Original Article

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Prevalence and associated factors of ADHD-like symptoms among pharmacy students at Prince of Songkla University, Thailand in 2024: a cross-sectional study

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Attention deficit disorder with hyperactivity; Pharmacy students; Prevalence; Socioeconomic factors; Thailand

Objectives: This study investigated the prevalence of attention-deficit hyperactivity disorder (ADHD) and its associated factors among pharmacy students at Prince of Songkla University in 2024. It was hypothesized that the prevalence of ADHD would be associated with various demographic, socioeconomic, historical, and behavioral factors.

Methods: This cross-sectional descriptive study involved pharmacy students from years 1–5 at Prince of Songkla University in Thailand. Data were gathered from 761 students using a self-administered questionnaire that included the Adult ADHD Self-Report Scale (ASRS Screener V1.1). Descriptive statistics, the chi-square test, the Fisher exact test, and multiple logistic regression were employed for data analysis.

Results: In total, 526 students participated in the study (participation rate: 69%), with an average age of 21±1.57 years. The risk of ADHD was prevalent in 14.4% of the respondents (76 students; 95% CI: 11.4%–17.5%). Significant factors associated with an increased risk of ADHD included identifying as not disclosed or preferring not to report gender (adjusted OR [OR_{adj}], 3.32; 95% CI, 1.04–10.57), having insufficient monthly income (OR_{adj}, 2.02; 95% CI, 1.13–3.61), and recent traffic violations (OR_{adj}, 2.02; 95% CI, 1.09–3.76). It was also found that difficulties with executive functioning, such as organization and procrastination, were highly prevalent among pharmacy students.

Conclusion: The study identified a substantial prevalence of ADHD risk among pharmacy students, with factors including gender, financial challenges, and behavioral patterns such as traffic violations significantly associated with this risk. These findings underscore the necessity for targeted mental health interventions in university settings.

Introduction

Background/rationale

Attention-deficit hyperactivity disorder (ADHD) is a neurological condition primarily characterized by difficulties with inattention, hyperactivity, and impulsivity. Although ADHD is most commonly associated with children and adolescents, it can affect individuals of any age, making it a significant global issue [1]. The COVID-19 pandemic has exacerbated symptoms

of ADHD, such as impulsivity, restlessness, and concentration challenges, especially among students who are under increased academic pressure. A study conducted in Japan [2] reported a notable increase in the prevalence of ADHD among university students during the pandemic, reaching approximately 12%. This rise was accompanied by worsened symptoms, including reduced focus, impaired multitasking, emotional instability, and increased impulsivity and hyperactivity, which negatively impacted social interactions and overall functioning.

Similar trends have been observed in Thailand, where growing evidence suggests that the COVID-19 pandemic has increased risk behaviors related to violence and mental health issues among adolescents [3]. These impacts have led to physical inactivity, sedentary lifestyles, and subsequent physical changes with long-term implications. Moreover, the pandemic has contributed to the development of psychological conditions such as emotional distress, conduct problems, hyperactivity, and inattention, particularly among adolescents with chronic illnesses [4]. These negative effects may have lasting consequences, including emerging ADHD symptoms, which could lead to further adverse physical health outcomes over time.

Research has identified several factors that contribute to the risk of ADHD and other mental health issues among students. These factors are typically categorized into personal demographics, familial influences, and social dimensions [5]. Notably, the COVID-19 pandemic has intensified certain behavioral changes, such as an increased reliance on excessive digital technology, which have been linked to symptoms of ADHD [6]. Furthermore, evidence suggests that medical students exhibit a higher prevalence of ADHD-like symptoms compared to their peers in other academic fields [7]. The shift to online classes due to COVID-19 has resulted in an overall decline in academic performance [8]. Individuals experiencing significant academic stress are particularly prone to displaying symptoms of ADHD.

Despite heightened awareness of ADHD, there is limited research on its prevalence and associated factors among students in the post-COVID-19 era, particularly within the pharmacy student population. The rigorous demands of pharmacy programs, combined with the challenges of adapting to new learning environments, may lead to an increase in ADHD-like symptoms in these students.

Objectives

This study aimed to investigate the prevalence of ADHD-like symptoms and their associated factors among pharmacy students, focusing on first- to fifth-year students in 2024 at Prince of Songkla University, Thailand.

Methods

Ethics statement

This study received approval from the Human Research Ethics Committee of the Faculty of Pharmaceutical Sciences at Prince of Songkla University (Approval No. 68108/36). Additionally, participants were given an invitation letter to review prior to deciding whether to participate in the research project.

Study design

A cross-sectional descriptive survey was conducted to explore the prevalence of ADHD-like symptoms and their associated factors among pharmacy students at Prince of Songkla University, Thailand.

Settings

The online questionnaire survey was conducted among pharmacy students at Prince of Songkla University, Thailand, from January 15 to February 14, 2024.

Participants

This research involved all students from years 1 to 5 at the Faculty of Pharmaceutical Sciences, Prince of Songkla University, who are currently enrolled in both the Industrial Pharmacy and Pharmaceutical Care programs and have consented to provide information.

Variables

Drawing from the literature review, we have categorized factors potentially associated with ADHD-like symptoms into four domains. The first domain, demographic factors, includes variables such as age and gender. The second domain, socioeconomic status, covers elements like current education level, field of study, living situation, and adequacy of monthly income. The third domain, history, encompasses both personal and familial aspects, specifically past behavioral issues and diagnoses of ADHD. The fourth domain, personal behavior, examines factors such as history of traffic violations, alcohol consumption, and smoking habits. Additionally, the category of online activities explores patterns of internet usage, including duration and extent. The framework outlining the relationship between these factors and ADHD is presented in Fig. 1.

Data sources/measurement

The research employed an online questionnaire structured into three sections: (1) Personal demographics, socioeconomic status, and past ADHD diagnosis: This section collected data on various variables such as age, gender, academic year, field of study, residence, adequacy of monthly income, and both personal and familial history of ADHD. It provided a comprehensive demographic and socioeconomic profile. (2) Personal behavior and online activities: This section explored participants' behavior and online engagement through eight questions covering topics such as traffic violations, alcohol consumption, smoking, online learning hours, and media usage patterns. It aimed to examine correlations between personal behaviors and online activities. (3) The Adult ADHD Self-Report Scale (ASRS) V1.1: This reliable screener, with a sensitivity of 0.93 and specificity of 0.71, was employed to assess potential ADHD symptoms in adults [9]. The scale

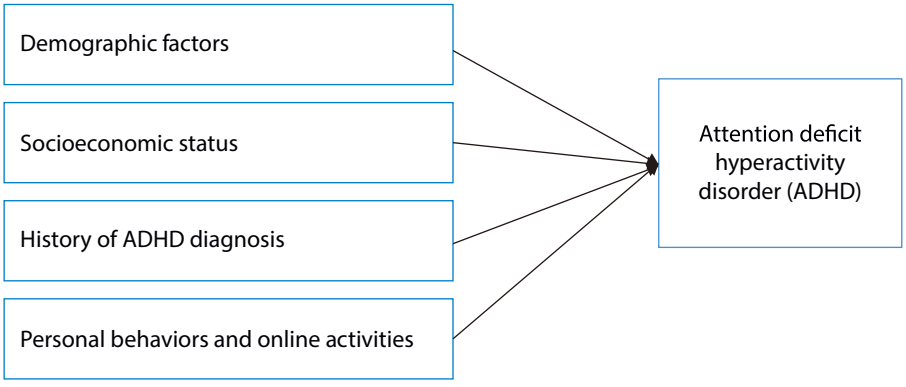

Fig. 1. Conceptual framework for studying the relationship between various factors and ADHD-like symptoms.

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includes six questions, each rated on a 5-point scale ranging from "never" to "very often." The questions are designed to measure the frequency of symptoms, aiding in the initial screening for ADHD. To assess ADHD symptoms, scores are assigned as follows: for items one through three, a score of 1 is given if responses range from "sometimes" to "very often"; otherwise, the score is 0. For items four through six, a score of 1 is assigned if responses are "often" or "very often"; otherwise, the score is 0. A total score of 4 or higher indicates potential ADHD symptoms.

The research data are available in Dataset 1.

Bias

This research took measures to prevent bias by anonymizing the identities of the respondents. Participants have the freedom to choose whether or not they wish to partake in this study.

Study size

The sample size was not estimated, as this study included the entire population that consented to provide information.

Statistical methods

This study utilized descriptive statistics to analyze personal data, including frequency distributions, percentages, means, and SDs. To investigate the relationships among variables, inferential statistics are employed, focusing on the analysis of single-variable relationships. Depending on the data, either the chi-square test or the Fisher exact test was used, with the latter being applied when expected values were fewer than 5 in more than 20% of cases. For the analysis of multiple variables, multiple logistic regression was conducted, and the results are presented as adjusted OR (OR_{adj}) and 95% CIs. All statistical analyses were performed using SPSS software, with the significance threshold set at 0.05. For data visualization, Tableau software was used.

Results

Participants

ADHD was evaluated in 761 pharmacy students across years 1 to 5 at Prince of Songkla University using the ASRS screener. Out of these students, 526 (69%) voluntarily participated, with an average age of 21±1.57 years. The majority of the participants were female (73%), enrolled in the industrial pharmacy program (59.9%), did not drink alcohol (66.2%), did not smoke (98.1%), and had no previous ADHD diagnosis (95.3%). The screening identified 76 students (14.4%; 95% CI, 11.4%–17.5%) as meeting the criteria for ADHD.

Table 1 presents the frequency distributions of subgroup variables and analytical factors associated with ADHD. The study employed the chi-square or Fisher exact test to identify significant associations between the occurrence of ADHD and various variables. These variables included gender, adequacy of monthly income, history of prior ADHD diagnosis, frequency of traffic rule violations in the past 3 months, daily internet or smartphone use, and duration of online study sessions.

The results revealed a statistically significant difference in ADHD rates based on gender (P=0.017). Furthermore, individuals with insufficient income were more likely to have ADHD compared to those with sufficient income (P=0.021). Additionally, there was a significant association concerning individuals with a prior ADHD diagnosis, who were much more likely to

Table 1. Preliminary test results for the relationship between screening factors and ADHD assessment results

Factors	n (%)	ADHD assessment results (n=526)		P-value[1)]
		No ADHD n (%)	ADHD n (%)	
Age (yr)				0.793
≤20	116 (22.1)	100 (86.2)	16 (13.8)	
21–23	322 (61.2)	273 (84.8)	49 (15.2)	
≥23	88 (16.7)	77 (87.5)	11 (12.5)	
Gender				0.017
Male	122 (23.2)	102 (83.6)	20 (16.4)	
Female	384 (73.0)	335 (87.2)	49 (12.8)	
Undisclosed gender	20 (3.8)	13 (65.0)	7 (35.0)	
Year of study				0.137
1	126 (24.0)	106 (84.1)	20 (15.9)	
2	137 (26.0)	122 (89.1)	15 (10.9)	
3	99 (18.8)	78 (78.8)	21 (21.2)	
4	96 (18.3)	82 (85.4)	14 (14.6)	
5	68 (12.9)	62 (91.2)	6 (8.8)	
Program of study				0.897
Industrial pharmacy	315 (59.9)	270 (85.7)	45 (14.3)	
Clinical pharmacy	211 (40.1)	180 (85.3)	31 (14.7)	
Residence				0.307
Home	86 (16.3)	69 (80.2)	17 (19.8)	
Off-campus dormitory	214 (40.7)	185 (86.4)	29 (13.6)	
On-campus dormitory	226 (43.0)	196 (86.7)	30 (13.3)	
Living arrangement				0.226
With family	90 (17.1)	73 (81.1)	17 (18.9)	
With friends	215 (40.9)	190 (88.4)	25 (11.6)	
Living alone	221 (42.0)	187 (84.6)	34 (15.4)	
Adequacy of monthly income				0.021
Sufficient	350 (66.5)	310 (88.6)	40 (11.4)	
Insufficient	176 (33.5)	140 (79.5)	36 (20.5)	
Personal history of ADHD diagnosis				0.005
Yes	4 (0.8)	2 (50.0)	2 (50.0)	
No	502 (95.4)	433 (86.3)	69 (13.7)	
Unsure	20 (3.8)	15 (75.0)	5 (25.0)	
Family history of ADHD diagnosis				0.189
Yes	6 (1.1)	4 (66.7)	2 (33.3)	
No	498 (94.7)	429 (86.1)	69 (13.9)	
Unsure	22 (4.2)	17 (77.3)	5 (22.7)	
Traffic violation behavior (in the past 3 months)				0.013
Ever violated traffic rules	166 (31.6)	133 (80.1)	33 (19.9)	

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Table 1. Continued

Factors	n (%)	ADHD assessment results (n=526)		P-value[1)]
		No ADHD n (%)	ADHD n (%)	
Never violated traffic rules	303 (57.6)	271 (89.4)	32 (10.6)	
Unsure	57 (10.8)	46 (80.7)	11 (1.3)	
Frequency of drinking (in the past 3 months)				0.318
Do not drink	349 (66.3)	304 (87.1)	45 (12.9)	
Drink less than or equal to 3 times per week	43 (8.2)	38 (88.4)	5 (11.6)	
Drink more than 3 times per week	115 (21.9)	94 (81.7)	21 (18.3)	
Smoking				0.625
Non-smoker	517 (98.3)	443 (85.7)	74 (14.3)	
Smoker	9 (1.7)	7 (77.8)	2 (22.2)	
Time spent on the internet/smartphone per day (hr)				0.040
Less than 4	70 (13.3)	65 (92.4)	5 (7.1)	
4–6	134 (25.5)	119 (88.8)	15 (11.2)	
More than 6	322 (61.2)	266 (82.6)	56 (17.4)	
Length of online study/learning session (hr)				0.027
Less than or equal to 1	40 (7.6)	34 (85.0)	6 (15.0)	
More than 1 up to 2	288 (54.8)	246 (85.4)	42 (14.6)	
More than 2 up to 3	140 (26.6)	127 (90.7)	13 (9.3)	
More than 3	58 (11.0)	43 (74.1)	15 (25.9)	
Most frequent time of using online media				0.053
Daytime	33 (6.3)	32 (97.0)	1 (3.0)	
Nighttime	486 (92.4)	413 (85.0)	73 (15.0)	
Both	7 (1.3)	5 (71.4)	2 (28.6)	

ADHD , attention-deficit hyperactivity disorder.
[1)] Chi-square test or Fisher exact test (for expected values below 5 in more than 20% of cases).

be deemed at risk for ADHD in this assessment (P=0.005). Furthermore, a statistically significant association was observed between ADHD assessment results and behavioral factors, including traffic violations (P=0.013), internet usage (P=0.040), and the duration of study sessions (P=0.027).

Main results

Fig. 2 presents a bar chart that displays responses to the ASRS screener for six key questions. Each bar represents the frequency of ADHD-related symptoms as rated by different groups of students. The x-axis indicates the number of students, and the colored segments within each bar show varying frequency responses, from "never" to "very often". Key observations reveal that many individuals often struggle to complete tasks after finishing the challenging parts, suggesting issues with task follow-through. Similarly, numerous respondents frequently encounter difficulties in organizing tasks that require careful planning, indicating problems with executive functioning.

Memory issues were prevalent, with a significant number of respondents reporting that they sometimes or often forgot appointments or obligations. Tasks requiring substantial mental effort

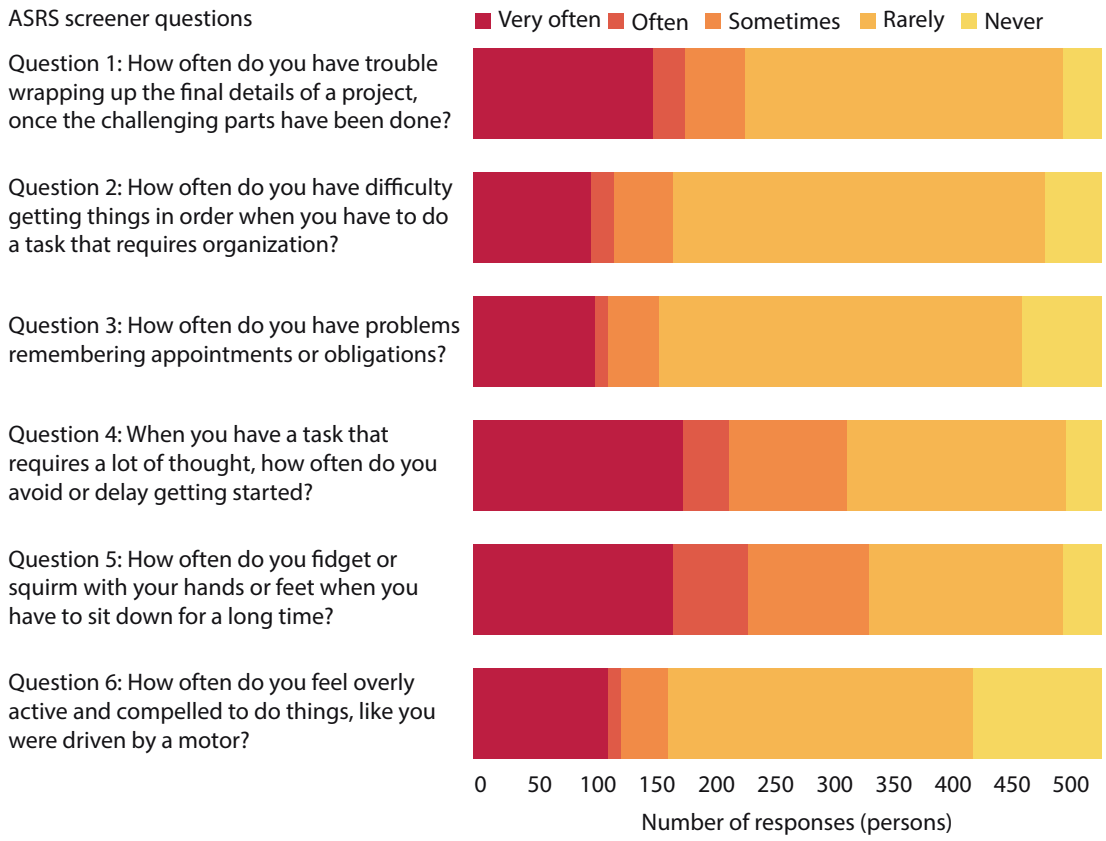

Fig. 2. The distribution of responses to the ASRS screener questions among pharmacy students. ASRS, Adult ADHD Self-Report Scale; ADHD, attention-deficit hyperactivity disorder.

frequently led to avoidance and procrastination, with many respondents admitting they delayed starting such tasks "very often" or "often." Restlessness was another common issue, with numerous respondents experiencing fidgeting or squirming when required to sit for extended periods. Although responses varied, fidgeting was frequently reported by a significant portion of respondents. Additionally, feelings of hyperactivity and the urge to stay in motion were apparent, with many respondents experiencing this "sometimes."

Multiple logistic regression analysis of factors related to the prevalence of ADHD identified significant associations after adjusting for the influence of a past ADHD diagnosis. The factors found to be statistically significant included not disclosed or unspecified gender (OR_{adj}, 3.32; 95% CI, 1.04–10.57), insufficient monthly income relative to expenses (OR_{adj}, 2.02; 95% CI, 1.13–3.61), and a history of traffic violations within the past 3 months (OR_{adj}, 2.02; 95% CI, 1.09–3.76), as detailed in Table 2.

Discussion

Key results

This research investigated the prevalence of ADHD and its associated factors among pharmacy students in 2024. The study involved 526 pharmacy students from first to fifth years at Prince of Songkla University, who participated voluntarily. The findings indicate that

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Table 2. Factors related to the prevalence of ADHD

Factor	OR_{adj}	95% CI	P-value[1)]
Gender (reference: female)			
Male	1.264	(0.627–2.546)	0.512
Unspecified gender	3.317	(1.041–10.574)	0.043
Adequacy of monthly income (reference: sufficient)			
Insufficient	2.019	(1.129–3.611)	0.018
Traffic violation behavior (reference: never violated traffic rules in the past 3 months)			
Ever violated traffic rules in the past 3 months	2.021	(1.086–3.759)	0.026
Unsure	1.189	(0.470–3.007)	0.714

ADHD, attention-deficit hyperactivity disorder.
[1)] Multiple logistic regression, with a significance level at 0.05.

14.4% of the students showed signs of ADHD. The initial analysis examined the relationship between ADHD and various factors, including gender, monthly income sufficiency, previous ADHD diagnoses, recent traffic violations, daily internet and smartphone usage, and the length of online study sessions. Further analysis on the impact of previous ADHD diagnoses revealed several risk factors that increase the likelihood of an ADHD diagnosis. Individuals of unspecified gender were found to have higher odds of ADHD than female students, although no significant difference was found between male and female students. Additionally, students with insufficient income were more than twice as likely to have ADHD than those with adequate income. Moreover, students who had committed traffic violations in the past 3 months were approximately twice as likely to have ADHD compared to those who had not.

Interpretation

Current pharmacy students appear to have a higher risk of developing ADHD-like symptoms, with a prevalence exceeding the 8% reported before the COVID-19 pandemic by the Mental Health Institute in Thailand [10]. Fig. 2 visualizes the prevalence of these behaviors among students. The cognitive symptoms reported in pharmacy students include impaired attention, difficulty in task management, forgetfulness, and reduced executive functioning—consistent with common ADHD challenges. Difficulties in executive functioning, such as organization and procrastination, were highly prevalent. While hyperactivity and impulsive symptoms were also present, they were less pronounced compared to the challenges associated with inattention. The findings suggest that several factors may contribute to this increased ADHD risk among pharmacy students, including mental health struggles related to gender identity, financial stress, and environmental influences. Notably, students with insufficient income were twice as likely to exhibit ADHD-like behaviors compared to those with sufficient income. Furthermore, students who violated traffic rules show a doubled risk of ADHD, with even those unsure about their traffic behavior showing an increased likelihood. This may be linked to traits such as impulsivity, inattention, and difficulties with executive functioning, which can contribute to higher rates of risky or rule-breaking behaviors, particularly in risky driving.

Comparison with previous studies

Our findings are consistent with increased rates of ADHD observed in other countries since

the onset of the COVID-19 pandemic. For example, a study in Europe noted an increase in the consumption of ADHD medications following the pandemic [11]. Additionally, our results align with studies indicating that not disclosed and transgender individuals experience significantly higher rates of mental health challenges than their cisgender counterparts [12]. There is also substantial evidence suggesting that chronic financial stress can contribute to cognitive and behavioral issues typically associated with ADHD [13]. Moreover, our findings corroborate the connection between traffic violations and unmedicated ADHD drivers, especially in situations that require low levels of attention [14]. However, our study identifies a correlation between the duration of online learning and the manifestation of ADHD symptoms, which contradicts previous research suggesting no link between learning styles and mental health issues [15].

Limitations/generalizability

While our study offers valuable insights, its scope was limited to a single university in Southern Thailand, potentially affecting its generalizability. The cross-sectional design provided only a snapshot in time and lacked the depth of a longitudinal study. Furthermore, the reliance on self-reported data could introduce biases, and the sample size for certain subgroups, such as male students, was relatively small. Future research should aim to include larger sample sizes to address these limitations.

Suggestions

To advance research on ADHD prevalence among pharmacy students, further studies are essential to fully comprehend their behavioral patterns and coping strategies. This understanding is crucial for developing effective support mechanisms tailored to their specific needs. Additionally, it is important to explore targeted interventions that address specific risk factors identified in the study, including insufficient income, gender identity, and recent traffic violations. Addressing these factors will improve our understanding of ADHD in this group and inform the development of more precise and effective intervention strategies.

Conclusion

Several factors increase the likelihood of experiencing ADHD-like symptoms. Individuals of unspecified gender, those with insufficient monthly income, and those with recent traffic rule violations were more prone to exhibit ADHD-like symptoms. Notably, symptoms such as difficulties in executive functioning, including organization and procrastination, were highly prevalent among pharmacy students.

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Writing – original draft: Rakchat K, Eadcharoen S, Pentrakan A
Writing – review & editing: Rakchat K, Eadcharoen S, Pentrakan A

Conflict of interest
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Data availability
Data files are available from Harvard Dataverse: https://doi.org/10.7910/DVN/BRQQDV

Dataset 1 . Raw response data from 526 participants in Thailand

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Supplementary materials
Not applicable.

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