AI -ChatGPT Usage Among Users: Factors Affecting Intentions to Use and the Moderating Effect of Privacy Concerns

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Abstract ChatGPT is an artificial intelligence model intended for many purposes that has increased in popularity in all fields in our lives such as education, health, entertainment, marketing, and transportation. This research aims to identify the factors affecting intentions to use ChatGPTs, examine the moderating effect of privacy concerns on the relationship between ChatGPT usage factors and trust, to examine the mediating effect of trust on the relationship between ChatGPT factors and intention to use. The recommended model was empirically tested using Structural Equation Modeling (SEM). The data were collected electronically from 410 students through social media platforms using purposive sampling. The structural model indicates that both the expertise and the responsiveness of AI ChatGPT have a significant positive association with consumers' trust. On the other hand, the relationship between perceived ease of use, anthropomorphism, and perceived risk on consumers' trust in ChatGPT was rejected. In addition, consumers' trust has a strong significant positive association with the behavioural intention to use ChatGPT. No moderation effect via privacy concerns on the relationship between intention and chat GPT usage. Meanwhile, the total effect of consumers' trust in ChatGPT on the relation between ChatGPT usage and the behavioral intention to use ChatGPT was not evident. This research's findings are intended to contribute to the existing literature on the factors that affect intention to use ChatGPT in the education context among learners in various stages providing insights and recommendations for future research.

Keywords- AI ChatGPT, Privacy Concerns, Trust, and Intention to Use.

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Introduction

In recent years, AI (Artificial Intelligence) has been widely used in different sectors including education, marketing, health care and finance. One of the most substantial breakthroughs in AI research has been the emergence of language models that are built on Generative Pre-Trained Transformers such as ChatGPT (Chat Generative Pre-Trained Transformer). The rise of generative AI, of which ChatGPT is an example, has raised concerns about its potential impact on education and how it can enhance the learning process (Strzelecki A.,2023).

Various ChatGPT's applications used in education, developing assignments (Sullivan et al., 2023) and supporting essay writing (Crawford et al., 2023). Universities are considering how ChatGPT may impact education teaching and learning in the future, as the possibilities of this technology are vast and potentially game-changing (Lim et al., 2023).

Researchers identified the usage of ChatGPT in education and academia. Cotton et al., (2023) examined the usage of ChatGPT in general education. Lund & Wang (2023) examined the influence of ChatGPT on education and Perkins (2023) demonstrated the benefits in academic research, writing, publishing and authorship, while other researchers have raised concerns about how ChatGPT could be used to cheat on examinations or finish assignments (Adeshola I.& Adepoju A. ,2023). University students use AI tools to aid with coursework, explore research topics, and learning experience, acquisition of Knowledge (Al-Sharafi et al., 2022).

Adeshola I.& Adepoju A. (2023) stated that the use of ChatGPT is not going to decrease in the coming years and suggested that education needs to find ways to integrate ChatGPT into the university curriculum. Adopting ChatGPT in academia and education is relatively new and is still being explored. More research is needed to understand the specific factors that influence the intentions to use ChatGPT. Previous studies have not explored the moderating role privacy concerns and the mediating role of trust. A research gap exists in examining user behaviors toward AI-ChatGPT, especially in the context of university students.

This study fills this gap by examining the moderating effect of privacy concerns in the relationship between adoption factors of ChatGPT and trust and the mediating effect of trust on the relationship between ChatGPT adoption factors and student's intentions to use ChatGPT.

A quantitative research approach is implemented using a survey questionnaire to collect data from a sample of users in various stages of education who have engaged with ChatGPT in their learning stage. To test the proposed hypotheses and investigate the moderating effects of privacy

concern and the mediating role of trust, the data will be examined using Structural Equation Modelling. The research's findings will help researchers get a better understanding of the factors that drive students to use ChatGPT, as well as insights into how AI developers can develop ChatGPT to increase usage rate.

The structure of this study is as follows. Literature review is discussed in section 2. Section 3 describes the research methodology, the sample, data collection, and the measurement of the constructs. Then, the reliability and validity of the measurement, factor analysis, descriptive statistics, correlation coefficients between the constructs and the results of structural equation modelling (SEM) are shown in section 3. In the end, the conclusions, discussions about the findings, implications, research limitations, and possible directions for future research are discussed in section 4.

Literature Review

Expertise

Wu et al., (2021) defined expertise as the perception of consumer's regarding the knowledge and experience in the system they are interacting with. Also, Mogaji et al. (2021) proposed that expertise was found to be vital for consumers. Additionally, Nordheim et al. (2019) showed that the ability of chatbot to provide correct answers influences consumers' trust. Moreover, Brandtzaeg & Følstad, (2017) noted that consumers could view the experience of the system they are using differently and that expertise is extremely associated with trust, resulting in significant trust differences. Based on the above we can postulate the following hypotheses:

H1: The expertise of AI ChatGPT has a positive impact on consumers' trust in ChatGPTs.

Responsiveness

Responsiveness indicates that the chatbot responds fast to consumers which is considered an important antecedent to trust (Nordheim et al., 2019). The positive relation between responsiveness and trust when using AI was confirmed by Holtgraves et al. (2007). Chen et al. (2021) highlighted that responsiveness of the AI could have positive influence on customer experience and trust. Conversely, other studies suggested that the fast response did not have a positive impact on trust (Glikson et al., 2020). Therefore, the following hypothesis could be proposed:

H2: The responsiveness of AI ChatGPT has a positive impact on consumers' trust in ChatGPTs.

Perceived Ease of Use

Ji et al., (2021), defined perceived ease of use as how it is easy for a user to achieve certain objectives when using mobile applications and social commerce platforms. According to Wirtz et al. (2019), ease of use is one of the considered factors when interacting with AI-based personal assistants. Lee & Park, (2022), showed that simplicity of operations is a major factor in determining consumers' satisfaction. It is important to note that ease of use is one of the core elements in the Technology Acceptance Model (Davis, 1989). Furthermore, Corritore et al., (2003) and Sarkar et al., (2020) showed the role of ease of navigation, and ease of searching as predictors to trust in online settings. Liu & Tao (2022) identified also that perceived ease of use positively influences trust. Hence, we can postulate the following hypothesis.

H3: Perceived ease of use of AI ChatGPT has a positive impact on consumers' trust in ChatGPT.

Anthropomorphism

Anthropomorphism refers to assigning human characters to non-human objects (Guthrie, 1993). One of the significant trends in the development of AI is humanising digital voice assistants, which was found to have positive impact on interactions and consumers' engagement (McLean, G. and Osei-Frimpong ,2019 and Moriuchi ,2019). The interpersonal attraction influenced also users' satisfaction and intention to use devices which implement voice-based assistants (Vas) (Han and Yang,2018). It was proven that human-like characteristics displayed in digital voice assistants can contribute to trustworthy (Pitardi and Marriott, 2021; Roy and Naidoo, 2021; Balakrishnan & Dwivedi, 2021). This adds to the primary purpose to enable better usage and trustworthy answers in technological devices featuring an anthropomorphic interface (Burgoon et al., 2000). Additionally, Van Pinxteren et al., (2019); Diederich et al., (2020) and Shim et al., (2020) proved that the level of anthropomorphism is a significant determinant of trust and intention to use Voice based assistants and chatbots.

Consequently, we can suggest the following hypothesis:

H4: The anthropomorphism of AI ChatGPT has a positive impact on consumers' trust in ChatGPT.

Perceived Risk

Perceived risk is defined as "the level of uncertainty experienced by consumers regarding their personal purchase or usage of a product or after using the purchased products" (Li et al., 2023). It also resembles the loss of searching for the desired outcome and achieving it, which affects the users' decision towards adopting this product/tool (Silva et al., 2023). Consumers usually consider whether the product or tool that they are using is trustworthy or not with assessing the risks associated to it. Furthermore,

artificial intelligence is considered a new and complex technology that could result in perceiving risks by the users, which eventually affect their trust and behavioral intention towards the tool (Li et al., 2023). Moreover, users perceive risk when there is weak security to protect their personal information as they are concerned about their data, who can access it and the level of its protection. This results in affecting the customers' trust and adoption in various technological fields as online shopping, mobile payment services and internet banking (Silva et al., 2023) In addition to that, Nordheim et al. (2019) indicated that the risk is an important cause for users' trust in AI technologies. When users perceive risk, they tend to have lower trust and it was noted that the lower perceived risk, the easier for the users to have more trust towards the technology. Therefore, the following hypothesis is proposed:

H5: Perceived risk has a negative influence on users' trust towards ChatGPT.

Privacy concerns

The perceived privacy when using a technology is an important factor in trusting and adopting it. AI technologies such as ChatGPT use personal and private information to offer personalised outcomes to the users. However, this causes a threat to the users' privacy, especially if any disclosure of the data occurred. Which may cause loss of trust and reluctance to deliver other personal information and to use AI technologies. Moreover, it was mentioned that losing personal information while using technologies over the internet is a very critical factor facing consumers nowadays. Consequently, users' trust would be if their personal information is not required (Li et al., 2023). According to Pitardi & Marriott (2021), perception towards privacy negatively affects the users' trust, thus the behaviour. Although it is identified through previous literature, that privacy concerns negatively influence users' willingness to use AI technologies such as ChatGPT, there is a difference in the behaviour of individuals with high vs low privacy concerns to build their trust towards sharing private information (Ameen et al., 2022; Li et al., 2023). Users tend to assess the level of risk by performing a risk-benefit analysis to weigh the expected risks against the perceived benefits, this will lead to a decision and a specific level of trust (Kim et al., 2023).

The moderating effect of privacy concerns is often studied in existing literature, however, there are contradictory findings towards it. Some research proved that privacy concerns have a moderating effect, while others concluded that it does not (Li et al., 2023; Pagani & Malacarne, 2017) Therefore, the following hypothesis is proposed to examine the moderating effect of privacy concerns in ChatGPT:

H6: Privacy concerns moderate the relationship between ChatGPT adoption factors and users' trust.

Trust

One of the essential factors in the trust-commitment theory is trust; trust exists when one party has confidence in an exchange partner's reliability and integrity (Morgan & Hunt, 1994). The success of recent technologies is determined by the trust factor (Loh et al., 2021). In context of personal use, user behaviour is influenced by the role of trust (Brill et al., 2019). In the context of AI (Artificial Intelligence), trust denotes how reliable and credible a system is (Shin, 2021).

Researchers demonstrated that trust in AI can have positive consequences, including reliance on AI agents, levels of perceived AI performance, and purchase intention (Cheng et al., 2022; Shin, 2021; Yen and Chiang, 2021). Mostafa and Kasamani (2022) reported that trust in AI chatbots positively influences usage intention and user engagement. There is further evidence that an elevated level of trust positively influences AI technology usage intention (Choung et al., 2022). Brill et al. (2019) examined the moderating role of trust and privacy on users' satisfaction. Many trust dimensions determine a user's decision to engage with technology, but few studies to date have researched AI services (Shin, 2021). Jo, H. (2023) stated that trust positively correlates with the actual usage of ChatGPT since it is crucial in driving behavioural intention. Users who trust the technology are more likely to adopt it (Lin et al., 2020). In various technology adoption contexts, researchers have illustrated the positive relationship between trust and behavioural intention (AlHogail, 2018; Hooda et al., 2022). Hence, when considering the adoption and usage of ChatGPT, it is essential to consider the influence of trust as a mediator and how it may impact the acceptance and use of the technology (Menon D., K Shilpa K.,2023).

Therefore, the following hypotheses are proposed.

H7: There is a positive relationship between trust and usage intentions.

H8: Trust mediates the relationship between ChatGPT adoption factors and usage intentions.

Conceptual Framework
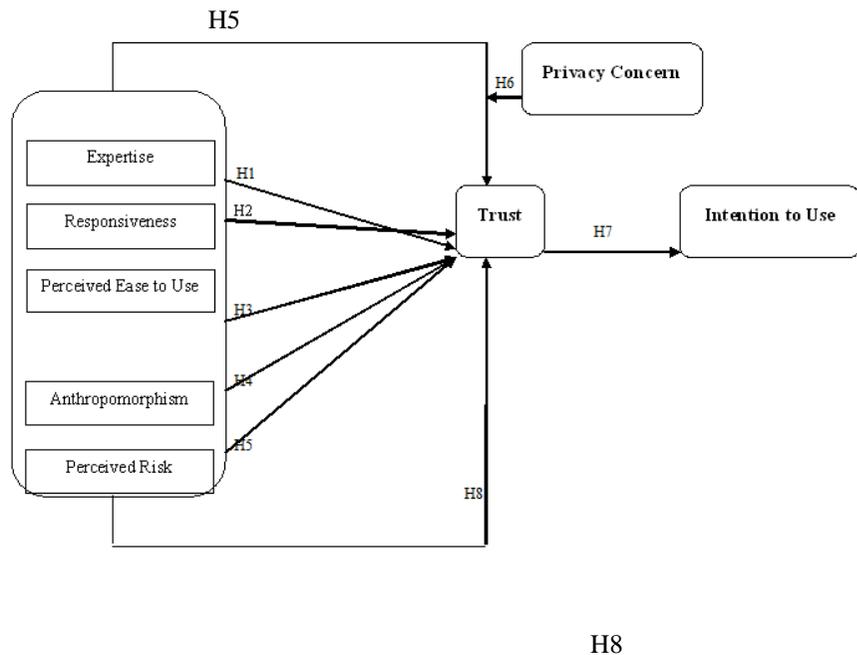
Figure 1: Conceptual Framework
Developed by the authors (2023).

Research Methodology

For the survey instrument, the questions were derived from established scales in previous research. The measurement for the constructs of interest was based on established scales proven to be psychometrically sound (Churchill, 1979). All items were scored based on five-point Likert scales ranking from 1 (strongly disagree) to 5 (strongly agree). Expertise was adopted from (Mayer, R. C., et al. (1995); Nordheim, C. B., et al., (2019). Ease of use (EU) was adopted from (Nordheim, C. B., et al., (2019); Chen, Q., et al., (2022) and Ye et al. (2019)). Anthropomorphism was adopted from (Ho, C. C., et al., (2010). Responsiveness was adopted from Chen et al., (2021), Perceived Risk was adopted from (Li et al., 2023; Nordheim et al., 2019). Privacy Concern was adopted from (Li et al., 2023). Trust was adopted from (Chandra et al. (2010). Intentions to use was adopted from (Shen, S., Xu, K., Sotiriadis, M. and Wang, Y. 2022).

Sampling and data collection

The target participants for this study were students in the middle, high school, undergraduate and postgraduate to analyse the intention to use ChatGPT in education. Participants were recruited online via social media platforms using purposive sampling. Since specific AI users may have different views about the issues at question and therefore need to be included in the sample (Mason, 2002)

The data were collected electronically from 410 students though social media platforms using purposive sampling. Data was collected using an online self-administered questionnaire distributed via social media platforms.

Data Analysis Techniques

There are 410 respondents completed online self-administered questionnaire. The data analysis was executed in two steps as follows: first, the validity and reliability of the measurement model were established, followed by the assessment of the structural model. The statistical techniques that are used in this research are as follows; First of all, the variables of the study are created using the equal weight method. Secondly, the internal consistency coefficient (Cronbach's Alpha) is used to reflect the scales' reliability as it captures the proportion of total variance common to all items that form the scale, which presumably corresponds to the underlying construct being measured (Tavakol & Dennick 2011). Confirmatory Factor Analysis (CFA) was conducted to examine the validity and reliability of the measurement scales. Also describing demographic characteristics of the sample and the description of variables of the study are done using frequency tables for categorical variables and summary measures for numerical data. CFA emphasized the need to remove some items from the research constructs due to their low standardized factor loading, which was below the minimum recommended cut-off point of 0.50 (Hair et al., 2010). All these methods are done using SPSS version 26 software. For answering hypotheses, Structural Equation Modelling was used to test the research hypotheses. The overall model fit was assessed using a number of measures. this is done using AMOS 24 software. Furthermore, Structural Equation Modelling (AMOS 24) was used to test the research hypotheses and identify the adoption factors (Expertise, Responsiveness, Perceived Ease of Use, Anthropomorphism, Perceived Risk)) and to measure their impact on student's trust in ChatGPTs toward using artificial intelligence (AI) tool for educational and learning purposes , examine the moderating effect of privacy concerns on the relationship between ChatGPT adoption factors and trust and to examine the mediating effect of trust on the relationship between ChatGPT adoption factors and intention to use.

The overall model fit was assessed using several measures: Degree of Freedom, Level of Significance, Normed Chi-Square, Root mean square error (RMESA), Incremental fit index (IFI), Relative fit index (RFI), Normed fit index (NFI), Turker-Lewis Index (TLI).

Descriptive Analysis

This section aims to describe the survey respondent's demographics, followed by a discussion over the validity and reliability test of the model's independent and dependent constructs, and finally an analysis of each statement headed by a variable in the model will be provided in term of Mean, Minimum, Maximum, and Standard Deviation. The primary data for this study was collected via a self-completed survey where the total number of participants who have completed the survey is 410 valid responses.

This part will tackle the research sample socio-demographic characters of the selected sample, the following table is an overview of the characteristics of the participants in terms of frequency and percentage.

Table (1): Description of demographic characteristics among survey participants (n=410)

Variable	Frequency	Percentage
Gender		
female	226	55.1%
male	184	44.9%
Age		
from 13 to 15	6	1.5%
from 16 to 18	63	15.4%
from 19 to 21	141	34.4%
from 22 to 24	80	19.5%
more than 24	120	29.3%
Educational Level		
middle school	4	1%
high school	51	12.4%
university student	209	51%
graduate	65	15.9%

postgraduate	81	19.8%
Number of Times of Using ChatGPT (per week)		
one to five times	300	73.2%
six to ten times	57	13.9%
more than ten times	53	12.9%
Length of Time of Using ChatGPT		
less than one year	286	69.8%
one year	79	19.3%
more than one year	45	11%

Reliability and Validity Analysis

Cronbach's Alpha reflects a good reliability of the research statements as its values range from 0.747 to 0.879 for the constructs which exceeded the threshold of 0.70. Also, the composite reliability varies from 0.503 to 0.628 which is above the preferred value of 0.50 and this proves that the model is internally consistent. Furthermore, the results of the Factor Analysis show that all items are loaded in their constructs as suggested in the proposed model, as the loadings of all items are greater than 0.50. On the other hand, AVE values are above the recommended threshold of 0.50 which indicates that the constructs could explain more than 50% of the statements and these values reflect a high internal validity.

Table (2): Reliability and validity of the questionnaire in each category

Constructs	Number of Statements	Cronbach's Alpha	Composite Reliability	AVE	Item	Loading
Expertise	4	0.802	0.503	0.628	EX1	0.72
					EX2	0.78
					EX3	0.71
					EX4	0.62
Responsiveness	3	0.776	0.567	0.511	RS1	0.876
					RS2	0.50
					RS3	0.60
Perceived Ease of Use	4	0.805	0.508	0.639	EU1	0.85
					EU2	0.79
					EU3	0.64
					EU4	0.60
Anthropomorphism	3	0.747	0.599	0.518	AP1	0.72
					AP2	0.76
					AP3	0.74
Perceived Risk	5	0.879	0.593	0.678	PR1	0.81
					PR2	0.78

					P R3	0.74
					P R4	0.83
					P R5	0.71
Trust	5	0.768	0.598	0. 557	T 1	0.71
					T 2	0.76
					T 3	0.66
					T 4	0.80
					T 5	0.76
Privacy Concern	3	0.807	0.582	0. 722	P C1	0.86 1
					P C2	0.89 2
					P C3	0.79 4
Intention to Use ChatGPT	4	0.871	0.628	0. 727	B I1	0.73
					B I2	0.87
					B I3	0.78
					B I4	0.75

Descriptive Statistics of Constructs and Statement Items

The descriptive analysis is comprised of the following: Mean, Standard Deviation, Skewness and Kurtosis for each statement. It's clear that the respondents tend to agree to the statements of each of expertise, responsiveness, ease of use, perceived risk, privacy concern, and intention to use as the mean values range from 3.5 to 4.5 while they tend to neutrally

agree to the statements of trust as the mean value ranges from 2.5 to 3.5. The construct with the highest agreement is the ease of use while the construct with the lowest agreement is the trust. The values of both skewness and kurtosis revealed that all study variables were not normally distributed because the values differ from zero. However, since the valid collected sample is 410 responses hence, according to Sekaran (2003), a research study sample size which is above 30 to 50 participants can run parametric tests especially in multivariate research.

Table (3): Descriptive statistics and normality test for research constructs (n=410)

	Mean	Standard Deviation	Skew ness	Kurt osis
Expertise	3.847	0.71712	-0.610	0.565
ChatGPT seems to be very knowledgeable	4.11	0.855	-1.114	1.776
ChatGPT answer is very professional	3.81	0.961	-0.584	-0.055
ChatGPT can provide accurate answers	3.54	0.938	-0.330	0.014
ChatGPT is capable of doing its job	3.92	0.863	-0.542	-0.063
Responsiveness	3.6366	0.61575	-0.199	0.49
ChatGPT will respond to my questions immediately	4.28	0.823	-1.011	0.558
ChatGPT will respond to my questions after a short delay (REVERSED)	2.63	1.039	0.322	-0.511
Communication with ChatGPT was smooth and there was no delay	4	0.894	-0.727	0.165
Ease of Use	4.1579	0.64629	-0.693	1.04
Learning to use ChatGPT is easy for me	4.31	0.765	-1.013	0.933

ChatGPT is easy to use	4.32	0.767	-1.197	1.816
I find it easy to become skilful at using ChatGPT	4.09	0.795	-0.519	0.109
Let ChatGPT do what I want it to do is easy	3.91	0.917	-0.633	-0.076
Anthropomorphism	0.1301	0.2082	1.541	2.001
Do you think the ChatGPT is unnatural or natural?	0.18	0.385	1.668	0.785
Do you think the ChatGPT is artificial or human?	0.03	0.175	5.365	26.913
Do you think the ChatGPT is mechanical response or conscious response?	0.18	0.383	1.689	0.858
Perceived Risk	3.5732	0.87584	-0.550	0.02
I believe that using ChatGPT is risky	3.76	1.047	-0.633	-0.236
I think using ChatGPT could have negative consequences	3.87	1.003	-0.708	-0.043
Using ChatGPT makes me insecure	3.07	1.182	-0.111	-0.775
I think it is unsafe to use ChatGPT	3.22	1.11	-0.200	-0.594
I believe that I must be cautious when I use ChatGPT	3.94	0.98	-0.964	0.919
Trust	3.4078	0.68368	0.043	0.184
The performance of ChatGPT always meets my expectations	3.63	0.941	-0.397	-0.120
ChatGPT is reliable	3.51	0.896	-0.546	0.209
ChatGPT is honest	3.34	0.976	-0.374	-0.022

I have trust in ChatGPT	3.31	0.971	-0.187	-0.250
ChatGPT seems to be deceitful	3.25	0.962	-0.019	-0.160
Privacy Concern	3.7984	0.84944	-0.632	0.317
I am concerned about the security of my personal information when I use ChatGPT	3.69	1.067	-0.564	-0.268
ChatGPT may misuse my personal information	3.64	1.01	-0.685	0.199
Submitting personal information for ChatGPT is unwise	4.07	0.918	-0.845	0.382
Intention to Use	3.7195	0.80436	-0.181	-0.323
I intend to continue using ChatGPT in the future	4.03	0.818	-0.467	-0.302
I will always try to use ChatGPT in my daily life	3.36	1.082	-0.022	-0.870
I plan to continue to use ChatGPT frequently	3.62	0.997	-0.190	-0.705
I will use ChatGPT to obtain information	3.86	0.87	-0.639	0.523

In this part, we use the "path analysis" to estimate the coefficients and significance of each path to test the theoretical model with the presence of a mediator. The first SEM included ChatGPT adoption factors as the independent variables, intention to use ChatGPT as the dependent variable, and consumers' trust in ChatGPT as the mediator variable.
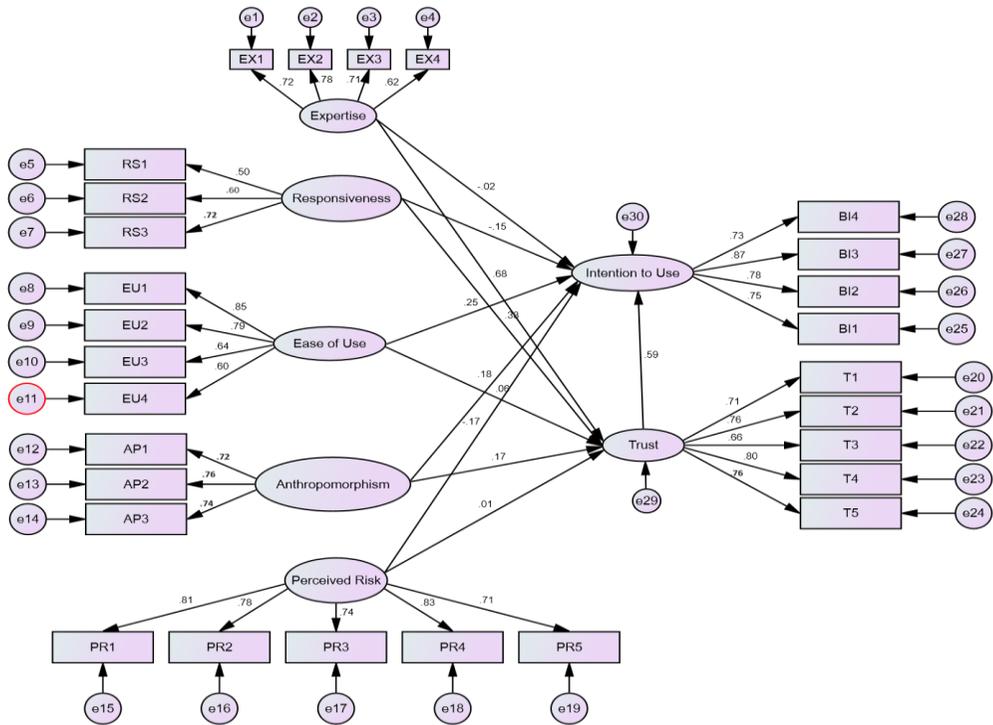
First Model

Figure (2): path diagram

The following table and the previous figure illustrate the path coefficients of the first SE model. The results provide support to all the research hypotheses, except for H₃, H₄, H₅. The structural model indicates that both the expertise of AI ChatGPT and the responsiveness of AI ChatGPT have significant positive association with consumers' trust in ChatGPT. On the other hand, the relationship between either perceived ease of use of AI ChatGPT, the anthropomorphism of AI ChatGPT, or perceived risk and consumers' trust in ChatGPT were rejected. According to the beta levels, the expertise of AI ChatGPT has the strongest impact on consumers' trust, followed by the responsiveness of AI ChatGPT. In addition, consumers' trust in ChatGPT has strong significant positive association with the behavioural intention to use ChatGPT.

Table (4): Path coefficients and significances

Structural Path	Path Coefficient	C.R (t-value)	Sig.	Acceptance/Rejection
Trust ← Expertise	0.682	9.897	***	Accepted
Trust ← Responsiveness	0.216	4.078	***	Accepted
Trust ← Ease of Use	0.076	1.379	0.168^{ns}	Rejected
Trust ← Anthropomorphism	0.597	1.905	0.057^{ns}	Rejected
Trust ← Perceived Risk	0.004	0.12	0.904^{ns}	Rejected
Intention to Use ← Trust	0.779	5.311	***	Accepted

Notes:

(***) means that the variable is significantly different from zero at the 0.001 level (two-tailed),

(**) means that the variable is significantly different from zero at the 0.01 level (two-tailed),

(*) means that the variable is significantly different from zero at the 0.05 level (two-tailed),

(ns) means that the variable is not significant.

The researchers further examined the mediation (i.e. indirect) effect of consumers' trust in ChatGPT, and total effects of the research constructs on the behavioural intention to use ChatGPT as illustrated in table 5. The results highlighted in the following table indicate the mediating effect of consumers' trust in ChatGPT on the relationship between both the expertise of AI ChatGPT and the responsiveness of AI ChatGPT and the behavioural intention to use ChatGPT. In addition, the results underscore the total effects of both consumers' trust in ChatGPT and the behavioural intention to use ChatGPT on the relationship between the expertise of AI ChatGPT, the responsiveness of AI ChatGPT, perceived ease of use of AI ChatGPT, the anthropomorphism of AI ChatGPT, and perceived risk. Meanwhile, the mediation and the total effects of consumers' trust in ChatGPT on the

relation between perceived ease of use of AI ChatGPT, the anthropomorphism of AI ChatGPT, and perceived risk and the behavioural intention to use ChatGPT were not evident.

Table (5): Indirect and total effects on the behavioural intention to use ChatGPT

Path	Indirect Effect	Total Effect
Intention to Use ← Trust ← Expertise	0.531^{***}	0.510^{ns}
Intention to Use ← Trust ← Responsiveness	0.168^{***}	0.034
Intention to Use ← Trust ← Ease of Use	0.059^{ns}	0.460
Intention to Use ← Trust ← Anthropomorphism	0.465^{ns}	1.287^{ns}
Intention to Use ← Trust ← Perceived Risk	0.003^{ns}	-0.157

The overall model fit was assessed using number of measures. The following table shows that the Chi-square value of 1463.978 with 339 degrees of freedom is statistically significant at 0.05 level which indicates that the model is not good fit, however Chi-Square test is very sensitive to the sample size. The results further exhibit that all fit indices obtained are satisfactory and within the suggested boundaries. Accordingly, the results confirm an acceptable fit of the proposed model.

Table (6): Goodness of fit indices

Indices	Abbreviation	Recommended Criteria	Results	conclusion
Chi-Square	χ^2	P-value > 0.05	1463.978	Not Good Fit
Degree of Freedom			339	
Level of Significance			0.000	
Normed Chi-Square	$\dfrac{\chi^2}{DF}$	$1 < \dfrac{\chi^2}{DF} < 5$	4.319	Good Fit
RMESA	Root Mean Square Error of Approximation	< 0.05 Good Fit < 0.08 Acceptable Fit	0.019	Good Fit
NFI	Normed Fit Index	> 0.90	0.943	Good Fit
RFI		> 0.90	0.913	Good Fit
IFI		> 0.90	0.990	Good Fit
TLI	Tucker-Lewis Index	> 0.90	0.964	Good Fit
CFI	Comparative Fit Index	> 0.90	0.988	Good Fit

The second SEM included ChatGPT adoption as the independent variable, intention to use ChatGPT as the dependent variable, and consumers' trust in ChatGPT as the mediator variable.
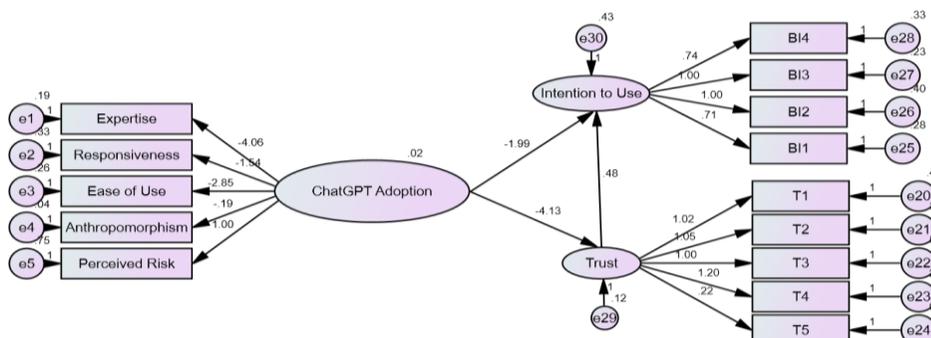
Second Model

Figure (3): path diagram

The following table and the previous figure illustrate the path coefficients of the second SE model. The structural model indicates that ChatGPT adoption has significant negative association with consumers' trust. In addition, consumers' trust in ChatGPT has moderate significant positive association with the behavioural intention to use ChatGPT.

Table (7): Path coefficients and significances

Structural Path	Path Coefficient	C.R -value)	Sig.	Acceptance/Rejection
Trust ← ChatGPT Adoption	-4.133	-2.891	0.004**	Accepted
Intention to Use ← Trust	0.478	2.532	0.011*	Accepted

Notes:

(***) means that the variable is significantly different from zero at the 0.001 level (two-tailed),

(**) means that the variable is significantly different from zero at the 0.01 level (two-tailed),

(*) means that the variable is significantly different from zero at the 0.05 level (two-tailed),

(ns) means that the variable is not significant.

The researchers further examined the mediation (i.e. indirect) effect of consumers' trust in ChatGPT, and total effects of ChatGPT adoption on the behavioural intention to use ChatGPT as illustrated in the table 8. The results

highlighted in the following table indicate the mediating effect of consumers' trust in ChatGPT on the relationship between adoption and the behavioural intention to use ChatGPT. Meanwhile, the total effect of consumers' trust in ChatGPT on the relation between ChatGPT adoption and the behavioural intention to use was not evident.

Table (8): Indirect and total effects on the behavioural intention to use ChatGPT

Path	Indirect Effect	Total Effect
Intention to Use ← Trust ← ChatGPT	-0.316[*]	-3.962[ns]

The overall model fit was assessed using a number of measures. The following table shows that the Chi-square value of 1463.978 with 339 degrees of freedom is statistically significant at 0.05 level which indicates that the model is not good fit, however Chi-Square test is very sensitive to the sample size. The results further exhibit that all fit indices obtained are satisfactory and within the suggested boundaries. Accordingly, the results confirm an acceptable fit of the proposed model.

Table (9): Goodness of fit indices

Indices	Abbreviation	Recommended Criteria	Results	conclusion
Chi-Square	χ^2	P-value > 0.05	308.432	Not Good Fit
Degree of Freedom			74	
Level of Significance			0.000	
Normed Chi-Square	$\dfrac{\chi^2}{DF}$	$1 < \dfrac{\chi^2}{DF} < 5$	4.168	Good Fit
RMESA	Root Mean Square Error of Approximation	< 0.05 Good Fit < 0.08 Acceptable Fit	0.043	Good Fit
NFI	Normed Fit Index	> 0.90	0.946	Good Fit
RFI		> 0.90	0.910	Good Fit
IFI		> 0.90	0.972	Good Fit
TLI	Tucker-Lewis	> 0.90	0.94	Good

	Index		1	Fit
CFI	Comparative Fit Index	> 0.90	0.97 1	Good Fit

Moderating effect

To test the moderating effect of privacy concerns on the hypothesized relationships portrayed in the structural model, this study employed a multi-group analysis. Prior to that, the sample was split into two independent groups (high and low privacy concern), based on the respondents' calculated median score of 4. A total of 277 respondents were in the group with low privacy concern, while 133 belonged to the group with high privacy concern. The following table summarize the results of the MGA group Analysis, and from it we can conclude that there is no significant difference between the two coefficients at 95% confident this means that no moderation effect on the relationship between intention and chat GPT adoption.

Table (10): MGA group analysis

Group	Path	Coefficient	Critical value
Low	Chat GPT adoption Intention to use.	1.22	-0.162
High		1.23	

Discussion and conclusions

Chat GPT is growing in usage among students, therefore more investigation is required regarding the factors affecting its adoption. This research recognises this area requiring further examination to this aspect. The current research intended to identify the adoption factors and its impact on students' usage intentions toward using artificial intelligence (AI) tool, Chat Generative Pre-Trained Transformer (ChatGPT), for educational and learning purposes based on the Technology Acceptance Model. Moreover, the research examined the moderating effect of privacy concerns on the relationship between ChatGPT adoption factors and trust. Additionally, the research analysed the mediating effect of trust on the relationship between ChatGPT adoption factors and intention to use. Structural Equation Modelling (SEM) was used to assess the series of interrelated relationships among the research variables concurrently. This research provides theoretical contributions to the topic regarding the adoption of ChatGPT by students. On the other side, the outcome will aid AI designers to develop services and

guide regulators in setting the rules governing the usage of AI-tools in general and ChatGPT specifically.

The structural model indicates that both the expertise of AI ChatGPT and the responsiveness of AI ChatGPT have significant positive association with consumers' trust in ChatGPT. These results are consistent with Wu et al., (2021) who indicated that expertise and responsiveness positively affect consumers' trust.

Unlike the literature; Pitardi and Marriott, (2021), Stoeckli et al., (2020) and Wang et al., 2022), the current research reports insignificant relation between perceived ease of use and consumers trust in ChatGPT. This result is in line with and Wu et al., (2021), despite the fact that ease of use is an important prerequisite for technology adoption, especially for complex intelligent systems (Lee & Park, 2022). Such result could be interpreted in light of the personal charterstics of students or could be related to the perception of students that ChatGPT is not complex and they do not expect any difficulty when using it.

Moving further, the effect of anthropomorphism on consumers' trust in ChatGPT was rejected, contrary to the results of (Wu et al., 2021; Pitardi and Marriott, 2021; Roy and Naidoo, 2021; Balakrishnan & Dwivedi, 2021). Important to note that as the paper examined the relation between perceived ease of use and trust in ChatGPT, so different variables and applications in other research could lead to different results, for example, anthropomorphism could be significant in voice-based assistants when consumers are shopping.

Furthermore, the current research showed insignificant relationship between perceived risk and trust which on line with Pitardi and Marriott, (2021), this means that respondents were not concerned by the perceived risk as long as it is not related to payments. However, Marriott and Williams, (2018) and Wu et al., (2021) proved that there is a negative relationship between trust and perceived risk and they denoted this to the fact that when users believe that the system is reliable, eventually they will perceive less risk when using the system.

The moderating effect of privacy on the relationship between ChatGPT adoption factors and users' trust was also analysed, following the results of Wu et al., (2021) and Ameen et al., (2022). This result ensures that protecting the security of users is one of the main precautions to consider especially when using new systems.

The results revealing a positive relationship between trust and intentions contradicts Pitardi and Marriott, (2021) result which showed that trust did not have a direct effect on intentions. They indicated that trust in their research trust affected attitude but has more of an indirect effect on

intentions. However, prior studies spotted the significance of trust especially when using Artificial Intelligence (Davenport et al., 2020 and e.g. Wang, Molina, & Sundar, 2020).). Furthermore, Oh et al., (2009) and Silva et al., (2023) showed the significant effect of trust on users' intention. Additionally, the mediating effect of trust on the relationship between ChatGPT adoption factors and usage intentions was examined and the result revealed significant effect of mediation. This result strengthens the model suggested as trust is one of the significant factors to consider when using artificial intelligent systems.

Implications to Research and Practice

This study contributes to the extant research stream on ChatGPT and the users' intentions to use it with developing a model that highlights various relationships. It combines the expertise, responsiveness, perceived ease of use, anthropomorphism and perceived risk as variables of assessing ChatGPT adoption from the users point of view. This adds to the understanding of the factors driving the usage of ChatGPT. In addition to that, the study examines the mediating effect of trust between the ChatGPT variables and the intentions to use it. Which results in acquiring deeper knowledge in understanding how can users' trust affect their intention to use such a technology or stop using it; due to the variables mentioned above. Moreover, the moderation effect of privacy concerns is also studied in this paper to identify its effect on the relationship between the ChatGPT variables and trust towards it (Silva et al., 2023). Although the effect of trust and privacy concern is studied in this context before, this study combined both of them with the mediation and moderation effect to allow deeper insights into understanding the relationship between the independent variables of ChatGPT adoption and the intention to use it. Furthermore, this research has an important implication, in which it shows that smart technologies intention to use is becoming different than the traditional technology usage (Foroudi et al., 2018).

Practitioners need to have a deeper understanding of the appealing characteristics of such and AI technology to utilize it. The study shows which characteristics impact the users' trust and intention to use of ChatGPT, it also shows the effect of privacy concerns on such a matter. This allows the decision makers to have more informed decisions on how to design their technologies and the advanced AI emerging capabilities. In addition to that, the findings of the paper show whether youth intend to adopt ChatGPT or not, due to the mentioned characteristics. Hence, these results give opportunities to adapt and customise the AI services to fit the needs of this section of users (Ameen et al., 2022).

<u>**Limitations and Future Suggestions**</u>

Despite the progressions of this study, there are some limitations and suggestions to work on. The study was conducted on a sample of youth in Egypt which infers that the results are representative of Egyptian users. Literature continuously debate the importance of various factors across different cultural contexts. Therefore, this issue can be studied across different cultures to assess their perception towards such a technology with the role of trust and privacy concerns. This study is also cross-sectional; however, it would be interesting to study this topic across longitudinal perspective to understand the users' adoption to technology and intention to use ChatGPT across different timings with the technology advancement. Moreover, the ethical and social implications of adopting ChatGPT should be considered in future research as factors perceived by the users (Pitardi and Marriott, 2021; Wu et al., 2023). Also, the effectiveness of using ChatGPT and aspects like customers' satisfaction when using could be examined. Important to consider the usage of ChatGPT in other areas as well.

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Appendix

Variables	Items	Sources
Expertise (EX)	EX1: ChatGPT seems to be very knowledgeable	Mayer, R. C., et al., (1995); Nordheim, C. B., et al., (2019)
	EX2: ChatGPT answer is very professional	
	EX3: ChatGPT can provide accurate answers	
	EX4: ChatGPT is capable of doing its job	
Ease of use (EU)	EU1: Learning to use ChatGPT is easy for me	Nordheim, C. B., et al., (2019); Chen, Q., et al., (2022) Ye et al. (2019)
	EU2: ChatGPT is easy to use	
	EU3: I find it easy to become skilful at using ChatGPT	
	EU4: Let ChatGPT do what I want it to do is easy	
Anthropomorphism (AP)	Do you think the ChatGPT is? AP1: Unnatural - Natural	Ho, C. C., et al., (2010)
	AP2: Artificial - Human	
	AP3: Mechanical response -	

	Conscious response	
Responsiveness (RS)	RS1: ChatGPT will respond to my questions immediately.	Chen et al., (2021)
	RS2: ChatGPT will respond to my questions after a short delay.	
	RS3: Communication with ChatGPT was smooth and there was no delay.	
Perceived Risk (PR)	PR1: I believe that using ChatGPT is risky.	(Li et al., 2023; Nordheim et al., 2019)
	PR2: I think using ChatGPT could have negative consequences.	
	PR3: Using ChatGPT makes me insecure.	
	PR4: I think it is unsafe to use ChatGPT.	
	PR5: I believe that I must be cautious when I use ChatGPT.	
Privacy Concerns (PC)	PC1: I am concerned about the security of my personal information when I use ChatGPT	(Li et al., 2023)

	PC2: ChatGPT may misuse my personal information.	
	PC3: Submitting personal information for ChatGPT is unwise.	
Trust	T1: The performance of ChatGPT always meets my expectations.	Chandra et al. (2010)
	T2: ChatGPT is reliable	
	T3: ChatGPT is honest	
	T4: I have trust in ChatGPT	
	T5: ChatGPT seems to be deceitful	
Behavioural intention (BI)	BI1: I intend to continue using ChatGPT in the future.	Shen, S.et al (2022)
	BI2**:** I will always try to use ChatGPT in my daily life.	
	BI3: I plan to continue to use ChatGPT frequently.	
	BI4: I will use ChatGPT to obtain information.	