How reputation concerns and Confucian values influence cheating behavior

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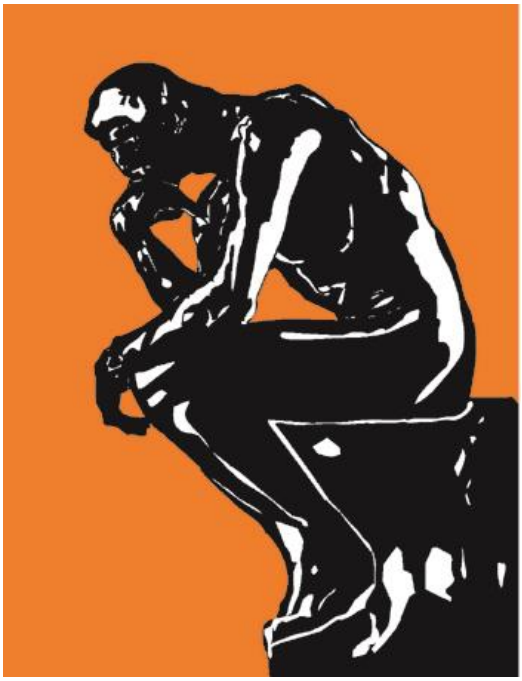

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Abstract

Cheating is a major problem in society, especially in the educational system. From the viewpoint of subjective cost-benefit analysis, concerns about reputation damage as well as considerations of cultural values against unethical behavior can help increase the perceived costs of cheating. To explore deeper into the psychological processes in such assessments, we employ Bayesian Mindsponge Framework (BMF) analytics – an information-processing-based method. Conducting Bayesian analysis on 493 university students from Germany, Vietnam, China, Taiwan, and Japan, we found that reputation concern is negatively associated with cheating behavior. If a student embraces Confucian values, the above negating effect is stronger. Our findings support the notion that mentally simulated negative consequences of cheating reduce the probability of carrying out such behavior. As the educational system is changing rapidly due to technological advancement, a better understanding of the influences of sociocultural factors can be helpful in cheating prevention efforts.

Keywords: cheating behavior; university student; reputation concern; Confucian values; information processing; Bayesian Mindsponge Framework

> "His love for all things beautiful aside, Kingfisher also wants to ensure his public image is well-received […]"
>
> In "The Most Beautiful Bird"; *Kingfisher Story Collection* (2022)

1. Introduction

In the classic ancient book "The Art of War" by Sun Tzu, there is a well-known quote: "All warfare is based on deception" (original Chinese: 兵者,诡道也) (Sun Tzu, 2006). Deceptive behavior is not a psychological phenomenon unique to interpersonal interaction but rather a form of deliberate false signaling quite widely observed in nature, suggesting its evolutionary significance in various contexts beyond human society (Mitchell & Thompson, 1986). However, deceptive behaviors in our modern society may negatively affect social functions and stability. Among them, cheating is one of the commonly deemed condemnable unethical acts.

Cheating behaviors in society can take various forms and occur in a variety of contexts, including academic cheating, cheating in romantic relationships, and even cheating in sports (McCabe et al., 2001; Milstein, 2020; Shrout & Weigel, 2018). Cheating is broadly defined as actions or behaviors that involve dishonesty, deception, or violation of rules or norms in order to gain an unfair advantage or benefit (McCabe et al., 2001; Whitley, 1998). Such actions can be detrimental to society in a variety of ways. Cheating, for instance, can undermine the trust and integrity of social institutions like schools, businesses, and governments (McCabe et al., 2001; Shu et al., 2011; Tyler & Huo, 2002). Those who are cheated on or suffer the consequences of someone else's cheating may experience emotional

pain and distress, for example, one may suffer from infidelity in romantic relationships (Shrout & Weigel, 2018). Multiple factors may contribute to cheating behavior, such as individual factors including personality traits or moral values, and situational factors containing perceived cost-benefit analysis of cheating (McCabe & Trevino, 1993; Welch et al., 2005). In addition to individual and situational factors, excessive external pressures or expectations, such as the perceived over-expectation to succeed in a competitive environment would also lead to cheating behaviors (McCabe et al., 2001).

In school settings, cheating is a pervasive issue in educational institutions around the world (McCabe et al., 2012). Common forms of cheating include plagiarism, copying another student's work, using unauthorized materials during exams, falsifying data or research, and paying someone else to complete an assignment or take an exam on their behalf. It is suggested that the reasons for students to cheat vary significantly, ranging from maintaining high grades, avoiding failure or punishment, conforming to parental and societal expectations, lacking preparation or comprehension of the material, or feeling the pressure to succeed (Whitley, 1998). Apart from their personal reasons, environmental factors are also contributing to academic cheating. The culture of dishonesty also plays a role in the formation and prevalence of academic cheating (Nonis & Swift, 2001). In such a culture, students gain access to cheating materials or resources easily and do not usually face serious consequences for cheating, which culminated in the collective belief that everyone cheats. To counter this cheating culture, educators and administrators must adopt strategies to prevent and detect cheating, implement strict consequences for cheating, and provide adequate academic support for struggling students in order to create and maintain an academically honest environment (Cizek, 1999; Lang, 2013).

From a cultural perspective, cheating behaviors exist in both the East and the West. East Asian societies place a high value on reputation and face-saving and view relationships among individuals and groups through a more competitive rather than collaborative lens (Ho, 1976; Hofstede, 1984). In other words, there is constant pressure on individuals in these cultures to maintain a positive image in the eyes of others in a highly competitive school setting. When students face intense competition and pressure to succeed in academic settings, they might commit cheating behaviors due to the desire to stand out among peers and satisfy the expectations of their families and society as a whole (Stevenson & Stigler, 1994). The face-saving pressure can lead to intense stress and anxiety which drive individuals to cheat or engage in other unethical behavior to avoid losing face or falling behind in the competition (Schweitzer & Hsee, 2002). In Western societies, however, reputation and social status are frequently tied to individual achievement and success rather than the success of the group as a whole (Fiske, 2018). There is still competition and social comparison, but it tends to be more individualistic and centered on individual achievement as opposed to group harmony (Hofstede, 2001). However, concerns about one's reputation remain significant in Western cultures, particularly in professional and business contexts,

where it is becoming increasingly important for individuals and businesses in the internet age. For instance, individuals in the west may feel pressure to maintain a positive social media presence or to impress co-workers and clients at work (Kluemper et al., 2012).

Integrated cultural values derived from philosophical teachings could also be vital in promoting/mitigating people's beliefs about cheating. Confucianism is an ancient Chinese philosophical and ethical system that remains influential in today's East Asian sphere. Unlike other religious teachings or distinct modern ideologies, Confucian values have been integrated more deeply into societies' cultural norms and evolved over the course of history, intertwining with other cultural values along the way (Vuong et al., 2018). Confucian values emphasize ethical conduct, social responsibility, and the significance of preserving social order and harmony (Yao & Yao, 2000). According to Confucianism, unethical behavior is detrimental to both the individual and society. In The Great Learning and The Doctrine of the Middle – a classic text by Confucius – it is stated that "Virtue is the root, goods are the branches. If you take the root to be outer and the branches to be inner then you will contest with the people over distribution and expropriation. Thus it is that where goods are concentrated, the people disperse. Where goods are dispersed, the people concentrate" (Eno, 2016). In addition, the concept of "*ren*" (仁) in Confucianism can be translated as "humaneness" or "benevolence" to reflect its moral standard in promoting practices of treating others with kindness and compassion; and the concept of "*li*" (礼) in Confucianism entails individuals to behave in a way that is appropriate and respectful in various social contexts, reflecting additional Confucian norms regarding social responsibility (Yao & Yao, 2000). It could be inferred that many of the Confucianism doctrines discourage individuals from conducting unethical behaviors in hope of upholding a harmonious society based on mutual social responsibility.

To explore the psychological processes of how reputation concerns may influence cheating behavior occurrences, the information processing approach can be helpful. For this purpose, in the present study, we employ Bayesian Mindsponge Framework (BMF) analytics to examine these possible information processes. The rationale for employing BMF analytics and the reasoning for model construction are presented in the methodology section. Based on the aforementioned issues surrounding cheating behavior, in this exploratory study, we aim to answer the following research questions (RQs).

RQ1: How do reputation concerns influence the probability of carrying out cheating behavior?

RQ2: How do Confucian values moderate the above relationship?

2. Methodology

2.1. Theoretical foundation: Mindsponge theory and information filtering

The term mindsponge was conceptualized in a study on acculturation and globalization by Vuong and Napier (2015). The concept was described as a dynamic process by which the mind assimilates new cultural values and discards waning ones in response to external conditions. Mindsponge was later further developed into a theory of how the mind processes information (Vuong, 2023). According to the mindsponge theory, the mind is an information collection-cum-processor, including biological and social systems with varying degrees of complexity. The extended mindsponge theory was constructed based on evidence in natural sciences, taking into account essential human physiological structures and activities.

From the mindsponge perspective, the mind possesses the following characteristics. Certain physical structures must operate as processing platforms, such as the central nervous system. The mindset is the collection of all accepted and integrated information in the system, maintained in the form of memory. The filtering system determines what information is accepted or rejected based on the current content of the mindset. Both the mindset and the filtering system are changed over time due to the activity of information filtering. If needed, the filtering process can be accelerated by employing the trust mechanism (selective prioritization), reducing energy expenditure used for evaluating new information.

The mindset changes continuously through ongoing mindsponge processes and causes subsequent thoughts, attitudes, and behaviors to change accordingly (Vuong et al., 2022; Vuong et al., 2023). Mindset changes are caused by the assimilation of new information deemed advantageous and the rejection of old information deemed no longer useful. The set of trusted values that build up a mindset is constantly updated to adapt to the living environment. The way the filtering system operates is determined by the mindset; therefore, it will continue to evolve as long as we continue to think. As a consequence of the alterations in mindset, new values are filtered differently.

A system's memory content is frequently updated, and so are its responses to incoming stimuli (Procès et al., 2022). The operations of the human brain are dependent on the activity of neurons and their synapses, which adhere to biochemical principles governing molecular interactions. Several information-processing regions of our cerebral cortex are responsible for our social perceptions and behaviors (Maliske & Kanske, 2022). The activity and adaptation tendencies of biological systems are dependent on usable resources, specifically energy expenditure (Schrödinger, 1992). Thanks to neuroplasticity, the updating mechanisms in human minds are "live-wiring" (more cognition-based) rather than the prevalent "hard-wiring" strategy (more instinct-based) in simpler organisms (Eagleman, 2015). Information filtering reflects the natural evolutionary tendency of systems in the biosphere (Darwin, 2003; Vuong, 2023).

The following is a summary of the filtering process:

1) The buffer zone temporarily stores information acquired from the surroundings or memory. Here, the information is evaluated by the filtering system.

2) Information's value is evaluated using subjective cost-benefit judgments. If the perceived benefits outweigh the perceived costs, then the value of the information is deemed positive, and *vice versa*. Trusted values currently stored in the mindset serve as references for evaluation through value connection and comparison.

• Acceptance: The information is accepted if its net perceived value is positive (the new value is in alignment with existing trusted values).

• Rejection: The information is rejected if its net perceived value is negative (the new value conflicts with existing trusted values).

3) Once accepted, the new information enters the mindset as a new trusted value and can drive future evaluations of related information as well as the formation of ideas, emotions, behaviors, etc.

2.2. Model construction

2.2.1. Materials and variable selection

This study uses secondary data from the data article "Cheating, Trust and Social Norms: Data from Germany, Vietnam, China, Taiwan, and Japan" (Huynh et al., 2022). The sample includes 493 university students from these five countries/regions. The data collection was approved by the Institutional Review Board Committee #01112022 of the University of Economics Ho Chi Minh City on 1 November 2020. Informed consent was obtained from all participants. The mean age of participants was 20.87 years old. Males and females were 44% and 56%, respectively. Students from Germany, Vietnam, China, Taiwan, and Japan were 21%, 34%, 17%, 13%, and 14%, respectively.

To measure cheating behavior, participants were asked to solve problems in a fixed amount of time in the form of matrices containing twelve three-digit numbers each. A participant could solve up to 20 matrices and receive a fixed payment for each successfully solved matrix. After finishing the task, participants received an answer sheet to evaluate their correct answers by themselves. When reporting the total number of correctly solved matrices, a participant could cheat and over-report. Participants received payment afterward. Before this experiment, participants were asked to answer a questionnaire about socioeconomic factors, perceptions of social norms, trust, and cognitive reflection tests (CRT).

The variables from the dataset that were used in this study are presented in Table 1. The rationale for variable selection is presented in the next subsection "Model Formulation".

Table 1. Variable description

Variable	Meaning	Type of variable	Value

Cheat	Whether the participant overreported the correct answers in the experiment	Binary	No is coded as 0; Yes is coded as 1
Worry	How much the participant was concerned about being caught cheating	Ordinal	From 1 (not at all) to 5 (extremely)
Confucian	Whether the participant associated themselves with Confucianism	Binary	No is coded as 0; Yes is coded as 1

The variable *Cheat* represents cheating behavior, from the act of over-reporting one's correct answers in the experiment. The variable *Worry* comes from the question "Imagine getting caught cheating during an examination in front of the whole class. On a 5-point scale, how concerned would you be about your reputation (1 – not at all, and 5 – extremely)?" The variable *Confucian* represents whether one embraced Confucian values or not, which has a mean value of 0.15 in the total sample.

2.2.2. Model formulation

The behavior of cheating is carried out only when the act is considered to have a net positive value. When the mind evaluates the idea of cheating, there are various possible perceived benefits such as profit, competitive advantages, emotional satisfaction, etc., and various possible perceived costs such as risks of punishment, sense of guilt, difficult execution, etc. The fundamental functions of the mind are problem-solving and protecting the "self" construct. For students living in modern environments, social survival is a major concern. Interactions with other people in society require a favorable representative value of oneself. Thus, the risk of damaging the value of the self in the perceptions of others is a considerable cost in the subjective cost-benefit evaluation of the act of cheating. This reputation damage is connected to many negative potential consequences in mental simulation on the external feedback of one's cheating behavior. The more one wants to avoid the negative consequence (expressed as concerns), the more the corresponding behavior is attached with a bigger perceived cost. Additionally, in Asian societies, the influence of Confucianism may further increase such perceived costs of cheating. Not only the act of cheating is against Confucian values (teachings on ethics and social responsibility) but it is thought to also harm oneself indirectly through shared reputation damage. Students who associated themselves with Confucianism may feel more pressure in avoiding public awareness of their indecent behavior, for it can also harm the reputation of their families and friends, as well as the social links to them. Based on this line of reasoning, the analytical model is formulated as follows.

$$Cheat \sim normal(\mu, \sigma) \quad (1)$$

$$\mu_i = \beta_0 + \beta_{Worry} * Worry_i + \beta_{Confucian*Worry} * Confucian_i * Worry_i \quad (2)$$

$$\beta \sim normal(M, S) \quad (3)$$

The probability around μ is in the form of a normal distribution with the standard deviation σ. The state of participant i's cheating behavior is indicated by μ_i. $Worry_i$ is participant i's degree of reputation concern from being caught cheating. $Confucian_i$ is participant i's state of embracing Confucian values. The model has an intercept β_0 and coefficients β_{Worry} and $\beta_{Confucian*Worry}$.

Figure 1 shows the visualization of the model's logical network.

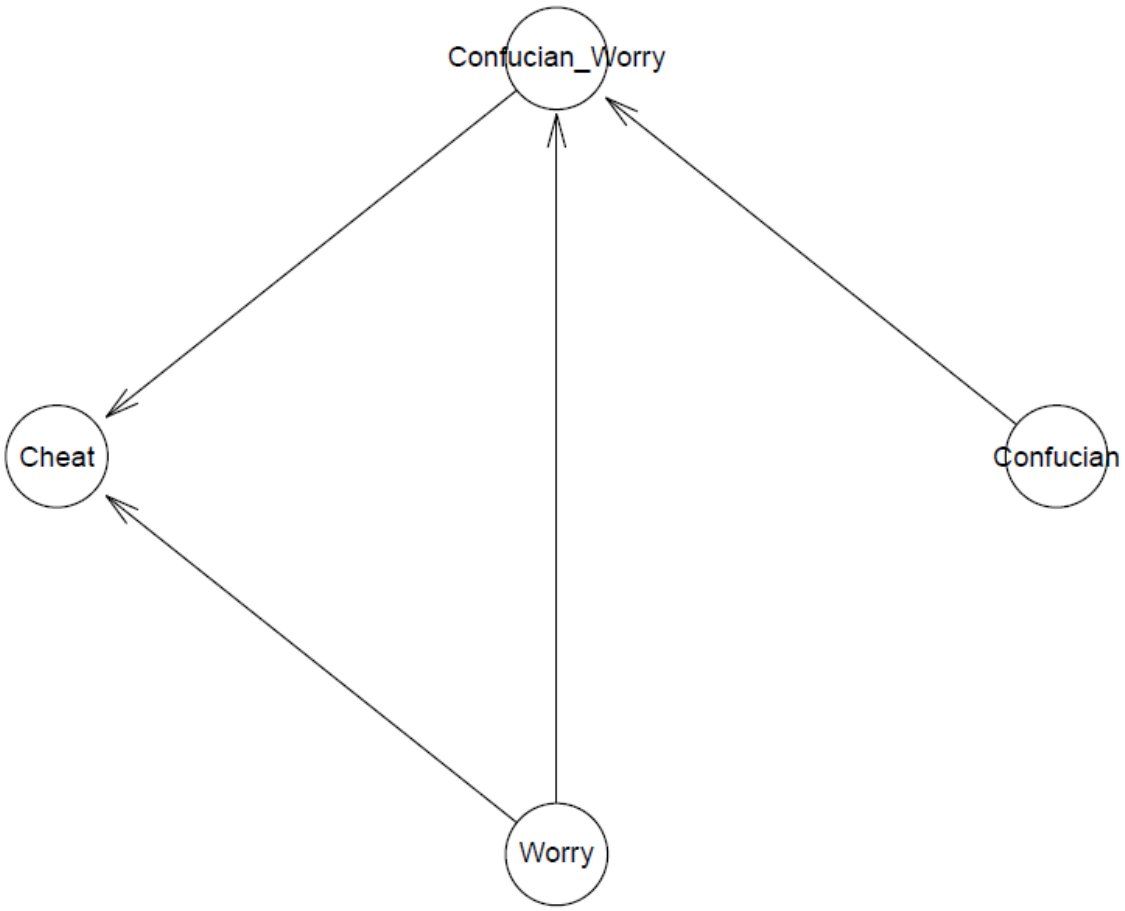

Figure 1. The model's logical network

2.3. Analysis and validation

Following the BMF protocol, we employ Bayesian analysis assisted by Markov Chain Monte Carlo (MCMC) algorithms (Nguyen et al., 2022; Vuong et al., 2022). The mindsponge mechanism and Bayesian inference are highly compatible, philosophically and technically. Bayesian inference treats all properties probabilistically, offering more accurate estimations and interpretations when working with parsimonious models. By leveraging the power of MCMC algorithms (Nguyen & Vuong, 2007; Nguyen et al., 2005), Bayesian analysis allows for a flexible range of applications. Additionally, compared to the frequentist approach, the Bayesian approach interprets statistical reliability using credible intervals rather than the *p*-value, which helps reduce the risks of *p*-value-overdependence and interpretation rigidity.

The analytical model's goodness-of-fit is evaluated using Pareto-smoothed importance sampling leave-one-out (PSIS-LOO) diagnostics (Vehtari et al., 2017). LOO is computed as follows.

$$LOO = -2LPPD_{loo} = -2\sum_{i=1}^{n} \log \int p(y_i|\theta) p_{post(-i)}(\theta) d\theta$$

Here, $p_{post(-i)}(\theta)$ is the posterior distribution based on the data minus data point i. For the PSIS method in R's "LOO" package, *k*-Pareto values are used to compute leave-one-out cross-validation, which helps identify observations with a high degree of influence on the PSIS estimate and may negatively affect the estimation. When *k*-Pareto values are greater than 0.7, observations are often considered influential. A model is normally considered to have healthy goodness-of-fit if the *k* values are below 0.5.

The Markov chains' convergence is statistically validated using the effective sample size (*n_eff*) and the Gelman-Rubin shrink factor (*Rhat*). The *n_eff* value represents the number of non-autocorrelated iterative samples during stochastic simulation. The effective samples are commonly considered sufficient for reliable inference if the *n_eff* values are greater than 1000. The *Rhat* value (also called the Gelman shrink factor) is another indicator of convergence. If the *Rhat* values are above 1.1, the chains likely do not converge. They are convergent if the *Rhat* values equal 1. The convergence of Markov chains is also visually validated using trace plots, Gelman-Rubin-Brooks plots, and autocorrelation plots.

The **bayesvl** R package (La & Vuong, 2019) is used for conducting Bayesian analysis. The model's MCMC configuration is as follows: 5000 iterations including 2000 warm-up iterations and four chains. Considering the importance of transparency and the cost of science such as the issues of shared data and reproducibility (Vuong, 2018, 2020), all data and code snippets of this study were deposited at an Open Science Framework server (https://osf.io/t97cd/).

3. Results

The latest model fitting run was conducted on March 29, 2023, on R version 4.2.1, Windows 11. The total elapsed time was 87.4 seconds.

Regarding PSIS-LOO diagnostics, Figure 2 shows that all *k* values are below 0.5, indicating an acceptable goodness-of-fit of the model.

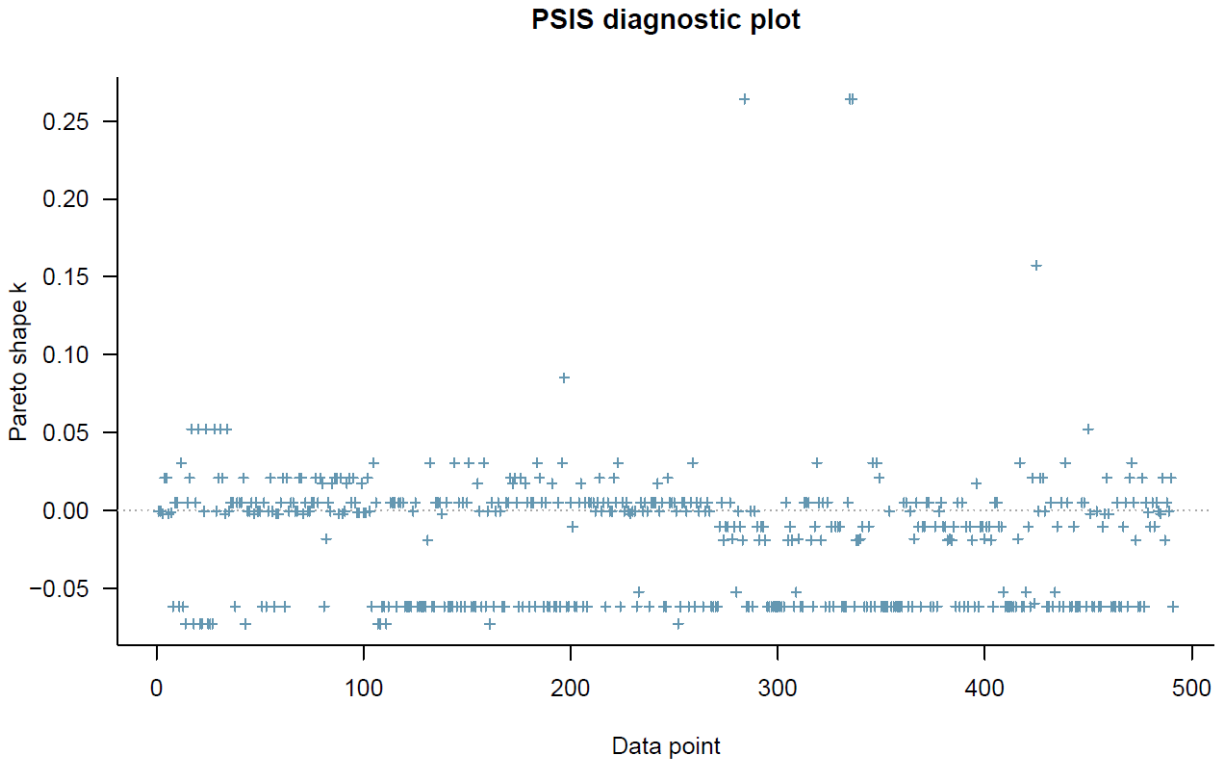

Figure 2. PSIS-LOO diagnostic plot for the model

As shown in Table 2, all *n_eff* values are over 1000, and all *Rhat* values equal 1. These statistical results indicate that the Markov chains are well-convergent.

Table 2. Estimated posteriors

Parameters	Mean	SD	n_eff	Rhat
Constant	-0.77	0.42	4915	1
Worry	-0.32	0.11	5013	1
*Confucian*Worry*	-0.14	0.12	5711	1

The trace plots for the model (see Figure 3) show that the Markov chains fluctuate around central equilibriums. The Gelman-Rubin-Brooks plots (see Figure 4) show that the shrink

factor values rapidly drop to 1 during the warm-up period. The autocorrelation plots (see Figure 5) show that autocorrelation is quickly eliminated. All these results again validate the convergence of the Markov chains.

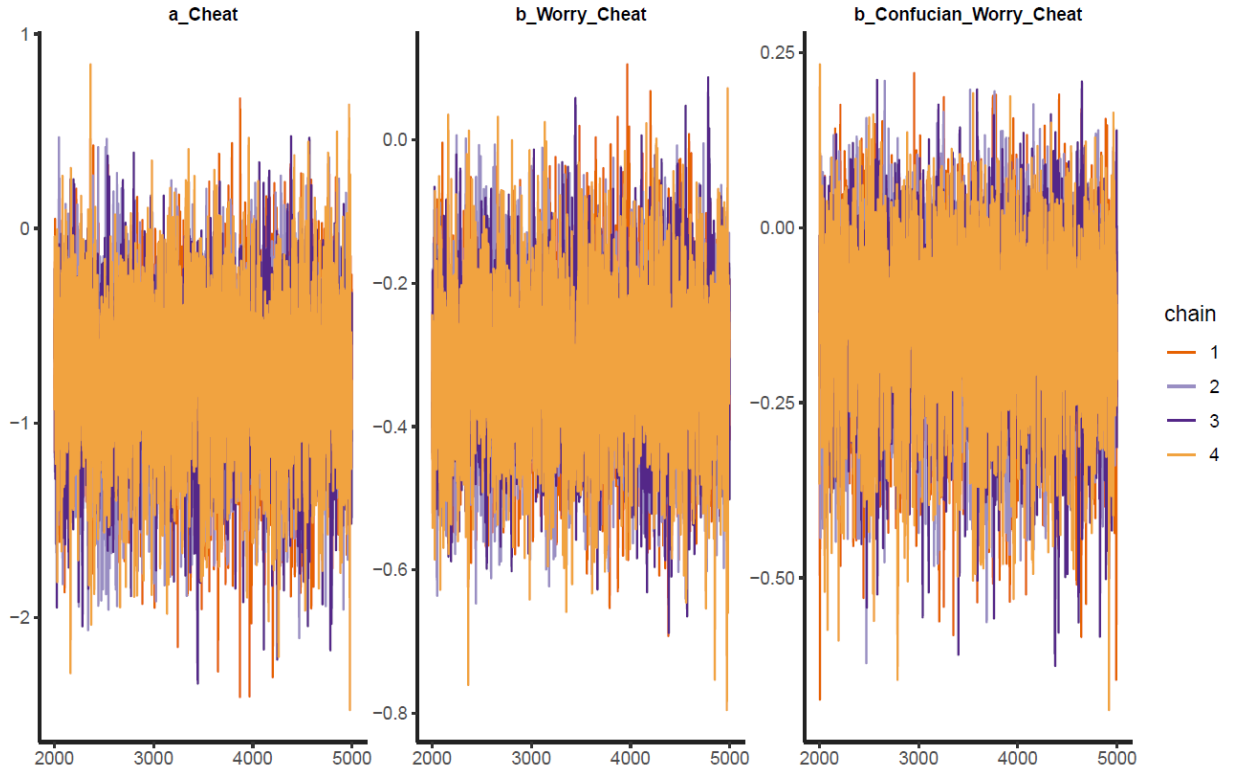

Figure 3. Trace plots for the model

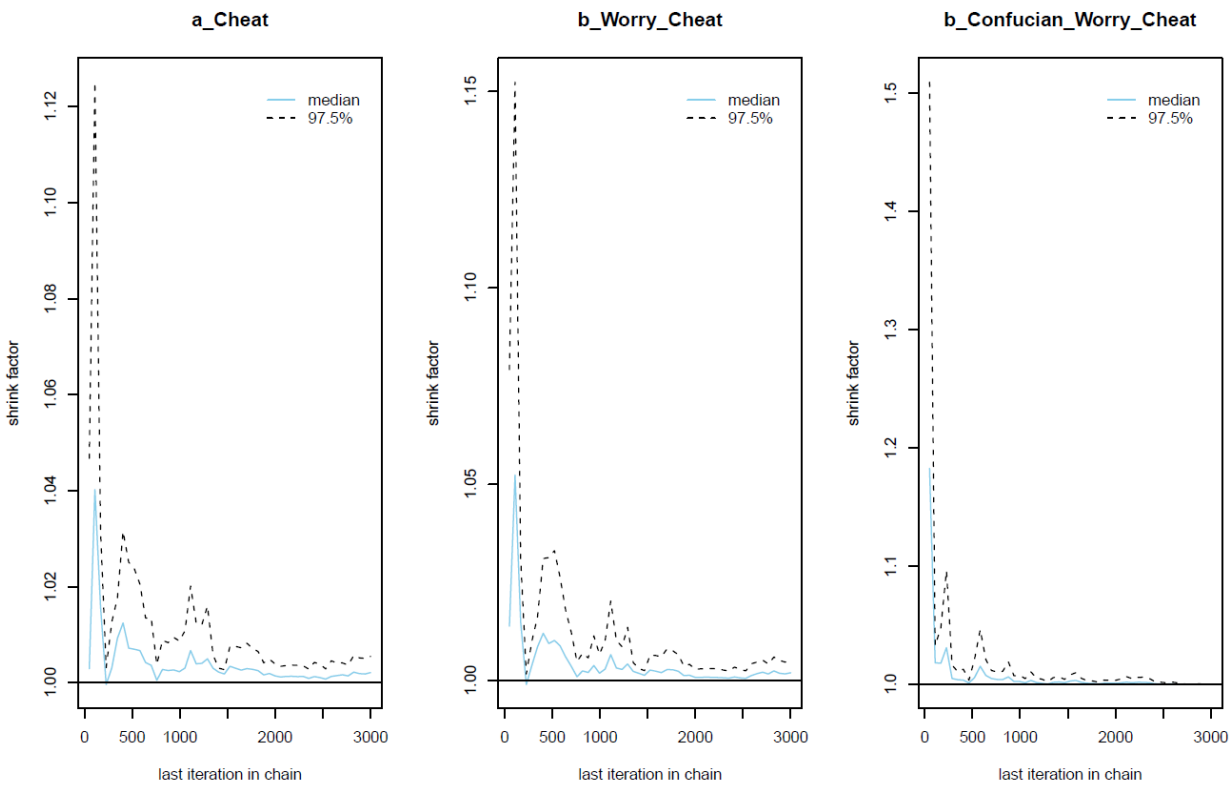

Figure 4. Gelman-Rubin-Brooks plots for the model

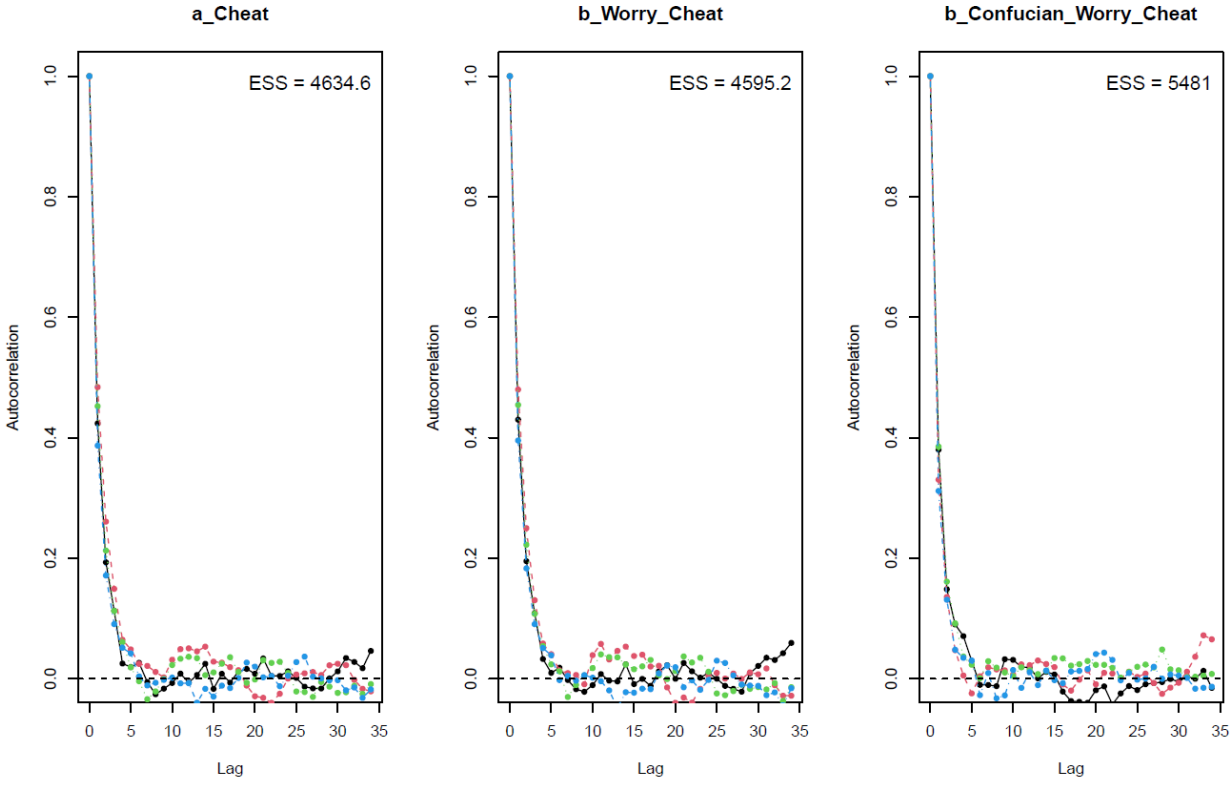

Figure 5. Autocorrelation plots for the model

As seen in Table 2, *Worry* is negatively associated with *Cheat* ($M_{Worry} = -0.32$ and $SD_{Worry} = 0.11$). *Confucian*Worry* is also negatively associated with *Cheat* ($M_{Confucian*Worry} = -0.14$ and $SD_{Confucian*Worry} = 0.12$), meaning that the moderator *Confucian* strengthens the negative association between *Worry* and *Cheat*. In Figure 6, it is shown that the coefficients of both *Worry* and *Confucian*Worry* lie almost completely on the negative side, indicating reliable effects.

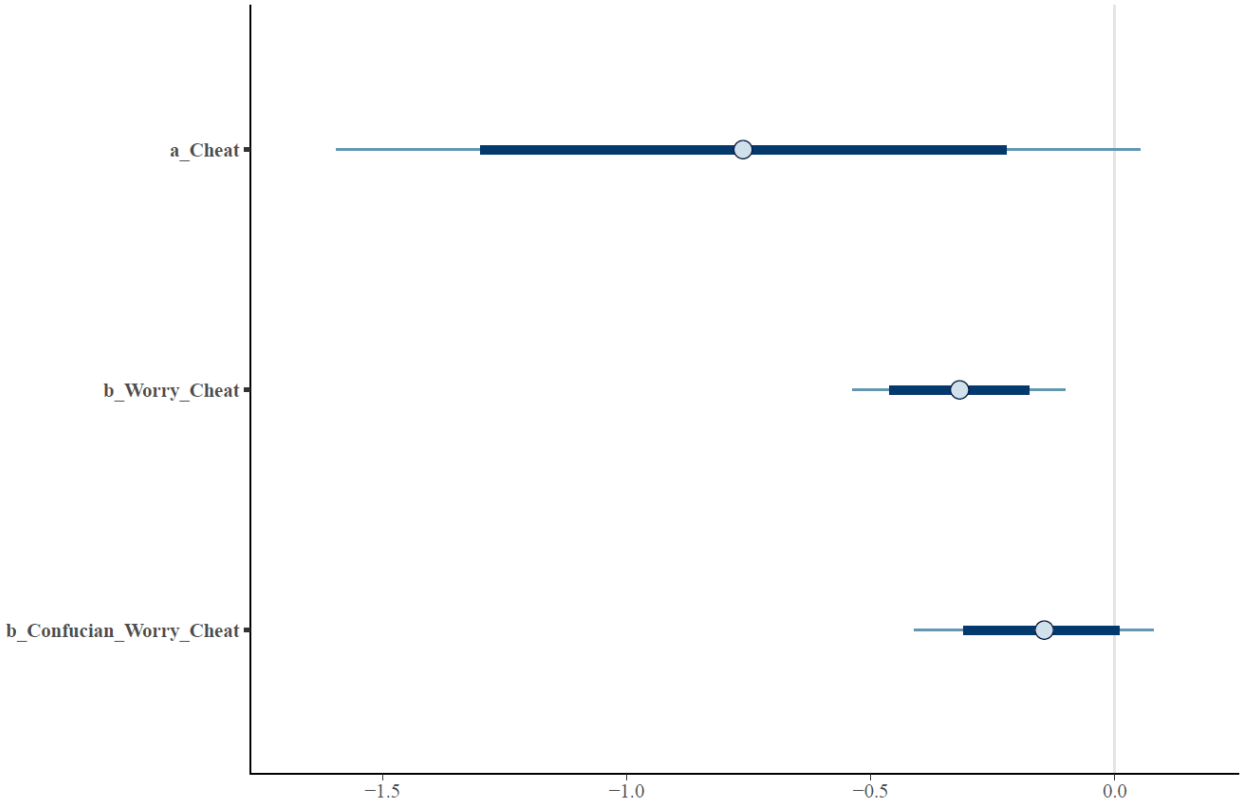

Figure 6. Posterior distributions on an interval plot

To make result interpretation easier, we calculate the estimated probabilities of cheating behavior using the mean values of the posterior coefficients with the following formula.

$$\ln \frac{\pi_{Cheating}}{\pi_{Not\ Cheating}} = -0.77 - 0.32 \times Worry - 0.14 \times Confucian \times Worry$$

For example, the probability of cheating behavior of a student with a reputation concern value of 3 and associating themselves with Confucianism are calculated as follows.

$$\pi_{Cheating} = \frac{e^{-0.77-0.32\times3-0.14\times1\times3}}{1 + e^{-0.77-0.32\times3-0.14\times1\times3}} = 0.1043 = 10.43\%$$

Figure 7 shows the visualization of calculated probabilities. The *y*-axis represents the probability of cheating behavior. The *x*-axis represents the degree of concern about one's

reputation upon being caught cheating. The color line represents the state of self-association with Confucianism. Both lines show a downward trend as the degree of concern increases. The "Confucian" line (orange) is below the "Not Confucian" line (blue).

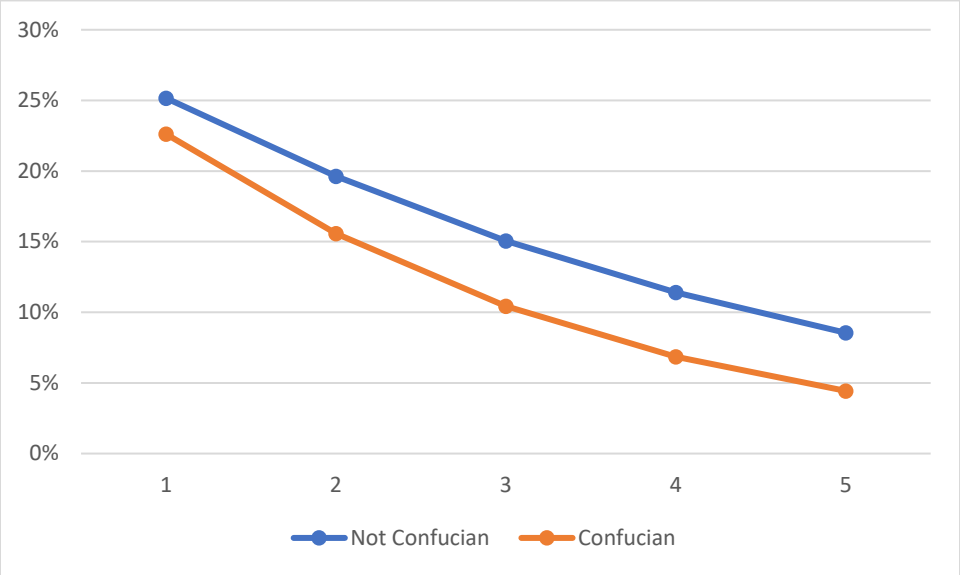

Figure 7. Estimated probabilities of cheating behavior based on reputation concern and Confucianism association

4. Discussion

The analysis results show that a higher degree of concern about one's reputation upon being caught cheating decreases the likelihood of carrying out cheating behavior. Embracing Confucian values further strengthens this negative association between reputation concern and cheating behavior. Among students with the same degree of reputation concern, those who associate themselves with Confucianism are less likely to cheat. Our findings are in alignment with former studies about the subjective cost-benefit analysis leading to cheating behavior including the influences of cultural factors (Lang, 2013; McCabe et al., 2001; Welch et al., 2005).

In terms of energy expenditure and information exchange, cheating behavior can be considered a "shortcut" to desirable outcomes. In many situations, the activation energy for certain outcomes is high enough to make the normal pathway objectively impossible. Here, if a person wants to obtain the outcome despite the incapability, then cheating is a possible option. For example, in the experiment used for collecting the data employed in this study (Huynh et al., 2022), solving all 20 matrices correctly in the given time was not feasible for an average student. If a student really wanted the maximum amount of payment but was unable to solve the puzzles as expected, over-reporting would happen. However, any action is within at least an interaction. The fundamental notion of two-sided impact is based on the basic laws of physical systems (Thornton & Marion, 2004). Instead of completely relying on

objective feedback like in simpler biological systems, the human brain allows for complex mental simulations to imagine and assess actions before actualization (Taylor et al., 1998). This is the neurological foundation behind the connection between intention and behavior, often applied through frameworks such as the Theory of Planned Behavior (Ajzen, 1991). Thus, the mind needs to evaluate if the act of cheating is beneficial (subjectively), or in other words – whether it is worth the possible consequences.

In other to optimize the value of a piece of information, the mind requires feedback (both objective and simulated) for the updating process (Nguyen et al., 2023). An intention has to have its perceived value pass a certain threshold (including activation energy cost) to be carried out (Vuong et al., 2022). During the evaluation, mental simulations of negative future feedback will reduce this perceived value and make the act of cheating more unlikely to be actualized. The intensity of simulated negative feedback is, however, heavily individual-specific. A student who cares little about reputation damage will attach a little additional perceived cost to the idea of cheating. On the other hand, a student who cares greatly about reputation damage will attach a big additional perceived cost, and thus, will more likely keep the total value under the threshold of actualization. Confucian values further intensify the simulated negative feedback of cheating – a behavior commonly deemed unethical and dishonored in society. The notion of "losing face" can be of particular emphasis in a Confucian society, since it negatively affects a person's psychological equilibrium (Han, 2016; Ho, 1976). Besides the negative impacts on the value of oneself, those who embrace Confucian values likely also think more about reputation damage to group values – their family members and other people of close relationships (Yao & Yao, 2000).

The findings of our study suggest that while it is crucial to prevent students from cheating using systemic regulations, the aspect of social cost and cultural values should also be focused on. Reputation damage and going against cultural expectations are not explicitly stated as punishment for cheating behavior, but such internal considerations increase the perceived costs of cheating and can help lower the probability of violation. Even in Western cultures where the notion of "face-saving" is not as emphasized, concerns about one's image in relation to one's social network can still contribute to the subjective cost-benefit judgments on collectively condemnable behaviors (Kluemper et al., 2012). Recent and ongoing technological advancement, especially in the field of artificial intelligence (AI), is rapidly changing the education system. More new tools are becoming available to students, and with it, new options for cheating. For example, assistance from multi-modal AI can greatly lower the efforts needed for cheating on one's homework. While school systems may take time to adapt to such new challenges, sociocultural factors can still serve as a good ethical gatekeeper for student behavior.

This study has some limitations. Although the sample used in this study includes students from different countries/regions, it does not cover major societies and cultures sufficiently. However, using the Bayesian approach, further studies with data from other

countries/regions can update our results to further increase estimation accuracy. Another noteworthy point is that this study only examines university students, who are still relatively young. As people live longer and interact more within their social infosphere, there might be certain patterns of value reinforcement. Future studies may investigate deeper how the subjective cost-benefit analysis on cheating behavior may change alongside life experience accumulation.

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