even when used ethically, could lead to perceptions of cheating, lacking creativity, or not being a hard-working teacher.

Findings related to control beliefs highlight the role of educators in establishing guidelines and promoting responsible AI use. The relevance and usefulness of assignments were seen as factors that would make ethical use easier, as they would encourage students to use ChatGPT responsibly to achieve their academic objectives. On the other hand, findings also highlighted the importance of advancing regulations regarding the use of ChatGPT in academic contexts.

5. Quantitative strand: main study

5.1. *Participants and procedure*

Participants for the main study were recruited using the same procedure of purposive sampling technique, recruitment criteria, and University used in Study 1. To ensure participants had experience with the ethical use of ChatGPT, they also took part in an intervention focused on learning how to use ChatGPT ethically. After the intervention, participants completed the TRGP questionnaire anonymously and confidentially (T1). At the end of the semester, they reported their ethical use of ChatGPT (T2). To ensure the confidentiality and trustworthiness of data, a code was created using nonidentifying attributes provided by each participant. This code was used to link both measures of data (T1 and T2).

A total of 127 university students pursuing a teaching degree were recruited. Twelve were excluded for several reasons. Five of them did not meet the second inclusion criteria, as two were retaking the course and only evaluated themselves based on the final exam without attending classes and three students were distance learning students. Additionally, five students failed to meet the fourth inclusion criteria. Three of them did not attend all the intervention sessions or complete the tasks from the intervention, while two students dropped out of the course. Finally, two students were excluded from data analysis due to failing careless responding items. Therefore, the valid sample comprised 115 students. The majority of participants identified as female (90.4%), and their ages ranged from 18 to 32 years old ($M = 21.4$, $SD = 2.2$). Regarding their university entrance studies, 78 (67.8%) pursued a bachelor in social sciences, 23 (20%) in science, 2 (1.7%) in arts, and 12 (10.4%) had a vocational training diploma.

5.2. *Measures*

Participants were presented with the same definition of the ethical use of ChatGPT as in Study 1. Items for the salient beliefs construct (i.e. procurement goal beliefs, other behavioural beliefs, approval goal beliefs, other normative beliefs, and control beliefs) were created based on the beliefs elicited in Study 1 (Ajzen, 2006; Francis et al., 2004). Items for the direct constructs (i.e. attitudes, subjective norm, perceived behavioural control, motivation, intention, and behaviour) were adapted from extant literature (Fishbein & Ajzen, 2010; Hamilton et al., 2022; La Barbera & Ajzen, 2024). All items are reported in the Supplementary File.

In line with Goldammer et al. (2020), actions were implemented to mitigate careless responses. Participants were given warnings about the consequences of careless responses, such as a reduction in their research participation incentive (0.5 points towards their final exam grade). Additionally, one bogus item (i.e. “Right now, I am using a PC to answer this questionnaire”) and one instructed item (i.e. “For this item, please choose the second response option”) were mixed in the questionnaires to detect careless responding. The questionnaire was administered using a paper-and-pencil format. Upon completion, questionnaires were reviewed to avoid missing data.

5.2.1. *Procurement goal beliefs*

Participants rated the perceived likelihood of achieving each procurement goal identified in the elicitation study by using ChatGPT ethically during the semester (i.e. “If I use ChatGPT ethically for university studies during this semester, it is likely that it will ...”), using a scale ranging from 1 = Strongly disagree to 7 = Strongly agree. Additionally, participants rated the subjective importance of each procurement goal to them during the semester (i.e. “How important are each of the following aspects to you during this semester?”), scoring on a scale from -3 = Extremely unimportant to +3 = Extremely important.

Two specific procurement goal beliefs were assessed: (1) the belief that using ChatGPT ethically would help them pass their courses, and (2) the belief that it would save them time on assignments. To calculate an overall goal belief score, the expectancy-value formula was used (Ajzen, 2020; Fishbein & Ajzen, 2010). This involved multiplying the likelihood score for each outcome by its importance score and then summing the resulting products. The scores varied from -21 to 21, with 0 indicating neutral beliefs and higher scores indicating more positive beliefs.

5.2.2. Behavioural beliefs

Participants were asked to rate the remaining behavioural beliefs. The same procedure used for the procurement goal beliefs was followed. A total of seven behavioural beliefs were assessed. Four of these beliefs highlighted the advantages of using ChatGPT ethically, including (1) the ability to complete course assignments with less effort, (2) improved grades, (3) access to creative ideas for assignments, and (4) a better understanding of the course material. On the other hand, three beliefs represented the disadvantages of using ChatGPT ethically, namely (1) the possibility of crashes or malfunctions, (2) the risk of plagiarism for students, and (3) the potential for generic or unhelpful answers.

5.2.3. Approval goal beliefs

Participants rated the perceived likelihood of gaining approval from different normative reference groups or individuals, based on their ethical use of ChatGPT (i.e. "How likely do you think it is that using ChatGPT ethically for university studies during this semester would help you gain approval from the following people?"), using a scale ranging from -3 = Extremely unlikely to +3 = Extremely likely. Additionally, participants rated the importance they place on the approval or disapproval of each normative reference (i.e. "How much do you care whether each of the following people approve or do not approve of what you do academically during this semester?"), using a scale from 1 = Not at all to 7 = A great deal.

Two specific approval goal beliefs were assessed: (1) the belief in the approval of university professors and (2) the belief in the approval of classmates. To calculate the overall goal belief, the perceived likelihood of approval from each reference group was multiplied by the subjective value placed on that approval. These products were then summed to obtain the final result, following the expectancy-value formula (Fishbein & Ajzen, 2010). The scores varied from -21 to 21, with 0 indicating neutral motivation to comply and higher scores indicating more motivation to comply with referents.

5.2.4. Normative beliefs

Participants were asked to rate the normative referents that they believe would approve or disapprove of the ethical use of ChatGPT. The same procedure used for the procurement goal beliefs was followed. A total of two normative referents were assessed, namely (1) parents and (2) employers.

5.2.5. Control beliefs

Participants indicated their agreement or disagreement with statements about the control beliefs from the elicitation study (i.e. "Indicate your level of agreement or disagreement with the following statements about the ethical use of ChatGPT for university studies during this semester") on a scale from 1 = Strongly disagree to 7 = Strongly agree. Likewise, participants were asked to rate how much each of these beliefs would make it easier for them to use ChatGPT ethically during the semester (i.e. "How much would each of the following aspects make it easier for you to use ChatGPT ethically for university studies during this semester?"). The rating scale for this aspect ranged from -3 = Not at all to +3 = A lot.

Nine control beliefs were examined: (1) professors being supportive and allowing ethical use of ChatGPT, (2) the presence of clear regulations at the university regarding ChatGPT usage, (3) the provision of appropriate prompts and guidance on the ethical use of ChatGPT, (4) professors assigning relevant and useful assignments, (5) feeling a lack of time to complete assignments, (6) professors assigning assignments that are unrealistic and challenging, (7) professors assigning excessive assignments, (8) the absence of a university policy on ethical and unethical use of ChatGPT, and (9) professors assigning numerous assignments with low-grade contribution. In line with the expectancy-value scoring method (Fishbein & Ajzen, 2010), an overall score was calculated by multiplying the agreement for each belief to the

extent it would facilitate behaviour and summing the resulting products. The scores varied from -21 to 21, with 0 indicating neutral perceived control and higher scores indicating more perceived control to perform the behaviour.

5.2.6. Attitude toward the behaviour

The attitude toward using ChatGPT ethically during the semester was evaluated using a 7-point scale with six semantic differential items. Following the recommended practices outlined by La Barbera and Ajzen (2024), three items were used to assess the experiential aspect of attitude: (1) boring/interesting, (2) tedious/exciting, and (3) unpleasant/pleasant. The other three items focused on the instrumental aspect of attitude: (1) worthless/valuable, (2) unproductive/productive, and (3) useless/ useful. An overall attitude score was obtained by calculating the mean scores of these items. Scores varied from 1 to 7, with higher scores indicating a more positive attitude.

5.2.7. Subjective norm

Subjective norm towards using ChatGPT ethically was assessed using six items from extant literature (Fishbein & Ajzen, 2010; Hamilton et al., 2022). Three items measured the descriptive type of subjective norm: (1) Most people who are important to me are using ChatGPT ethically during this semester, (2) Most people whose opinions I value make an effort to use ChatGPT ethically during this semester, and (3) Most people I respect and admire are using ChatGPT ethically during this semester. The remaining three items measured the injunctive type of subjective norm: (1) Most people who are important to me would approve of me using ChatGPT ethically during this semester, (2) Most people whose opinions I value think that I should try to use ChatGPT ethically during this semester, and (3) Most people I respect and admire think that I should try to use using ChatGPT ethically during this semester. A scale ranging from 1 = Strongly disagree to 7 = Strongly agree was used. To calculate an overall subjective norm score, the mean scores of these items were computed. Scores varied from 1 to 7, with higher scores indicating more perceived social pressure to comply with the behaviour.

5.2.8. Perceived behavioural control

Perceived behavioural control was evaluated using items that measure controllability and self- efficacy, as suggested by previous research (Ajzen, 2006, 2020; Francis et al., 2004). Controllability was assessed through three items: (1) The decision to use ChatGPT ethically during this semester is under my control, (2) Whether I use ChatGPT ethically during this semester is entirely up to me, and (3) It is up to me to decide whether I use ChatGPT ethically during this semester. Self-efficacy was also measured using three items: (1) I am confident in my abilities to use ChatGPT ethically during this semester, (2) I am confident that I could use ChatGPT ethically during this semester, and (3) I am capable of using ChatGPT ethically during this semester. A scale ranging from 1 = Strongly disagree to 7 = Strongly agree was used. The mean scores of these items were calculated to obtain an overall perceived behavioural control score. Scores varied from 1 to 7, with higher scores indicating a more perceived ability to successfully perform the behaviour.

5.2.9. Motivation

To assess participants' motivation for using ChatGPT ethically throughout the semester, three items adapted from Hamilton et al. (2022) were used: (1) I am motivated to use ChatGPT ethically during this semester, (2) I have the motivation to use ChatGPT ethically during this semester, and (3) Ethical use of ChatGPT during this semester motivates me. Items were scored from 1 = Strongly disagree to 7 = Strongly agree. An overall score was calculated through the mean score procedure. Scores varied from 1 to 7, with higher scores indicating more motivation to perform the behaviour of interest.

5.2.10. Intention

Participants' intention to use ChatGPT ethically during the semester was examined using three items adapted from previous research (Ajzen, 2006): (1) I intend to use ChatGPT ethically during this semester, (2) I plan to use ChatGPT ethically during this semester, and (3) I aim to use ChatGPT ethically during this semester. Participants rated their agreement on a scale from 1 = Strongly disagree to 7 = Strongly agree. An overall score from behavioural intention was calculated through the mean score. Scores varied from 1 to 7, with higher scores indicating more behavioural intentions.

5.2.11. Behaviour

At the end of the semester, participants were asked to report their ethical use of ChatGPT. They answered three items that were adapted from existing research (Francis et al., 2004; Hamilton et al., 2022): (1) During this semester, I have used ChatGPT ethically on numerous occasions, (2) During this semester, I have rarely used ChatGPT unethically, and (3) During this semester, I have used ChatGPT ethically quite frequently. Participants used a scale from 1 = Strongly disagree to 7 = Strongly agree. The mean score of these responses was calculated to determine the use of ChatGPT ethically during the semester. Scores varied from 1 to 7, with higher scores indicating more frequent ethical use of ChatGPT for university studies.

5.3. Data analysis

The analysis procedure for this study consisted of four steps. First, a pilot study was conducted with 7 students who participated in the elicitation study. Cognitive interviewing techniques were used (Beatty & Willis, 2007; Francis et al., 2004). During this process, participants completed the questionnaire and provided verbal feedback on the items. They were asked if any items were unclear, repetitive, ambiguous, or too lengthy. Based on their feedback, minor adjustments were made to improve clarity and conciseness. While some participants mentioned that the questionnaire was lengthy, the researchers chose to retain all items to ensure the representation of salient beliefs (Ajzen, 2020).

Second, the validity and reliability of the TRGP constructs were tested. Evidence for construct validity is required to attribute meaning to latent variables measured by composite scales (DeVellis, 2017). The evaluation was conducted using Confirmatory Composite Analysis (CCA) in SmartPLS software (version 4; Ringle et al., 2022), which is analogous to confirmatory factory analysis when a Partial Least Square Structural Equation Modelling (PLS-SEM) approach is used. The four-step approach recommended by Hair et al. (2022) was followed: (1) standardized factor loadings (λ) >

0.40 (ideally > 0.70) and variance inflation factor (VIF) < 5 was used to establish indicator reliability; (2) internal consistency reliability was assessed using Cronbach's alpha, composite reliability (ρ_c), and reliability coefficient (ρ_A), with values of 0.70–0.90 considered satisfactory; (3) convergent validity was examined using the average variance extracted (AVE) > 0.50 criterion; (4) discriminant validity was assessed using the Fornell-Larcker criteria, according to which the square root of each construct's AVE should be greater than its highest correlation with any other construct. Finally, potential for common method bias, a systematic error arising when multiple variables are measured using the same method (e.g. surveys), was evaluated using Harman's single-factor test. This test assesses whether a single latent factor explains a majority of the data variance (>50%), indicating potential method bias.

Third, descriptive and inferential analyses were conducted to explain students' responses. Upon examining the skewness and kurtosis values, it was observed that they fell within the range of -2 to +2 for all constructs; the highest value observed was $sk = 1.65$ for the construct of "behaviour". This finding suggests that the data followed a normal univariate distribution (Hair et al., 2010). Consequently, parametric statistics were used. Specifically, one-sample *t*-tests were conducted to determine if the mean scores for each TRGP construct significantly deviated from the mid-points of the scales.

Finally, PLS-SEM was used to test the TRGP hypotheses formulated. PLS-SEM is a robust method that produces robust results even with small sample sizes (Hair et al., 2022). In order to determine the statistical significance of the PLS-SEM results, bootstrapping on 10,000 samples was employed, as recommended by Hair et al. (2022) and Ringle et al. (2022).

5.4. Statistical power

The statistical power of the study was determined using G*Power 3 (Faul et al., 2007). A sample size of 34 participants was needed to achieve a medium effect size ($d = 0.5$) for the one-sample *t*-tests. For PLS-SEM, it is recommended to have a sample size to indicator ratio of at least 10:1. In this study, this ratio translates to a sample size of 110 participants. Additionally, it is advisable to assess power for the most complex regression in the model. In this case, the regression includes two predictors (attitudes and subjective norm) and one dependent variable (motivation). To achieve a medium effect size ($f^2 = 0.15$) with $\alpha = 0.05$ and power = 80%, a minimum sample size of 68 participants is necessary. As the study had 115 valid participants, it had sufficient power to test the formulated hypotheses.

5.5. Results

5.5.1. Validity and reliability

A few items with poor indicator reliability (loading < 0.40) were identified and removed. Specifically, the behavioural beliefs concerning that ethical use of ChatGPT would help pass assignments with less effort (BB1), will crash or will be inoperative (BB5), will put at risk of plagiarism (BB6) and will provide generic or unhelpful answers (BB7) did not contribute to the construct. Additionally, two other constructs had non-salient items. The control beliefs regarding professors being supportive and allowing the use of ChatGPT (CB1), availability of clear regulations at the university (CB2), and knowing appropriate prompts for ethical use (CB3) had low factor loadings. Similarly, one item from the behaviour scale (BEH2) also exhibited low factor loadings. Lastly, an item measuring perceived behavioural control (PBC6) had a VIF value of 5.04. Consequently, these items were excluded from further analysis.

Table 2 summarizes the psychometric properties of the retained items. As can be seen, all criteria have been met. Item loadings exceeded the 0.40 threshold, with most surpassing a standardized loading of 0.70, indicating adequate indicator reliability. Internal consistency coefficients were above the 0.70 cutoff, supporting the measures' reliability¹. The AVE was also above the minimum 0.50 threshold, indicating adequate convergent validity. This suggests that items from each TRGP constructs have positive correlations with alternative items of the same construct. Table 3 presents the results for discriminant validity. All pairwise correlations between constructs (off-diagonal values) were lower than the square root of AVE (bold diagonal values), satisfying the Fornell-Larcker criteria. Therefore, discriminant validity was established, confirming that the TRGP constructs are distinct from each other. Finally, Harman's single-factor test showed that the total variance extracted by a single factor was 34.97%; since this value is well below the threshold of 50%, no significant common method bias was detected.

5.5.2. Inferential statistics

The average scores for all TRGP constructs are shown in Table 2. Regarding antecedents of attitudes, the one-sample *t*-tests showed that both procurement goal beliefs ($t_{(114)} = 13.773, p < 0.01$) and behavioural beliefs ($t_{(114)} = 29.988, p < 0.01$) were higher than the midpoint of the scale. This indicates that students generally hold positive beliefs regarding the ethical use of ChatGPT for academic pursuits.

Table 2. Results of indicator reliability, internal consistency reliability and convergent validity.

Construct	Items	λ	α	ρ_c	ρ_A	AVE	M	SD
1. Procurement goal beliefs	PG1	0.923	-	-	-	0.585	6.800	5.294
	PG2	0.564						
2. Behavioural beliefs	BB2	0.717	-	-	-	0.498	11.283	4.035
	BB3	0.668						
	BB4	0.731						
3. Approval goal beliefs	AGB1	0.469	-	-	-	0.520	-0.261	4.502
	AGB2	0.906						
4. Normative beliefs	NB1	0.851	-	-	-	0.791	-3.978	8.488
	NB2	0.926						
5. Control beliefs	CB4	0.409	-	-	-	0.538	13.746	5.214
	CB5	0.746						
	CB6	0.826						
	CB7	0.854						
	CB8	0.688						
	CB9	0.787						

¹ It should be noted that individuals hold both positive and negative beliefs about the same behaviour, and these beliefs can sometimes contradict each other. Consequently, it is not appropriate to compute an internal consistency coefficient, nor exclude salient beliefs from the questionnaire for not being internally consistent (de Leeuw et al., 2015; Fishbein & Ajzen, 2010; Francis et al., 2004). Therefore, internal consistency reliability is only computed for direct constructs from the TRGP model.

Construct	Items	λ	α	ρ_c	ρ_A	AVE	M	SD
6. Attitude	ATT1	0.632	0.860	0.871	0.896	0.592	5.425	1.111
	ATT2	0.749						
	ATT3	0.798						
	ATT4	0.814						
	ATT5	0.763						
	ATT6	0.842						
7. Subjective norm	NOR1	0.769	0.890	0.892	0.917	0.647	4.265	1.435
	NOR2	0.865						
	NOR3	0.833						
	NOR4	0.826						
	NOR5	0.811						
	NOR6	0.716						
8. Perceived behavioural control	PBC1	0.671	0.829	0.857	0.876	0.588	6.014	0.940
	PBC2	0.740						
	PBC3	0.749						
	PBC4	0.824						
	PBC5	0.838						
9. Motivation	MOT1	0.870	0.869	0.871	0.920	0.792	5.258	1.349
	MOT2	0.913						
	MOT3	0.886						
10. Intention	INT1	0.902	0.914	0.920	0.946	0.854	5.777	1.251
	INT2	0.924						
	INT3	0.946						
11. Behaviour	BEH1	0.919	0.851	0.872	0.930	0.869	4.587	1.647
	BEH3	0.945						

λ = Standardized factor loadings; α = Cronbach's alpha; ρ_c = composite reliability; ρ_A = reliability coefficient; AVE = average variance extracted; M = mean; SD = standard deviation.

Regarding precursors of subjective norms, the results showed that both approval goal beliefs ($t_{(114)} = -0.621, p = 0.54$) and normative beliefs ($t_{(114)} = -5.026, p < 0.01$) were rated below the midpoint on the scale. However, only normative beliefs were found to be statistically significant. This suggests that students generally feel social pressure against using ChatGPT, even when using it ethically. They also believe that they will not gain approval from others by using it ethically.

Table 3. Results of discriminant validity.

Construct	1	2	3	4	5	6	7	8	9	10	11
1. Procurement goal beliefs	0.765										
2. Behavioural beliefs	0.473	0.706									
3. Approval goal beliefs	0.102	0.169	0.721								
4. Normative beliefs	0.199	0.258	0.419	0.890							
5. Control beliefs	0.135	0.181	0.039	-0.042	0.734						
6. Attitude	0.186	0.224	0.223	0.326	0.009	0.769					
7. Subjective norm	0.156	0.425	0.168	0.342	0.163	0.416	0.805				
8. Perceived behavioural control	0.117	0.276	0.101	0.041	0.240	0.285	0.448	0.767			
9. Motivation	0.196	0.449	0.079	0.255	0.128	0.442	0.686	0.416	0.890		
10. Intention	0.130	0.331	0.084	0.203	0.159	0.301	0.593	0.566	0.737	0.924	
11. Behaviour	0.185	0.288	0.127	0.248	-0.065	0.233	0.447	0.317	0.470	0.333	0.932

Regarding control beliefs, the mean score was significantly above the midpoint of the scale ($t_{(114)} = 29.988, p < 0.01$). This suggests that students have a strong sense of being in control of their ethical use of ChatGPT.

Finally, all direct measures of the TRGP model, except for the subjective norm ($t_{(114)} = 1.982, p = 0.05$), were found to be statistically significant and above the midpoint of the scale. Students demonstrated positive attitudes towards the ethical

use of ChatGPT ($t_{(114)} = 13.750, p < 0.01$), and felt they are capable and in control of using it ethically ($t_{(114)} = 22.979, p < 0.01$). They were also motivated to use it ethically ($t_{(114)} = 10.003, p < 0.01$) and reported strong intentions to do so ($t_{(114)} = 15.223, p < 0.01$). In terms of behaviour, the findings indicate that students in the study reported they used ChatGPT ethically throughout the semester ($t_{(114)} = 3.171, p < 0.01$).

5.5.3. Hypothesis testing

The findings of the PLS-SEM analyses are presented in Table 4. The model predicted 50.1% of the variance in motivation, 62.5% of the variance in intention, and 11.1% of the variance in ethical use of ChatGPT (behaviour). Out of the eleven hypotheses tested, seven were supported. Regarding the hypothesis rejected, procurement goal beliefs and behavioural beliefs did not have a significant impact on attitudes, contrary to what was expected in H1 and H2. Additionally, approval goal beliefs were found to not predict subjective norms, leading to the rejection of H3. Lastly, perceived behavioural control was found to not moderate the relationship between motivation and intention, hence not supporting H10.

The results did, however, support the remaining hypothesis. Specifically, results supported H4, which suggests that normative beliefs have a significant impact on subjective norms. Additionally, the findings also supported Hypothesis 5, indicating that control beliefs play a role in predicting and explaining students' perceived behavioural control. Furthermore, the study's hypotheses regarding determinants of motivation were also supported. H6 states that attitudes have an influence on motivation, and this was confirmed. Similarly, H7 suggests that subjective norms predict motivation, and the findings supported this claim. Likewise, the study found that motivation played a significant role in determining students' intentions to use ChatGPT ethically. This supports the H8. Additionally, perceived behavioural control also had an impact on students' intentions, confirming H9. Lastly, in line with H10, the study revealed that intentions were indeed a significant predictor of behaviour.

5.6. Conclusion

The main study conducted PLS-SEM analyses to investigate the factors that influence intentions and ethical usage of ChatGPT. The findings provided evidence for seven out of the ten hypotheses, offering a comprehensive understanding of the psychological factors that drive pre-service teachers' intentions and behaviours regarding ethical use of ChatGPT. Normative beliefs strongly influence subjective norms, highlighting their role in shaping perceptions of ethical behaviour. Control beliefs also had a significant impact on perceived behavioural control, underscoring the importance of self-efficacy and controllability in ethical decision-making regarding the use of ChatGPT. Attitudes and subjective norms were identified as important motivators, with positive attitudes driving motivation and social influences playing a significant role. Motivation emerged as a key factor in predicting intentions, along with perceived behavioural control. Finally, individuals' intentions strongly predicted their ethical behaviour.

Table 4. Results of hypothesis testing.

Hypothesis	β	β_m	t	p	Hypothesis testing
1. Procurement goal beliefs → Attitude	0.099	0.117	0.959	0.338	Rejected
2. Behavioural beliefs → Attitude	0.178	0.220	1.751	0.080	Rejected
3. Approval goal beliefs → Subjective norm	0.028	0.057	0.259	0.796	Rejected
4. Normative beliefs → Subjective norm	0.330	0.334	3.283	0.001	Accepted
5. Control beliefs → Perceived behavioural control	0.240	0.284	2.556	0.011	Accepted
6. Attitude → Motivation	0.192	0.198	2.773	0.006	Accepted
7. Subjective norm → Motivation	0.606	0.604	8.203	0.000	Accepted
8. Motivation → Intention	0.607	0.609	6.598	0.000	Accepted
9. Perceived behavioural control → Intention	0.313	0.317	3.059	0.002	Accepted
10. Perceived behavioural control*Motivation → Intention	0.000	-0.005	0.005	0.996	Rejected
11. Intention → Behaviour	0.333	0.342	3.713	0.000	Accepted

β = standardized coefficients for the original sample; β_m = standardized coefficients for the bootstrapping sample.

6. General discussion

This investigation aimed to understand the factors that influence the ethical use of ChatGPT among undergraduates, with a specific focus on pre-service teachers. The Theory of Reasoned Goal Pursuit (Ajzen & Kruglanski, 2019) guided this endeavour, which consisted of an exploratory, mixed-method investigation (Cohen et al., 2018; Creswell & Plano Clark, 2018). The research consisted of two parts: a qualitative elicitation study and a quantitative main study. The elicitation study aimed to identify the determinants of ethical use of ChatGPT (1st RQ), while the main study explored whether these determinants predicted students' intentions to use ChatGPT ethically (2nd RQ).

The results of the elicitation study revealed both the advantages and concerns associated with using ChatGPT for university studies, which aligns with the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis performed by Farrokhnia et al. (2024). Participants recognized the benefits of efficiency, improved grades, creativity, and enhanced learning. However, they also expressed concerns about the reliability of the tool, the risk of plagiarism, and the quality of the generated content. Participants also emphasized the role of professors in helping them understand how to use ChatGPT ethically, suggesting that guidance and prompts from professors would be helpful. The findings also provide empirical evidence for the theorized benefits of ChatGPT (Cooper, 2023; Dwivedi et al., 2023). However, it also confirms the concerns surrounding the potential for unethical conduct (Kasneci et al., 2023). Additionally, they show that university students are aware of these aspects, highlighting the beliefs that could be targeted in future interventions aimed at promoting the ethical use of LLM.

Next, the main study examined whether the determinants identified in the elicitation study predicted the intentions and ethical use of ChatGPT. The results were mixed regarding the TRGP (Kruglanski et al., 2002). Specifically, findings suggested that procurement goals and behavioural beliefs did not significantly impact attitudes; nor did approval goals influence subjective norms. This finding does not align with a key aspect of the TRGP model (Ajzen & Kruglanski, 2019), nor with previous studies (Hamilton et al., 2022). This may be due to the context-dependency of goals. Undergraduates in this study may not seek approval for using ChatGPT. Another possible explanation is the difference in the target behaviour. While Hamilton et al. (2022) examined more pragmatic behaviours, such as physical activity, the current study focuses on ethical aspects. Therefore, the rejection of these hypotheses reflects the complexity of ethical decision-making.

However, the remaining findings were in line with the TRGP framework. Normative beliefs strongly influenced subjective norms, indicating their significant contribution to pre-service teachers' perceptions of what is academically acceptable. Control beliefs also emerged as important predictors of perceived behavioural control, highlighting the importance of individuals' self-efficacy and controllability in using ChatGPT ethically. Attitudes and subjective norms were found to be important in predicting motivation. Positive attitudes towards the ethical use of ChatGPT strongly influenced motivation levels, while subjective norms had a significant impact on motivation, indicating the role of social influences. Perceived behavioural control was also a significant predictor of intentions, emphasizing the importance of individuals' beliefs in promoting the ethical use of ChatGPT.

These results highlight the importance of attitudes in the motivational development of adopting a certain behaviour (Ajzen, 2020). In addition, they emphasize that social influence also plays an important role, along with the aspects that would facilitate such behaviour (Concari et al., 2023; Hamilton et al., 2022). In addition, the findings suggest that understanding and influencing individuals' motivation can be instrumental in promoting the ethical use of ChatGPT among pre-service teachers.

6.1. Contribution to the literature and implications

The novelty and contribution of this investigation is threefold: (1) it identifies the determinants of ethical use of ChatGPT; (2) it provides predictive analysis on the factors that affect intentions and ethical use; and (3) it provides empirical evidence, albeit inconclusive, for the newly developed TRGP theory.

In terms of the first aspect, this investigation is the first study to explore what motivates the ethical use of ChatGPT in the context of undergraduates, with a special focus on pre-service teachers. By examining students' beliefs, this study can inform future efforts to promote ethical use. It is important to recognize the benefits that students perceive in using LLM

tools like ChatGPT, while also addressing their concerns, such as professors not allowing its use even when it is used ethically, or the lack of university guidelines on what constitutes ethical use (Farrokhnia et al., 2024). The results of this study also highlight the conditions that facilitate the ethical use of ChatGPT, such as having guidance and learning useful prompts (Dwivedi et al., 2023). Furthermore, it reveals that students may engage in unethical behaviours with ChatGPT when they do not consider academic tasks important for their professional development, or when professors assign tasks that do not significantly contribute to the course grade. Therefore, this study emphasizes the crucial role that professors play in helping students understand how to use ChatGPT ethically and in promoting such ethical use.

Regarding the second and third aspects, this study is the first of its kind to apply the TRGP model in the field of LLM and also in education. Two previous investigations have used the TRGP concerning different behaviours, namely physical activity (Hamilton et al., 2022) and waste separation (Concari et al., 2023). However, the present study is unique due to its focus on ChatGPT and its specific domain of interest, which is educational-related behaviour. The results reported overall align with previous research, though some differences exist. In contrast to prior studies (i.e. Concari et al., 2023; Hamilton et al., 2022), procurement goal beliefs, nor other behavioural beliefs, predicted attitudes. Several reasons may account for this finding. Attitudes are shaped by various factors beyond behavioural beliefs and outcome evaluations, such as personal values and experiences that were not captured in our study (Toma & Lederman, 2022; Tytler & Ferguson, 2023). Another possibility is that participants' beliefs may have changed over time between the elicitation and the data collection for the main study. Students may have gained experience using the tool and might have found that it is not as useful as they initially expected. Recent studies have shed light on a concerning issue known as AI drift or degradation in LLMs (Chen et al., 2023). This phenomenon refers to the tendency of LLMs to evolve and generate inconsistent and incorrect responses, including hallucinations like creating fake references (Farrokhnia et al., 2024). This is an interesting aspect that warrants further investigation.

The present study did neither find evidence to support the hypothesis that approval goal beliefs predict subjective norms. This also contradicts the findings of previous studies by Hamilton et al. (2022) and Concari et al. (2023). However, our findings did show that normative beliefs, as predicted in the TPB literature (Fishbein & Ajzen, 2010), significantly influenced subjective norms. The reasons for these findings are unclear. One possible explanation is that approval goal beliefs, which in this study were related to seeking approval from university professors and classmates, may not be important when it comes to using ChatGPT. Similar to the study by Hamilton et al. (2022), many students in our study stated that they do not seek approval from anyone when using ChatGPT ethically. They may use it solely for their own benefit and not as means to gain social approval. This aspect requires future studies to clarify undergraduates' approval goals related to the ethical use of ChatGPT.

The remaining findings of this study align with previous research (Concari et al., 2023; Hamilton et al., 2022) and with the theoretical propositions of the TRGP (Ajzen & Kruglanski, 2019). The results underscore the significance of motivation in predicting intentions. Specifically, students' attitudes towards the ethical use of ChatGPT strongly influenced their motivation levels. This suggests that positive attitudes can drive motivations towards the ethical use of ChatGPT. Moreover, subjective norms exerted a significant impact on motivation, highlighting the influential role of social factors in shaping intentions. Overall, these findings emphasize the crucial role of motivation in determining students' intentions. Consequently, understanding and influencing individuals' motivations can be pivotal in promoting an ethical use of ChatGPT. These findings provide valuable insights into the factors that influence ethical usage, revealing the complex interplay between beliefs, attitudes, norms, motivation, perceived behavioural control, intentions, and actual behaviours. Taken together, the study offers empirical evidence that partially supports the usefulness of the TRGP to understand the psychological drivers behind undergraduates intentions and actions regarding LLM.

These insights have practical implications. On the one hand, this investigation can inform interventions aimed at encouraging the ethical use of ChatGPT. It suggests that the TRGP model may be used to predict intentions and behaviours within the field of education. Therefore, it can guide the design and implementation of effective interventions rooted in an empirically validated theory for behavioural change. This study offers practical recommendations for encouraging ethical ChatGPT use. Motivation is shaped by attitude and social norms. Therefore, efforts should emphasize the benefits of ethical use and build a positive attitude towards such responsible behaviour. Students are also influenced by parents and employers; hence, including them in these efforts can promote a shared commitment to ethical

AI use. Likewise, perceived control strongly influences motivation and intentions. To improve students' perceived behavioural control, interventions should focus on the control beliefs elicited, including (i) training educators to design relevant assignments, avoiding unrealistic or overly challenging tasks, which may lead to unethical behaviours; (ii) limiting assignment volume and allow enough time to reduce time constraints; and (iii) institutions should provide clear guidance on ethical vs. unethical AI use to avoid confusion. These recommendations could inspire future research on cultural and institutional differences. In collectivist cultures, social norms may shape student behaviour more strongly. Resources, teaching methods, and assessment styles also play a key role, with institutions with fewer resources and unclear policies facing major challenges in promoting the ethical use of ChatGPT among their undergraduates.

On the other hand, it has implications beyond the topic of ChatGPT. It also paves the way for future research exploring the predictive power of the TRGP in relation to other educational- related behaviours.

6.2. Limitations

Despite its strengths, this study has limitations. The use of self-report measurement instruments introduces potential biases such as desirability bias (Cohen et al., 2018). This is particularly relevant for the behavioural construct, as actual behaviour (i.e. ethical use of ChatGPT) was not possible to be measured through direct procedures. Although careless responding was examined, hence improving the quality of the analysed data (Goldammer et al., 2020), desirability bias items were not included to avoid making the instrument excessively long. It should also be noted a limitation regarding the qualitative elicitation study, composed mostly of female participants, which may limit the generalizability of the findings. Future studies should use a more balanced and diverse sample for broader, more representative results. Another limitation relates to the beliefs elicited. Beliefs regarding ChatGPT's procurement goals may not be stable over time, which could have influenced its measurement in the main study. This could have reduced the predictive power, making it less likely to have included all the beliefs that could predict participants' behavioural intentions. Additionally, the two referents (i.e. university professors and classmates) elicited to measure approval goals beliefs may not accurately capture the perspectives of all participants. Therefore, we echoed Hamilton et al.'s (2022, p. 15) recommendations: "Given that most people denied having approval goals, other methods and questioning techniques to identify approval goals may be needed".

Finally, the definition of ethical use of ChatGPT adopted in this study is another potential limitation. At the time of data collection, there were no established policies or guidelines at the University of Burgos or internationally to define what constitutes ethical use of ChatGPT. Consequently, the definition of ethical use provided to participants may not entirely reflect what the actual ethical use of ChatGPT would entail beyond the context of this investigation. These limitations highlight the challenges associated with investigating emerging issues. While they do not invalidate the study's findings, they should be taken into account when interpreting the results and planning future studies on the TRGP model and ethical use of LLM.

7. Conclusions

This study explored the factors influencing ethical ChatGPT use in undergraduates. Participants acknowledged both the advantages and disadvantages of ChatGPT, demanding guidance on ethical use. Findings also suggest that motivation and perceived behavioural control predicted intentions for ethical use, with positive attitudes and subjective norms acting as key drivers of motivation.

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