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Peer Rejection And Mental Health Outcomes In Adolescents: The Indirect Effects Of Repeated Rejection In A Three-Month Follow-Up

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Abstract

This longitudinal study examines the long-term impacts of peer rejection on mental health among adolescents, with a specific focus on the indirect effects of repeated rejection. Data were collected from 478 students at two time points during the 2023–2024 academic year in Hanoi, Vietnam. Peer rejection was measured using a composite scale based on established tools, and mental health outcomes were assessed using the Strengths and Difficulties Questionnaire (SDQ). Partial Least Squares Structural Equation Modelling (PLS-SEM) was employed to analyse the relationships between variables. The results indicate that peer rejection at Time 1 (T1) significantly predicts both internalising problems (β = .207, p < .001) and externalising problems (β = .135, p = .035) at Time 2 (T2). Additionally, peer rejection at T1 significantly predicts repeated rejection at T2 (β = .627, p < .001). Furthermore, repeated rejection at T2 also significantly predicts internalising (β = .374, p < .001) and externalising problems (β = .281, p < .001) at T2. Indirect effect analysis shows that repeated rejection at T2 partially explains the relationship between early peer rejection and subsequent mental health problems, specifically internalising (β = .235, p < .001) and externalising problems (β = .176, p < .001). These findings highlight the detrimental effects of repeated peer rejection on adolescent mental health, underscoring the need for early interventions and targeted support in school environments. Addressing repeated peer rejection could help mitigate its long-term impact on both emotional and behavioural outcomes.

Keywords: adolescent, indirect effect, mental health, peer rejection, repeated rejection, Vietnam

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Introduction

Peer relationships play an important role in the emotional and social development of adolescents. Secure and high-quality peer attachments are linked to better psychosocial adjustment, such as higher levels of trust, communication, and closeness, and lower levels of isolation and social rejection (Delgado et al., 2022; Therriault et al., 2024). During adolescence, individuals become more sensitive to how peers accept or reject them. Positive peer relationships are connected to greater empathy, which supports emotional health and reduces behavioural and emotional problems (Li et al., 2025; Schoeps et al., 2020). While positive interactions help adolescents develop social skills and emotional support, negative experiences – such as peer rejection – can increase the risk of mental health issues like depression, anxiety, and behavioural difficulties (Prinstein & Aikins, 2004; Rubin et al., 2008).

Peer rejection is a common and harmful social experience during adolescence. It refers to being excluded or not accepted by peers, which often causes feelings of loneliness and emotional pain (Lev-Wiesel et al., 2006; Masten et al., 2009; Zimmer-Gembeck, 2016). Many adolescents see peer rejection as one of the most painful events of their youth, and about one-third of young adults report such experiences during adolescence (Lev-Wiesel et al., 2006). Research shows that rejection can lead to both internalising problems, such as anxiety, depression, and loneliness, and externalising problems, such as aggression and rule-breaking (Gao et al., 2017; Janssens et al., 2015). These issues may be caused by emotional distress and fewer opportunities to build healthy friendships. Rejected adolescents may also associate with peers who have similar behaviour problems, which can make their situation worse (Dong et al., 2023). Peer rejection is linked to higher risks of suicidal thoughts and behaviours (Geoffroy et al., 2016; Lereya et al., 2015). In addition, rejected adolescents are more likely to be both bullied and to bully others, often targeting different peers in each case (Xiong et al., 2025). Rejection is also closely connected to depression. There is a two-way relationship: rejection can cause depression, and depression can lead to more rejection (Beeson et al., 2020; Platt et al., 2013; Zimmer-Gembeck, 2016).

Although many studies examine the effects of peer rejection, most use cross-sectional designs. Peer rejection in childhood and early adolescence is a strong predictor of later emotional and behavioural problems. Longitudinal research shows that early peer rejection is linked to higher levels of aggression, depressive symptoms, and lower academic achievement during adolescence. Some effects are stronger for boys (aggression, depression) and for girls (academic difficulties) (Coie et al., 1995; Ialongo et al., 1998). When peer rejection is combined with aggression, it predicts more severe and long-lasting internalising problems (e.g., depression) and externalising problems (e.g., aggression, substance use). For girls, this combination is also related to higher risks of substance use and sexual risk behaviours in adolescence (Coie et al., 1995; Prinstein & La Greca, 2004). However, there is limited research on how repeated peer rejection over time may explain these long-term outcomes.

Repeated peer rejection refers to ongoing or frequent experiences of being excluded or treated negatively by peers during adolescence. It involves more than a single event and includes continuous patterns of exclusion, dismissal, or mistreatment by others over time. Research suggests that repeated rejection can lead to chronic stress, negative self-image, and social withdrawal, which all increase the risk of poor mental health outcomes (McLachlan et al., 2010; Zimmer-Gembeck et al., 2007). These repeated experiences may trap adolescents in a cycle of isolation and further rejection, making it harder for them to build healthy social connections (Coie et al., 1995; Laird et al., 2001). Persistent rejection can also shape long-term development, predicting emotional and behavioral problems even when earlier difficulties are considered (Coie et al., 1995; Laird et al., 2001). In addition, repeated rejection may increase sensitivity to future rejection, causing adolescents to overreact to minor social setbacks and feel more isolated and distressed (Beeson et al., 2020; Masten et al., 2009; Zimmer-Gembeck, 2016). However, few studies have directly examined repeated rejection as an indirect pathway between early peer rejection and later mental health problems.

In Vietnam, bullying among adolescents – especially in schools – is a serious issue. Studies report that between 32% and over 96% of middle and high school students have experienced at least one form of bullying, depending on the time, location, and study sample (Duong et al., 2018; Nguyen et al., 2020; UNICEF, 2022). However, peer rejection has not been studied much as a separate experience. It is often examined together with bullying, which can be misleading. Peer rejection and bullying are different and may affect mental health in different ways. Peer rejection involves being regularly excluded from social interactions or group activities. This often leads to loneliness, low self-esteem, and emotional distress (Rodman et al., 2017). In contrast, bullying includes more direct and aggressive actions, such as physical harm, verbal abuse, or social manipulation (Bhatia, 2023). Although both experiences can harm mental health, they may do so through different processes.

Despite its serious impact, peer rejection remains under-researched in Vietnam, especially in relation to both internalising (e.g., anxiety, depression) and externalising (e.g., aggression, conduct problems) outcomes. There is a lack of longitudinal studies exploring repeated rejection as a possible indirect pathway. This gap makes it hard to design effective prevention and support strategies for students who face peer rejection. Studying peer rejection separately is important for developing school-based interventions that address its unique effects on mental health.

The current study addresses this gap by using a longitudinal design to follow high school students over time. It explores the effects of peer rejection on both internalising and externalising problems, and how repeated rejection may account for indirect effects. Specifically, the study tests two main hypotheses:

- (H1) Peer rejection at Time 1 (T1) is associated with mental health outcomes (internalising and externalising problems) at Time 2 (T2).
- (H2) Repeated peer rejection at T2 exerts an indirect effect the relationship between peer rejection at T1 and mental health outcomes at T2.

This research aims to clarify the long-term and compounding effects of peer rejection on adolescent mental health. It highlights the need to address repeated rejection in school-based interventions to support adolescents' emotional and behavioural well-being.

Method

Research design

The longitudinal study aimed to examine the long-term relationship between peer rejection and mental health, with a specific focus on the indirect effects of repeated rejection. The study was conducted throughout the 2023–2024 academic year. A semester in Vietnam typically lasts approximately four and a half months. The first semester exam usually takes place around four months after the semester begins, marking the most stressful and anxious period for students. To minimize the influence of confounding variables, the study selected a three-month period, excluding the exam period. A three-month period is also appropriate since short-term exclusion can have immediate and profound psychological effects (Williams & Jarvis, 2006). Approval was obtained from the University of Education and local Department of Education and Training to conduct the research at local schools. Based on a list of schools in Hanoi provided by the Department, one middle school and one high school were randomly selected and invited to participate. Both schools were public, non-specialised, and non-elite institutions. After agreeing to participate, each school provided a list of all classes, excluding advanced classes. From this list, two classes per grade were randomly selected from grades 7 to 12, resulting in a total of 12 classes across the two schools, with an average of 35 to 45 students per class. Grade 6 was excluded due to students' limited exposure to peer relationships in the school setting. All students in the selected classes were invited to take part in the study, and informed consent was obtained from both the students and their parents or guardians.

Data collection

Data were collected at two time points: the first survey (Time 1, T1) was conducted at the beginning of the academic year, and the follow-up survey (Time 2, T2) took place three months later to avoid the exam period. To ensure consistency, the same questionnaire was used at both time points. Data collection occurred during students' free-activity sessions to avoid interrupting regular class schedules. The research team first explained the purpose of the study and provided a general overview of the questionnaire. Students were informed that the study had been approved by school leaders and homeroom teachers. Each student received a copy of the study information and a parental consent form to take home. On the scheduled survey day, held one week later during another free-activity session, only students who returned signed parental consent forms were allowed to participate. Students were clearly informed that, in addition to parental permission, their participation was voluntary. The research team emphasised that students could withdraw at any time or skip any questions without giving a reason, and that non-participation would not affect their grades or relationships with teachers or researchers. To ensure a comfortable environment, teachers were asked not to be present during the survey. After approximately 25 minutes of completing the questionnaire, each student received a small token of appreciation valued at $3.20 for purchasing learning materials.

Measures

In addition to collecting demographic information such as gender, grade level, school type, and school name, the questionnaire also included the following measurement scales.

To measure peer rejection among adolescents, we developed a questionnaire based on existing tools, including the Multidimensional Peer Victimization Scale (Mynard & Joseph, 2000), the Social Peer Rejection Measure (Lev-Wiesel et al., 2006), the Index of Peer Relations (Walter, 1990), and items from Asher et al. (2001). The scale comprised 22 items, structured into three subscales: peer rejection (7 items), bullying (11 items), and cyberbullying (4 items). The model fit of the scale was satisfactory in our previous study. The normed chi-square (χ^2/df) was 2.85, indicating an acceptable fit. The CFI value of .946 suggests a good model fit, while the RMSEA of .038 and SRMR of .041 indicate a close fit to the data. This study specifically utilized the peer rejection subscale to assess adolescents' experiences of being ignored, socially excluded, and treated as non-existent within their peer group. The peer rejection subscale measured instances of being excluded from group activities, play, study sessions, and group meetings. Higher scores indicate greater levels of peer rejection. Students responded using a 4-point scale: 1 (Never), 2 (Two times), 3 (Three times), and 4 (More than three times), based on experiences in the past month. The internal reliability of this subscale was high, with Cronbach's alpha values of .916 at Time 1 and .939 at Time 2, demonstrating good consistency.

The Strengths and Difficulties Questionnaire (SDQ) was used to assess mental health among children and adolescents (Goodman, 1997). The SDQ has been translated into nearly 90 languages, including Vietnamese (SDQInfo, n.d.), and consists of 25 items divided into five subscales: Emotional symptoms, Conduct problems, Hyperactivity/inattention, Peer relationship problems, and Prosocial behaviour. Each subscale contains five items, with responses rated on a 3-point Likert scale (0 = 'Not True', 1 = 'Somewhat True', 2 = 'Certainly True'). For low-risk populations, Goodman et al. (2010) recommend calculating total scores for Internalizing problems (Emotional symptoms and Peer relationship problems) and Externalizing problems (Conduct problems and Hyperactivity/inattention), and they were modelled as distinct constructs. Although moderate associations between the two constructs have been reported in prior research (e.g., r = .37), discriminant validity was confirmed in our model, and no covariance path was estimated between the two outcomes in accordance with the theoretical structure of the SDQ. The SDQ has been adapted for use in Vietnam (Dang et al., 2013) and is widely used in studies on children's mental health. In this study, the reliability of the Internalizing and Externalizing subscales was .683 and .570, indicating acceptable reliability.

Ethical approval

This study was approved by the Vietnam Ministry of Science and Technology, and Institute of Psychology, Vietnam Academy of Social Sciences on September 14, 2023 (reference number 65/2023/501.02/HĐKHXH), and followed the

ethical principles of the Declaration of Helsinki. Participation was voluntary. Written informed consent was obtained from both students and their parents or guardians before data collection.

Data analysis

Data were analysed using SPSS 22 and SmartPLS 4. Initially, the data were recoded from words to numerical values to enable statistical analysis. Descriptive statistics and group comparison tests were conducted to explore sample characteristics and differences across subgroups. Subsequently, the predictive model was developed using partial least squares structural equation modelling (PLS-SEM).

Prior to analysis, data cleaning procedures were conducted. A total of 478 cases were retained for the final analysis; these were participants who completed surveys at both T1 and T2. Cases with missing data in more than two items on any major construct or who only participated in one wave (T1 or T2) were excluded from the sample. For the retained cases, missing values were minimal and were handled using mean substitution within each respective scale.

Model quality was evaluated using standard criteria. The composite reliability values exceeded 0.70, indicating good internal consistency. The heterotrait-monotrait (HTMT) ratio of correlations remained below the threshold of 0.90, confirming discriminant validity. The Standardized Root Mean Square Residual (SRMR) was below 0.08, suggesting a good model fit. Furthermore, variance inflation factor (VIF) values were all below 3.0, indicating no issues with multicollinearity within the structural model. The structural relationships were assessed using standardized β coefficients, R^2 values for explained variance, and f^2 for effect sizes. A bootstrapping procedure with 5,000 resamples was employed to test the significance of the path coefficients. Statistical significance was determined at the 0.05 level.

Results

Participants and Response Rates

A total of 510 students participated in the first survey (T1), and 495 students participated in the follow-up survey (T2). The final analysis included 478 students who participated in both surveys and provided complete responses, resulting in a response rate of 93.7%. Approximately half of the sample consisted of male students (48.7%), with no significant difference between the number of male and female participants. The distribution of students was relatively even across grades, except for grade 12, which had slightly fewer participants.

Descriptive Statistics of Variables

A paired-sample t-test was conducted to compare peer rejection scores between the two survey points. At T1, the mean peer rejection score was 9.77 (SD = 4.43), while at T2, it was 9.95 (SD = 4.89). The difference was not statistically significant ($t_{(474)}$ = -.904, p = .366), indicating consistent scores across both time points. However, the autoregressive path from Peer Rejection T1 to Peer Rejection T2 in the structural model was significant (see Table 2), suggesting moderate temporal stability. This indicates that, on average, students who reported higher levels of peer rejection at the beginning of the school year tended to report similar levels three months later.

As an exploratory analysis, gender differences in peer rejection scores were examined at both T1 and T2. Female students reported significantly higher levels of peer rejection than male students at both time points (T1: $t(478) = -4.52$, $p < .001$; T2: $t(478) = -4.49$, $p < .001$; see Table 1).

Tab. 1. Rejection Score in T1 and T2 by Gender

	Boy		Girl				
	M	SD	M	SD	t	df	p
Peer Rejection T1	8.84	3.66	10.64	4.90	-4.52	478	<.001
Peer Rejection T2	8.93	4.10	10.90	5.37	-4.49	478	<.001

PLS-SEM Results

The PLS-SEM analysis showed that, as expected, both outcome variables demonstrated significant autoregressive effects (Table 2). Specifically, Externalizing Problems at T1 significantly predicted Externalizing Problems at T2 ($\beta = .673$, $p < .001$), and Internalizing Problems at T1 significantly predicted Internalizing Problems at T2 ($\beta = .692$, $p < .001$).

Peer Rejection at T1 was positively associated with Peer Rejection at T2 ($\beta = .612$, $p < .001$), further supporting the stability of perceived peer rejection across the school term.

Regarding the predictive effects of Peer Rejection, higher levels of Peer Rejection at T1 significantly predicted decreases in Internalizing Problems at T2 ($\beta = -.116$, $p = .009$) and showed a marginally non-significant effect on Externalizing Problems at T2 ($\beta = -.089$, $p = .065$). Peer Rejection at T2 also significantly predicted both Internalizing Problems at T2 ($\beta = .262$, $p < .001$) and Externalizing Problems at T2 ($\beta = .208$, $p < .001$), indicating concurrent associations.

Tab. 2. Partial Least Squares Structural Equation Modelling Results

			95% Confidence Interval		
Dependent	Predictor	β	LL	UL	p
Externalising Problems (T2)					
	Peer Reject (T1)	-.089	-.182	.008	.065
	Peer Reject (T2)	.208	.121	.293	<.001
	Externalising Problems (T1)	.673	.616	.739	<.001
Internalising Problems (T2)					
	Peer Reject (T1)	-.116	-.203	-.029	.009
	Peer Reject (T2)	.262	.178	.347	<.001
	Internalising Problems (T1)	.692	.630	.758	<.001
Peer Reject (T2)					
	Peer Reject (T1)	.612	.527	.691	<.001

Tab. 3. Indirect effects

	95% Confidence Interval			
	β	LL	UL	p
Peer Reject (T1) → Peer Reject (T2) → Externalising Problems (T2)	.127	.074	.181	<.001
Peer Reject (T1) → Peer Reject (T2) → Internalising Problems (T2)	.160	.109	.216	<.001

Peer Rejection at T2 also showed a significant indirect effect (Table 3) in the relationship between Peer Rejection at T1 and both Externalising Problems (β = .127, p < .001) and Internalising Problems (β = .160, p < .001) at T2. Table 3 presents the detailed results of the PLS-SEM model, and Figure 1 illustrates the model structure.

The model explained 50.8% of the variance in Externalising Problems (*R2 Adjusted* = .505, p < .001), 57.9% in Internalising Problems (*R2 Adjusted* = .576, p < .001), and 37.4% in Peer Rejection at T2 (*R2 Adjusted* = .373, p < .001). The *f2* ranged from .009 to .808, indicating meaningful impacts.

Fig. 1. PLS-SEM Model of Peer Rejection and Mental Health Outcomes

Discussion

This study explored how peer rejection affects mental health among adolescents and whether repeated rejection plays an indirect role. It is one of the few longitudinal studies on this topic in Vietnam and adds to international research on peer relationships and youth well-being. The PLS-SEM analysis revealed several key findings. First, both internalizing and externalizing problems showed moderate-to-high temporal stability. Peer rejection also demonstrated significant stability from T1 to T2. Surprisingly, higher levels of peer rejection at T1 predicted decreases in internalizing problems at T2, while its effect on externalizing problems was marginally non-significant. However, peer rejection at Time 2 was positively associated with both internalizing and externalizing problems at T2, and it showed a significant indirect effect in the relationship between T1 peer rejection and both adjustment outcomes. These results partially support H1 and fully support H2.

Our results show that peer rejection significantly predicts internalising problems during adolescence, and several mechanisms may explain this link. First, adolescents often internalise peer rejection, leading to lower self-esteem and more negative self-views. Unlike adults, they are more likely to accept negative peer feedback, which increases their vulnerability to depression and anxiety (Rodman et al., 2017). Second, repeated or perceived rejection heightens sensitivity to future rejection, causing adolescents to become more anxious and cautious in social settings, further increasing emotional distress (Beeson et al., 2020; Zimmer-Gembeck, 2016). Third, there is a reciprocal relationship between peer rejection and internalising problems – rejection can lead to emotional difficulties, and those difficulties can, in turn, lead to more rejection (LoParo et al., 2023; Platt et al., 2013). The negative effects are especially strong for socially vulnerable adolescents, such as those who are shy or experience anxious solitude, though supportive friendships may protect against these outcomes (Ladd et al., 2025; Liu et al., 2019). Longitudinal studies support this, showing that early peer rejection predicts stable or worsening patterns of internalising problems into later adolescence, particularly when combined with factors like aggression or social withdrawal (Coie et al., 1995; Ladd et al., 2025; Pedersen et al., 2007).

Our results also show that peer rejection significantly predicts externalising problems in adolescence. This affects may goes through several pathways. First, peer rejection – especially when it occurs repeatedly – directly predicts later externalising behaviours such as aggression and rule-breaking. This effect remains even after controlling for earlier behavioural problems, suggesting that peer rejection is an independent risk factor (Coie et al., 1995; Janssens et al., 2017; Laird et al., 2001). Second, longitudinal studies support a unidirectional effect, where peer rejection leads to an increase in externalising behaviours over time. Adolescents who are rejected by their peers are more likely to show greater aggression and rule-breaking as they grow older, rather than these behaviours causing rejection (Coie et al., 1995; Janssens et al., 2017).

Our results show that repeated rejection partially accounted for indirect effects in the relationship between peer rejection and both internalising and externalising problems in adolescence, suggesting that repeated rejection may lead to greater mental health difficulties. Several mechanisms may explain this effect. First, repeated peer rejection and depressive symptoms often reinforce each other, creating a cycle in which rejection increases depression, and depression increases the likelihood of further rejection (LoParo et al., 2023; Platt et al., 2013; Zimmer-Gembeck, 2016). Second, adolescents who experience repeated rejection often develop higher sensitivity to rejection and lower self-esteem, which increase vulnerability to depression, distress, and even substance use (Nepon et al., 2021; Zimmer-Gembeck, 2016). Third, peer rejection during adolescence is often recalled as a traumatic experience in adulthood, with long-term effects such as depression and symptoms of post-traumatic stress, especially when social support is lacking (Lev-Wiesel et al., 2006). Additionally, developmental research shows that boys who experience both rejection and aggression in childhood are more likely to show severe emotional and behavioural problems later, while for girls, rejection alone predicts stable psychological issues (Coie et al., 1995). Repeated rejection also shapes adolescents' perceptions, coping strategies, and future social behaviour, contributing to ongoing emotional maladjustment (Zimmer-Gembeck, 2016).

The results suggest that peer rejection can start a harmful cycle. Adolescents who experience rejection early in the school year are more likely to be rejected again and develop more serious emotional or behavioural problems. This shows the importance of early intervention. Schools should focus on identifying students at risk of rejection and offer programs to support social skills, peer bonding, and emotional well-being. Furthermore, the stronger effect of rejection on internalising problems suggests that emotional symptoms like anxiety and depression may be more sensitive to peer rejection than externalising behaviours like aggression. More research is needed to understand this pattern, but it could help in designing targeted mental health interventions.

This study has several limitations. First, the short time gap between T1 and T2 (three months) may not fully show the long-term effects of peer rejection. Future research should consider using longer follow-up periods. Second, we only focused on the changes and effects of peer rejection over time. Third, while we used well-known and reliable tools, the self-report format might be affected by personal bias. Using reports from teachers or peers could provide more balanced information. The study also focused on students from public schools in an urban area. Future studies should include students from rural or private schools to improve generalisability. Although gender differences were explored in the results, gender was not tested in the model. Future research should explore whether the effects of rejection differ by gender. It is important to note that while our findings demonstrate significant indirect effects, they do not establish a full or partial longitudinal mediation. Future research using mediation models with longer time frames is needed to clarify whether repeated rejection functions as a true mediator.

Conclusion

This study examined how peer rejection affects the mental health of adolescents and whether repeated rejection helps explain indirect effects in this process. The results showed that early experiences of peer rejection were linked to later emotional and behavioural problems. Repeated peer rejection also accounted for a partial indirect effect in this relationship, showing that ongoing rejection may increase the risk of mental health difficulties over time. These findings support previous research and add new evidence about the impact of repeated rejection. The results highlight the need for schools to take early action to identify and support students who are socially excluded. Interventions should focus on building social skills, creating inclusive environments, and reducing peer rejection to protect students' mental health. This study is one of the first in Vietnam to explore this topic using a longitudinal approach. Although the follow-up period was short, the findings are important for understanding how peer experiences affect young people's well-being. Future research should use longer timeframes and apply full longitudinal mediation models, in addition to testing other risk factors like gender and using multi-source data such as teacher or peer reports, to provide a more comprehensive understanding.

Ethical Approval

This study was approved by the Vietnam Ministry of Science and Technology, and Institute of Psychology, Vietnam Academy of Social Sciences on September 14, 2023 (reference number 65/2023/501.02/HĐKHXH), and followed the ethical principles of the Declaration of Helsinki.

Data Availability Statement
The data that support the findings of this study are available from the authors, upon reasonable request due to the sensitivity of victims' bullying.

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Conflict of Interests
On behalf of all authors, the corresponding author states that there is no conflict of interest.

Author Contributions
Le-Hang Thi Do contributed to data acquisition, analysis, and approved accountability for all aspects of the work. Mai-Huong Thi Phan contributed to the conception and design, funding secure, data analysis and interpretation, critically revised the manuscript, and approved accountability for all aspects of the work. Phuong-Hoa Thi Nguyen contributed to the data acquisition and interpretation, and approved accountability for all aspects of the work. Loc Nguyen Phuc contributed to conceptual development and approved accountability for all aspects of the work. Phuong-Thao Cao contributed to conception and design and approved accountability for all aspects of the work. Minh-Thu Pham contributed to conception and design and approved accountability for all aspects of the work. Huong-Quynh Ngoc Dang contributed to data analysis and approved accountability for all aspects of the work. Quynh-Anh Ngoc Nguyen contributed to the conception and design of the study, data interpretation, drafted the manuscript, and approved accountability for all aspects of the work.

Supplementary material
Not applicable.

Declaration about the use of generative AI and AI-assisted technologies in the writing process
During the preparation of this work the author(s) used ChatGPT in order to revise the English expression. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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