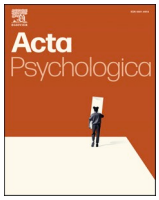
Acta Psychologica 260 (2025) 105616

Contents lists available at ScienceDirect

Acta Psychologica

journal homepage: www.elsevier.com/locate/actpsy



The mediating factor of psychological well-being between cyberbullying experience and sedentary behaviour among university students

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ARTICLE INFO

Keywords:
Cyberbullying
Psychological well-being
Sedentary behaviour
University students
Mediation analysis
Digital health

ABSTRACT

The cyberbullying affects 45 % of young people, this situation highlights the burden of cyberbullying amidst advancement of technology/digital era in developing countries like Indonesia. This study revealed the mediating role of psychological well-being in the relationship between cyberbullying experiences and sedentary behaviour among university students in Indonesia. A cross-sectional survey was conducted with 700 undergraduates from Universitas Muhammadiyah Kalimantan Timur, using standardized measures of cyberbullying victimization, psychological well-being, coping capacity, and sedentary behaviour. Structural Equation Modelling revealed significant associations between cyberbullying experience and lower psychological well-being ($\beta = 0.264$, $p \leq 0.001$), and between lower psychological well-being and sedentary behaviour ($\beta = 0.208$, $p \leq 0.001$). Psychological well-being fully mediated the cyberbullying-sedentary behaviour relationship, with no direct link identified between these variables. Although coping capacity contributed independently to psychological well-being ($\beta = 0.448$, $p \leq 0.001$), it did not moderate the cyberbullying-psychological well-being relationship as hypothesized. Model fit indices ($X^2 = 2782.212$; SRMR = 0.071; $X^2/df = 3.56$) were acceptable despite NFI concerns (0.760). These findings illuminate the mechanism through which digital victimization may influence physical activity patterns, highlighting the critical importance of psychological interventions in addressing the behavioural health consequences of cyberbullying among university students. Future research should explore these relationships longitudinally and investigate effective coping strategies.

1. Introduction

Cyberbullying represents one of the most concerning digital behaviours affecting university students worldwide. As digital technologies become increasingly embedded in academic and social life, students' exposure to online harassment has grown proportionally, creating significant challenges for their psychological well-being and physical health behaviours. This issue is particularly prominent in Indonesia, with its rapid digital transformation making it Southeast Asia's highest internet user (212 million users and 74.6 % penetration rate as of 2025) (Kemp, 2021). Notably, young adults aged 19–34 constitute 49.52 % of Indonesian internet users, a demographic that largely overlaps with the university student population, who are typically aged 19–23 (Borualogo & Casas, 2022; Nasywa & Tentama, 2021).

Cyberbullying victimization has been consistently linked to adverse psychological outcomes. Victims frequently report heightened stress, anxiety, and depression symptoms, which subsequently affect their academic performance, social relationships, and overall quality of life (Kloping et al., 2022; Rahman et al., 2023). For university students already navigating academic pressures and life transitions, the additional burden of cyberbullying can significantly compromise psychological resources and coping mechanisms (Rahman et al., 2023). This is particularly relevant in the Indonesian context, where mental health literacy remains low and psychological support services may be less accessible than in Western university settings (Lee et al., 2023). The impact of cyberbullying experiences can vary among individuals due to differences in self-esteem and self-worth, collectively referred to as coping capacity (Singhal & Prakash, 2021).

Cyberbullying harms young people's health by causing serious psychological wellbeing problems like depression, anxiety, and thoughts of

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https://doi.org/10.1016/j.actpsy.2025.105616
Received 15 May 2025; Received in revised form 13 September 2025; Accepted 18 September 2025

suicide (Nikolaou, 2017, 2022a). Previous study found a strong connection between being cyberbullied and having suicidal behaviours, showing how much emotional pain this causes (Nikolaou, 2017). Previous study also showed that cyberbullying raises stress levels and hurts overall health, making young people feel worse and sometimes leading to risky behaviours. This shows that cyberbullying is not just about hurting feelings—it can damage the mental and emotional well-being of young people a lot (Nikolaou, 2017, 2022a).

Previous study also revealed cyberbullying on negatively affect educational outcomes for young people (Nikolaou, 2022a, 2022b). The study found that bullying victimization, including cyberbullying, can lower school performance by causing stress, reducing concentration, and increasing absenteeism. Cyberbullying makes students feel unsafe and less motivated to participate in school activities, leading to poorer grades and less engagement with learning (Nikolaou, 2022b). Previous study also showed how the stress and emotional harm from cyberbullying makes it harder for youth to focus and succeed academically. Overall, cyberbullying can create a difficult environment for learning, which harms students' educational success (Nikolaou, 2022a).

A theoretical framework that helps explain the relationship between cyberbullying experiences and behavioural outcomes is Lazarus and Folkman's stress-coping theory (Biggs et al., 2017). This theory suggests that when individuals encounter stressors such as cyberbullying, they implement various coping strategies that may be adaptive or maladaptive. One concerning potential maladaptive coping mechanism is sedentary behaviour for a long time, such as watching television, playing online games, browsing internet, etc., which research has linked to emotional and mental disorders (Lawless et al., 2015; Teychenne et al., 2019). This association is particularly troubling given that sedentary behaviour patterns established during university years can persist into adulthood, potentially contributing to long-term health risks.

The Indonesian university context presents unique conditions that may exacerbate cyberbullying impacts. Many students relocate from rural areas to urban centres for higher education, creating geographic separation from established support networks and exposing them to diverse online communication norms (Kloping et al., 2022). Furthermore, institutional policies addressing cyberbullying remain unestablished in many Indonesian universities, creating gaps in support for victimized students (Cassidy et al., 2018; Cilliers, 2021). This institutional deficiency may inadvertently contribute to poor psychological outcomes and unhealthy behavioural coping mechanisms among affected students.

Despite growing research on cyberbullying, significant gaps remain in understanding the mechanisms through which online victimization affects physical health behaviours. Additionally, while previous studies have examined direct relationships between cyberbullying and psychological outcomes (Feinstein et al., 2014; Nikolaou, 2017; Teychenne et al., 2015) or between psychological states and health behaviours (Geller et al., 2024; Nikolaou, 2022a; Teychenne et al., 2015), few have investigated the potential mediating and moderating factors in these relationships. Specifically, previous research has not examined poor psychological well-being as a mediating variable in the relationship between cyberbullying and sedentary behaviour. Moreover, prior studies have not investigated coping capacity as a moderating factor influencing the associations among cyberbullying, psychological well-being, and sedentary behaviour. The present study addresses these gaps by examining how psychological well-being mediates the relationship between cyberbullying experiences and sedentary behaviour among Indonesian university students, and whether coping capacity moderates the impact of cyberbullying on psychological well-being. Therefore, the hypothesis of this study posits that there is a significant association between the experience of cyberbullying and its effects on psychological well-being, coping capacity, and sedentary behaviour.

2. Literature review

2.1. The association between cyberbullying experienced, psychological wellbeing, and sedentary behaviour

Cyberbullying, defined as the use of digital platforms to harass, intimidate, or harm others, has become a significant issue among university students in Indonesia and across Southeast Asia. In Indonesia, nearly 50 % of high school and university students have reported experiencing cyberbullying, with 59 % encountering incidents within the last three months (Bhatia, 2023). The prevalence of cyberbullying is exacerbated by Indonesia's extensive internet penetration, which reached 74.6 % in 2025 (Kemp, 2021). Studies reveal that cyberbullying behaviours often persist from high school into university, as individuals who were either victims or perpetrators during adolescence are likely to continue these roles in higher education (Beran et al., 2012; Kraft & Wang, 2012). Furthermore, the anonymity provided by digital platforms such as social media increases the frequency of cyberbullying incidents, with harassment through chat applications and unauthorized sharing of personal photos being the most common forms (UNICEF Indonesia, 2020). These behaviours not only impact victims' mental health but also contribute to academic difficulties and social withdrawal (UNICEF Indonesia, 2020).

Cyberbullying has emerged as a significant concern due to its documented psychological impacts on victims, including depression, anxiety, and suicidal ideation (Nikolaou, 2017). Moreover, cyberbullying is also impact on academic performance among the students (Nikolaou, 2022b). Victims often experience social isolation, low self-esteem, and emotional disturbances, which can severely affect their psychological wellbeing. For example, studies have shown that university students subjected to cyberbullying report anger issues, self-guilt, and fear of social interactions, contributing to heightened stress and suicidal tendencies (Xia et al., 2023). Additionally, cyberbullying's 24/7 nature exacerbates its psychological toll by leaving victims feeling perpetually vulnerable (Schenk et al., 2013). Stress-coping theory provides a valuable framework for understanding these impacts. According to this theory, the psychological effects of cyberbullying depend on how individuals perceive and respond to stressors. Victims with poor coping mechanisms often exhibit more severe symptoms of depression and anxiety compared to those with higher resilience (Santos et al., 2021).

Cyberbullying negatively affects the psychological wellbeing of young people, causing feelings of sadness, anxiety, and low self-esteem. These emotional struggles often lead them to engage in risky health behaviours such as smoking, drinking alcohol, unhealthy eating, and lack of exercise (Nikolaou, 2022a). Sedentary behaviour, characterized by prolonged periods of low energy expenditure while sitting or reclining, has been closely linked to psychological distress among university students. Research highlights that students who spend extended hours in sedentary activities, such as screen-based behaviours, are more likely to experience anxiety, depression, and stress (Geller et al., 2024; L. Zhang et al., 2025). These behaviours often serve as coping mechanisms for stress but can also exacerbate psychological wellbeing issues due to reduced physical activity and social interaction (Teychenne et al., 2015). Similarly, a cross-sectional study in China demonstrated a dose-response relationship between sedentary behaviour and psychological wellbeing issues, including suicidal ideation, independent of physical activity levels (Zhang et al., 2025).

Among university students, sedentary behaviour patterns are particularly concerning due to their long-term health implications. Studies show that students spend an average of 7–10 hours per day engaged in sedentary activities such as attending lectures, studying, or using digital devices (Geller et al., 2024; L. Zhang et al., 2025). This lifestyle is associated with adverse physical health outcomes, including obesity, cardiovascular disease, and metabolic syndrome (Dempsey et al., 2020). Furthermore, prolonged sedentary habits established during university years often persist into adulthood, increasing the risk

of chronic illnesses later in life (Felez-Nobrega et al., 2017). In Indonesia and other developing nations with limited access to recreational facilities, the rise in screen time due to smartphones and social media further compounds these risks (Khan & Burton, 2017). Interventions targeting university students should therefore focus on reducing sedentary behaviours while promoting physical activity to mitigate both immediate and long-term health consequences.

2.2. Coping capacity and psychological impact

Coping capacity plays a crucial role in moderating the psychological impacts of cyberbullying. Research indicates that individuals with strong social support systems—such as positive family communication—are better equipped to mitigate the adverse effects of cyberbullying (Elgar, 2014). For instance, parental attachment and peer acceptance have been found to reduce feelings of loneliness and depression among victims (Canestrari et al., 2023). Cultural considerations also influence how individuals respond to cyberbullying. In collectivist cultures like Bangladesh and Malaysia, where community ties are strong, victims may experience heightened shame and fear due to societal expectations and stigmatization (Sheikh et al., 2023). Conversely, individualistic cultures may emphasize personal resilience and coping strategies. These cultural nuances highlight the importance of tailoring interventions to specific sociocultural contexts. Overall, understanding the interplay between psychological well-being, coping mechanisms, and cultural factors is essential for developing effective strategies to combat the detrimental effects of cyberbullying.

Coping capacity, particularly resilience and cognitive-emotion regulation strategies, emerges as a critical buffer against the detrimental effects of cyberbullying. Adaptive coping mechanisms—such as positive reappraisal and problem-focused strategies—significantly mitigate psychological distress (Tao et al., 2024). For instance, students with high resilience exhibit lower levels of depression despite cyberbullying exposure, underscoring the protective role of personal coping resources (Worsley et al., 2019). This moderation effect is further amplified by social support systems, which enhance coping efficacy (Ali & Shahbuddin, 2022).

The interplay between coping strategies and cyberbullying outcomes is mediated by several psychological processes. Cognitive-emotion regulation strategies, such as reframing and acceptance, reduce rumination and emotional dysregulation (Shaheen et al., 2023). Conversely, maladaptive strategies like self-blame exacerbate distress, highlighting the dual role of coping mechanisms (Chu et al., 2023). Structural equation models confirm that resilience not only directly alleviates distress but also indirectly mitigates effects through enhanced social connectedness (Ngo et al., 2021).

2.3. Positive adaptations of cyberbullying

The experience of cyberbullying can paradoxically strengthen social bonds and emotional intelligence. Research indicates that victims who seek support frequently develop deeper interpersonal connections and increased empathy toward others' suffering (Navarro et al., 2015). Qualitative studies reveal that some victims reinterpret their experiences as opportunities to build more authentic relationships, particularly when they receive validation from peers or mentors. This social reinforcement can create protective networks that buffer against future stressors (Yarbrough et al., 2023).

The literature identifies cognitive reappraisal as a key mechanism for deriving positive outcomes. Victims who reframe cyberbullying as a manageable challenge rather than an insurmountable threat demonstrate higher life satisfaction and optimism (Estévez et al., 2019). This adaptive reframing is particularly evident among individuals with pre-existing high self-esteem, suggesting that personal resources moderate the potential for positive transformation. Neurobiological studies corroborate these findings, showing that successful coping correlates with enhanced prefrontal cortex activation during emotional regulation tasks (Kopecký & Szotkowski, 2017).

Research consistently demonstrates that robust social support systems significantly buffer the psychological impact of cyberbullying on university students. Victims with strong interpersonal networks exhibit lower levels of depression, anxiety, and suicidal ideation compared to those with limited support (Ho et al., 2020). Social support operates through multiple pathways: it provides emotional validation, reduces feelings of isolation, and fosters a sense of belonging, which collectively counteract the stigmatization often experienced by victims. Notably, peer support is particularly effective, as it offers relatable empathy and practical coping strategies derived from shared experiences (Huang et al., 2023).

The interaction between social support and empathy creates a reinforcing cycle that enhances resilience. For instance, empathetic responses from supporters validate victims' emotions, which in turn strengthens trust and openness in seeking help (Heiman & Olenik-Shemesh, 2022). Longitudinal data suggest that this synergy not only alleviates immediate distress but also promotes long-term adaptive coping skills, such as problem-solving and emotional regulation (Chu et al., 2023). However, the quality of support matters—generic or superficial responses may inadvertently exacerbate feelings of vulnerability, whereas empathetic, tailored support is consistently linked to positive outcomes (Akturk, 2015).

3. Methods

3.1. Design of the study

This study employed a cross-sectional design with quantitative methods to examine relationships among cyberbullying experiences, psychological well-being, and sedentary behaviour in university students. Data were collected via standardized measures and analyzed using Structural Equation Modelling to test hypothesized mediating and moderating effects.

3.2. Participants

Participants were undergraduate students from Universitas Muhammadiyah Kalimantan Timur, a large Indonesian university with a strong digital focus, creating an ideal context for studying cyberbullying phenomena. From a population of 7951 students across 18 undergraduate programs, we recruited 700 participants based on sample size requirements for structural equation modelling (Soper, 2020).

We employed proportionate stratified sampling by program enrolment numbers, followed by simple random sampling to ensure representation across all academic years. Inclusion criteria required participants to be currently enrolled students aged 18+ who were present during data collection (January–March 2024) and willing to complete the questionnaire.

The sample included students from diverse backgrounds, with many having relocated from rural areas to urban settings for higher education—a transition that potentially increases vulnerability to online victimization due to disrupted support networks (Kloping et al., 2022).

Demographic data collected included gender, academic program, year of study, place of origin, household composition, internet usage patterns, residential status, and experiences of social ostracism to examine potential risk and protective factors associated with cyberbullying experiences.

The sampling frame was obtained from the Academic Affairs office at Universitas Muhammadiyah Kalimantan Timur. Student names were randomly selected using the website https://wheelofnames.com/. The researcher coordinated with Academic Affairs to acquire course schedules, which facilitated visits to participants' classes. After courses ended, participants were located through their class leaders. Questionnaires were then distributed, and participants' willingness to engage was

confirmed; unwilling students were replaced with others. If participants were absent on the day of data collection, the researcher followed up the next day. Participants were informed about the study through an information sheet and completed informed consent forms prior to participation.

3.3. Research instruments

The study employed standardized measures to assess cyberbullying experiences, coping capacity, psychological well-being, and sedentary behaviour among undergraduate students. Cyberbullying experiences were measured using the Cyberbullying Victimization Measures (CVM) developed by Virginia L. Byrne. This instrument consists of eight items rated on a 5-point Likert scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always) (Byrne, 2021). Mean scores were calculated for analysis, with higher scores indicating greater cyberbullying victimization. The scale demonstrated good internal consistency in the current sample (Cronbach's $\alpha = 0.82$).

Coping capacity was assessed using the Coping Strategies Inventory (Zhang et al., 2021), which comprises 12 items evaluating five dimensions: emotional coping, behavioural coping, categorical thinking, superstitious thinking, and negative thinking. Participants responded on a 5-point Likert scale (1 = Very inconsistent with how I would respond, 5 = Very consistent with how I would respond). Mean scores were calculated for each dimension, with higher scores indicating greater use of the respective coping strategy. The internal consistency for the overall scale was acceptable (Cronbach's $\alpha = 0.78$).

Psychological well-being was evaluated using two validated measures: the Patient Health Questionnaire (PHQ-9) (Dian et al., 2022) and the Generalized Anxiety Disorder Scale (GAD-7) (Savani et al., 2023). The PHQ-9 consists of 9 items assessing depressive symptoms, while the GAD-7 comprises 7 items measuring anxiety symptoms. Both instruments use a 4-point scale (0 = Not at all, 1 = Several days, 2 = More than half the days, 3 = Nearly every day) to indicate the frequency of symptoms experienced over the past two weeks. Higher mean scores indicate poorer psychological well-being. Both scales demonstrated excellent internal consistency in this study (PHQ-9: Cronbach's $\alpha = 0.89$; GAD-7: Cronbach's $\alpha = 0.88$).

This study focused on the impact of sedentary behaviour in relation to feelings of sadness or down. In this study, sedentary behaviour associated with negative affect was measured using a 4-item scale developed for this study. Participants reported how often they engaged in sedentary activities (e.g., sitting, watching television, other leisure activities) when feeling sad or down. Items were rated on a 4-point Likert scale (1 = Never, 2 = Sometimes, 3 = Often, 4 = Always). The scale showed acceptable internal reliability (Cronbach's $\alpha = 0.76$).

3.4. Statistical analysis

This study employed Structural Equation Modelling (SEM) to examine relationships among cyberbullying experiences, psychological well-being, coping capacity, and sedentary behaviour. Structural Equation Modelling (SEM) facilitates the concurrent analysis of multiple relationships involving both observed and latent variables, encompassing intricate models that incorporate mediating and moderating variables. This methodology is particularly advantageous for research addressing mediation and moderation effects, as it enables the modelling of indirect, direct, and interaction effects within a unified analytical framework, thereby offering a more comprehensive and refined understanding of the underlying mechanisms (Garrido et al., 2022).

The measurement model specified cyberbullying experience as a latent variable with eight indicators (C1-C8), coping capacity with twelve indicators (E1-E12), psychological well-being with sixteen indicators (F1-F16), and sedentary behaviour as a single-indicator construct (SB). We assessed measurement quality through multiple criteria. Internal consistency was evaluated using rho_A coefficients (threshold >0.7), while composite reliability values above 0.70 confirmed consistent measurement of latent constructs (Dijkstra & Henseler, 2015). Factor loadings quantified the relationship strength between indicators and their respective constructs, with higher values indicating stronger associations (Debowska et al., 2017; Kineber & Hamed, 2022). The PLS-SEM analysis was conducted using SMART-PLS Version 3, with relationships considered statistically significant at $p < 0.05$ (Hair et al., 2014).

Model fit was evaluated using established indices: Chi-square to degrees of freedom ratio ($\chi^2/df < 5$), Normed Fit Index (NFI > 0.90), and Standardized Root Mean Square Residual (SRMR <0.08) (Hair et al., 2022; Sathyanarayana & Mohanasundaram, 2024). We employed bootstrapping (5000 resamples) to test direct effects among variables and assess indirect pathways, particularly examining how coping capacity and psychological well-being might mediate the relationship between cyberbullying experiences and sedentary behaviour.

3.5. Ethical consideration

The authors obtained ethical approval from the Institutional Research Board (IRB) of the Institute for Population and Social Research, Mahidol University (reference number COA 2023/12-242).

4. Results

4.1. Participant characteristics

This study included 700 undergraduate students with a predominantly female sample (58.14 %). Most participants were 18–19 years old (53.15 %), with fewer aged 20–21 (42.29 %) or 22–23 (4.57 %). The academic distribution showed a slight predominance of first-year students (30.14 %), with progressively fewer second-year (27.43 %), third-year (21.86 %), and fourth-year students (20.57 %).

Participants came from diverse academic disciplines, with Management (20.86 %), Public Health (19.29 %), and Psychology (10 %) representing the largest programs. Most students originated from rural areas (60 %) and lived in boarding houses (54.43 %), while others resided with parents (38.14 %) or relatives (7.43 %). The majority (85.57 %) reported coming from nuclear families, with smaller percentages from single-parent households (11.29 %). Regarding social experiences, most participants (76 %) reported no ostracization, though some were uncertain (19.43 %) or had experienced exclusion (4.57 %). Table 1 presents the complete demographic breakdown of the study population.

Table 2 revealed that among 470 students who experienced cyberbullying as a victim. More than half of the students (52.4 %) reported receiving hurtful comments online, making it the most frequent type of cyberbullying. About one in four students (27.3 %) had hurtful pictures sent to them, and around 20.7 % received hurtful videos, showing that harmful visual content is also a significant issue. Additionally, over one-third of the students (35.1 %) experienced rumors spread about them online, which can damage their reputation and social life. Threats sent via online messages or platforms affected about 16.3 % and 11.4 % of students respectively. Finally, 15 % of students had someone pretend to be them online, which is a serious form of identity misuse.

The coping capacity of the 700 students was evaluated in Table 3 across various emotional states, with responses categorized as strongly consistent, quite consistent, and surprisingly consistent. In relation to the feeling of lack of interest, 153 students (22 %) indicated strong coping responses, while 240 students (34.29 %) reported quite consistent coping, and 107 students (15.29 %) described their coping as surprisingly consistent. Similarly, among those experiencing sadness, 146 students (20.86 %) reported strong coping, 252 students (36 %) identified quite consistent coping, and 106 students (15.14 %) perceived their coping as surprisingly consistent. For feelings of hopelessness, 101 students (14.43 %) demonstrated strong coping, 202 students (28.86 %)

Table 1
The descriptive analysis of general information of participants (N: 700).

Variable	N (700)	%
Age		
18–19	372	53.15
20–21	296	42.29
22–23	34	4.57
Sex		
Female	407	58.14
Male	293	41.86
Student year		
First-year	211	30.14
Second year	192	27.43
Third year	153	21.86
Fourth-year	144	20.57
Study program		
Nursing	55	7.86
Public health	72	19.29
Environmental health	19	2.71
Pharmacy	53	7.57
Psychology	78	10
Law	57	8.14
Management	146	20.86
Accountancy	10	1.43
International relation	28	4
Informatics	71	10.14
Civil engineering	29	4.14
Mechanical engineering	25	3.57
Geology engineering	9	1.29
Sport education	15	2.14
English education	17	2.43
Digital business	3	0.43
Agrotechnology	8	1.14
Agribusiness	13	1.86
Original home		
Rural	420	60
Urban	280	40
Feel ostracized		
Yes	32	4.57
No	532	76
I am not sure	136	19.43
Living at boarding house		
Yes	381	54.43
No, living with relatives	52	7.43
No, living with parent	267	38.14
Household structure		
One-person	6	0.86
Single parent	79	11.29
Composite	2	0.29
Extended	14	2
Nuclear	599	85.57

Table 2
Frequency of cyberbullying experiences among students (N: 470).

	Experienced (N: 470)	
	n	%
Getting hurtful comments	367	52.4
Getting hurtful picture	191	27.3
Getting hurtful video	145	20.7
Getting hurtful webpage	76	10.9
Getting spread rumour	246	35.1
Threatened via online message	114	16.3
Threatened via online platform	80	11.4
Pretended to be me via online	105	15

quite consistent coping, and a notably higher proportion of 228 students (32.57 %) reported surprisingly consistent coping. Lastly, regarding anxious feelings, 164 students (23.43 %) exhibited strong coping capacity, 229 students (32.71 %) quite consistent, and 107 students (15.29 %) surprisingly consistent. Overall, the data indicate that the majority of students perceive their coping ability as quite consistent across multiple emotional challenges, with the surprisingly consistent response being particularly prominent among students reporting hopelessness. This suggests variability in perceived coping effectiveness depending on the type of emotional difficulty encountered.

Table 4 indicates a significant prevalence of psychological wellbeing challenges among students, with a considerable portion reporting frequent symptoms. Specifically, 119 students (17 %) reported feeling down, depressed, or hopeless nearly every day, while 80 students (11.4 %) experienced these feelings more than half of the days. Anxiety and nervousness nearly every day affected 102 students (14.6 %), with an additional 68 students (9.7 %) experiencing these symptoms more than half the days. Difficulty concentrating was also commonly reported, with 108 students (15.4 %) experiencing this nearly every day and 84 students (12 %) more than half the days. Moreover, 99 students (14.1 %) reported feelings of restlessness or inability to sit still nearly every day, while 78 students (11.1 %) experienced these symptoms more than half the days. Irritability or anger was reported nearly every day by 111 students (15.9 %) and more than half the days by 86 students (12.3 %).

Table 5 demonstrates that a majority of students engage in sedentary behaviour with varying frequency. Specifically, 324 students (46.3 %) reported sometimes participating in sedentary activities, while 274 students (39.1 %) reported often engaging in such behaviour. A smaller proportion, 92 students (13.1 %), indicated never engaging in sedentary behaviour, and only 10 students (1.4 %) reported always engaging in it.

Prior to SEM analysis, we verified key multivariate assumptions. Multicollinearity was not detected, with all VIF values below 2.34 and correlations under 0.80. Despite slight non-normality indicated by Mardia's coefficient (118.24), the large sample size ($n = 700$) made our PLS-SEM analysis robust to this violation. Scatterplots confirmed linear relationships between variables, while Levene's test indicated homoscedasticity ($p > 0.05$). Thirteen potential outliers were examined but retained as valid responses. Our over-identified model (df = 781) with 700 participants for 37 parameters ensured adequate statistical power for analysis.

Table 6 presents the correlation matrix of the study's latent variables, providing crucial information about the strength and directionality of relationships among cyberbullying experiences, coping capacity, psychological well-being, and sedentary behaviour. Prior to SEM analysis, we examined these bivariate associations to assess potential multicollinearity issues, as correlations exceeding 0.80 between predictor variables can distort parameter estimates and compromise model validity. All correlation coefficients fell below this threshold, confirming the appropriateness of proceeding with structural equation modelling.

The matrix reveals several significant associations. Cyberbullying experiences were moderately correlated with poor psychological well-being ($r = 0.314$, $p < 0.001$), while demonstrating negligible relationships with poor coping capacity ($r = 0.034$, $p > 0.05$) and sedentary behaviour ($r = 0.069$, $p > 0.05$). Poor coping capacity showed weak but significant associations with poor psychological well-being ($r = 0.146$, $p < 0.001$) and sedentary behaviour ($r = 0.079$, $p < 0.05$). The relationship between poor psychological well-being and sedentary behaviour was positive and significant ($r = 0.209$, $p < 0.001$).

Table 7 presents the internal consistency metrics for the measurement model's latent constructs. We employed both Rho_A and composite reliability coefficients to assess scale reliability, adhering to contemporary psychometric standards in behavioural science research. The Rho_A values, which provide a more conservative estimate of reliability than traditional Cronbach's alpha, exceeded the recommended threshold of 0.7 for all constructs: Coping Capacity (0.860), Cyberbullying Experience (0.874), Sedentary Behaviour (1.000), and Poor Psychological

Table 3
Frequency of coping capacity among students (N: 700).

Coping capacity	Strongly inconsistent		Quite inconsistent		Consistent		Quite consistent		Strongly consistent	
	n	%	n	%	n	%	n	%	n	%
Lack of interest or motivation	150	21.43	136	19.43	200	28.57	133	19.00	81	11.57
Feeling sad, depressed, or hopeless	208	29.71	272	38.86	165	23.57	40	5.71	15	2.14
Fatigue or low energy	126	18.00	219	31.29	258	36.86	75	10.71	22	3.14
Appetite changes (eating too little or too much)	101	14.43	193	27.57	279	39.86	99	14.14	28	4.00
Feeling worthless or guilty	198	28.29	219	31.29	183	26.14	66	9.43	34	4.86
Difficulty concentrating or making decisions	62	8.86	147	21.00	246	35.14	158	22.57	87	12.43
Restlessness or slowed movements	73	10.43	125	17.86	227	32.43	153	21.86	122	17.43
Thoughts of self-harm or death	133	19.00	99	14.14	210	30.00	142	20.29	116	16.57
Anxiety, nervousness, or excessive worry	131	18.71	130	18.57	195	27.86	160	22.86	84	12.00
Difficulty controlling worry or relaxing	77	11.00	128	18.29	189	27.00	183	26.14	123	17.57
Irritability or easily annoyed	119	17.00	176	25.14	250	35.71	102	14.57	53	7.57
Feeling afraid or fearful of bad things happening	76	10.86	89	12.71	189	27.00	192	27.43	154	22.00

Table 4
Frequency of psychological wellbeing issues among students (N: 700).

Psychological issues	Not at all		Several days		More than half the days		Nearly every day	
	n	%	n	%	n	%	n	%
Little interest or pleasure in doing things	119	17.00	419	59.86	84	12.00	78	11.14
Feeling down, depressed, or hopeless	154	22.00	371	53.00	96	13.71	79	11.29
Trouble sleeping or sleeping too much	115	16.43	247	35.29	110	15.71	228	32.57
Feeling tired or low energy	103	14.71	298	42.57	142	20.29	157	22.43
Poor appetite or overeating	182	26.00	280	40.00	97	13.86	141	20.14
Feeling guilty or like a failure	151	21.57	268	38.29	116	16.57	165	23.57
Trouble concentrating	195	27.86	302	43.14	105	15.00	98	14.00
Moving or speaking slowly, or feeling restless	233	33.29	266	38.00	114	16.29	87	12.43
Thoughts of self-harm or death	427	61.00	142	20.29	69	9.86	62	8.86
Feeling nervous or anxious	152	21.71	302	43.14	131	18.71	115	16.43
Difficulty controlling worry	189	27.00	273	39.00	115	16.43	123	17.57
Worrying too much	123	17.57	263	37.57	128	18.29	186	26.57
Trouble relaxing	317	45.29	231	33.00	90	12.86	62	8.86
Feeling restless or unable to sit still	321	45.86	234	33.43	81	11.57	64	9.14
Easily annoyed or irritable	221	31.57	284	40.57	95	13.57	100	14.29
Feeling afraid as if something bad might happen	174	24.86	259	37.00	118	16.86	149	21.29

Table 5
Frequency of sedentary behaviour among students (N: 700).

Sedentary behaviour	Frequency (n)	Percentage (%)
Never	81	11.57
Sometimes	240	34.29
Often	254	36.29
Always	125	17.86

Table 6
The correlation matrix between latent variable (N: 700).

	Cyberbullying experience	Poor coping capacity	Poor psychological wellbeing	Sedentary behaviour
Cyberbullying experience	1	0.034	0.314**	0.069
Poor coping capacity		1	0.146**	0.079*
Poor psychological wellbeing			1	0.209**

* p-Value < 0.05.
** p-Value < 0.000.

Wellbeing (0.931).

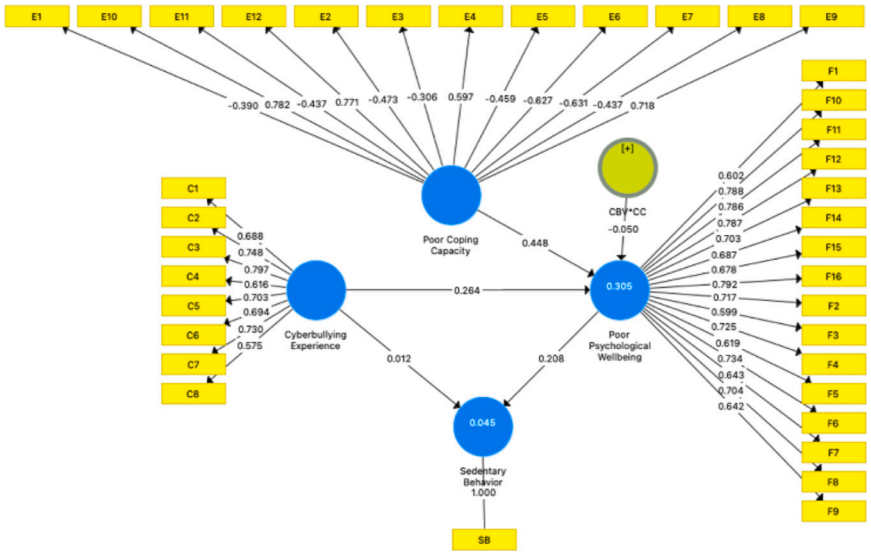
The composite reliability values demonstrated acceptable internal consistency for Cyberbullying Experience (0.882), Sedentary Behaviour (1.000), and Poor Psychological Wellbeing (0.940), while Coping Capacity (0.310) fell below the conventional threshold. This anomaly for Coping Capacity warrants further investigation and represents a limitation addressed in the discussion section. The perfect reliability score (1.000) for Sedentary Behaviour reflects its measurement as a single-indicator construct, consistent with our measurement model specification.

Table 7
Internal consistency validity and reliability.

	Rho_A	Composite reliability
Coping capacity	0.860	0.310
Cyberbullying experienced	0.874	0.882
Sedentary behaviour	1.000	1.000
Poor psychological wellbeing	0.931	0.940

The standardized path coefficients reported in the model (Fig. 1), such as 0.264 for the relationship between cyberbullying experience and poor psychological wellbeing, and 0.208 for sedentary behaviour and poor psychological wellbeing, indicate the expected change in the outcome variable, measured in standard deviations, for every one standard deviation increase in the predictor. Specifically, a one standard deviation increase in cyberbullying experience is linked to a 0.264 standard deviation rise in poor psychological wellbeing, while a similar increase in sedentary behaviour corresponds to a 0.208 standard deviation increase in poor psychological wellbeing.

The coefficient of determination (R^2) for poor psychological wellbeing is 0.305. This means that roughly 30.5 % of the variation in poor psychological wellbeing can be explained collectively by cyberbullying experience, poor coping capacity, and sedentary behaviour. In psychological and behavioural research, individual path coefficients between



N: 700; *p-value < 0.000; X2= 2782.212; NFI = 0.760; SRMR = 0.071; df: 781, X2/df= 3.56
CBV*CC (Moderation/ interaction effect between cyberbullying experience and poor coping capacity)

Fig. 1. SEM analysis model of cyberbullying experience, poor coping capacity, poor psychological well-being, and sedentary behaviour.
N: 700; *p-value < 0.000; X2 = 2782.212; NFI = 0.760; SRMR = 0.071; df: 781, X2/df = 3.56.
CBV * CC (moderation/interaction effect between cyberbullying experience and poor coping capacity).

0.2 and 0.3 are typically interpreted as small to moderate effects, which is expected given the complex nature of mental health outcomes influenced by multiple factors.

Model fit indicators showed adequate fit: χ^2/df = 3.56 (meets criterion <5) and SRMR = 0.071 (meets criterion <0.08), although the NFI value of 0.760 was below the conventional threshold of 0.90, suggesting potential areas for model refinement. Path coefficients indicate that for each unit increase in cyberbullying experience, poor psychological well-being increases by 0.264 units, subsequently increasing sedentary behaviour by 0.208 units.

Fig. 1 displays the structural equation model examining relationships among cyberbullying experience, poor coping capacity, poor psychological wellbeing, and sedentary behaviour (N = 700).

5. Discussion

The study revealed that male students experience higher levels of cyberbullying compared to female students. This phenomenon can be attributed to behavioural tendencies, particularly their online gaming and social media engagement. Males typically dedicate more time to online gaming, which increases their exposure to cyberbullying. The confrontational and aggressive nature of many online games further amplifies the risk of both perpetrating and becoming victims of cyberbullying (Huang et al., 2021; Jin et al., 2023). In Indonesia, the gaming culture is undergoing rapid transformation, with a significant proportion of the youth actively participating in online gaming. This engagement is often linked to negative behaviours, such as cyberbullying. The impulsive tendencies commonly observed among males may heighten their vulnerability, as they are more likely to engage in high-risk online activities without fully contemplating the potential repercussions (Jin et al., 2023).

Cyberbullying has emerged as a significant concern in contemporary society, particularly among adolescents, with profound implications for mental health. The prevalence of cyberbullying is estimated to affect between 10 % to 20 % of young people, leading to various emotional and psychological issues, including depression, anxiety, and suicidal ideation (Mahanta & Khatoniyar, 2019). Research indicates that victims of cyberbullying often experience heightened emotional distress, which can manifest as anger, fear, and sadness (Merrill & Hanson, 2016).

Psychological challenges can drive individuals to take action in an effort to alleviate their difficulties, a process referred to as coping strategies (Biggs et al., 2017). Engaging in sedentary behaviour is one such maladaptive coping strategy often employed during experiences of stress, anxiety, or other psychological distress. Previous studies investigating the relationship between psychological factors and physical inactivity have demonstrated that negative emotions, such as stress and depression, significantly contribute to sedentary behaviour and decreased participation in physical exercise. Additionally, evidence indicates a strong association between heightened stress levels, reduced physical activity, and increased sedentary behaviour. While physical exercise is widely recognized as an effective means of alleviating negative emotions, including stress, individuals often resort to sedentary lifestyles during periods of heightened stress, further diminishing their engagement in physical activity (Dougall et al., 2011; Stults-Kolehmainen & Sinha, 2014).

Previous research revealed that individuals with psychological issues may feel overwhelmed or fatigued, prompting them to seek comfort in sedentary activities that require less energy and effort (Burg et al., 2017; Yoon et al., 2023). This pattern is further corroborated by the findings of Lee and Kim, which revealed a significant correlation between elevated levels of stress, anxiety, and depression and an increase in sedentary behaviour among university students (Lee & Kim, 2018). Previous study show that sedentary behaviour is linked to poor health outcomes, regardless of how active a person is overall. Extended periods of inactivity have been associated with conditions like metabolic syndrome, diabetes, and higher mortality rates in the future (Cohen et al., 2013).

6. Implication

This study highlights the essential role that universities play in

creating a supportive environment to promote psychological well-being and prevent cyberbullying. The results indicate that proactive strategies—such as offering mental health evaluations, counseling services, and digital literacy initiatives—can greatly improve students' self-awareness and ability to respond to cyberbullying. Furthermore, the implementation of clear institutional policies and an anonymous online reporting system underscores the significance of university accountability in effectively addressing incidents of cyberbullying.

7. Limitation and future research

The limitations of this study are primarily from its methodological design. As a cross-sectional study, it cannot establish causal relationships between variables, given that data are collected at a single point in time (Wang & Cheng, 2020). The use of self-administered questionnaires poses challenges in obtaining accurate responses from participants. Additionally, they might misinterpret questions, omit responses, provide inconsistent answers, or fail to follow the provided instructions. The authors cannot clarify questions, probe further, validate responses, or interpret respondents' non-verbal cues (De Leeuw, 2008).

Future research should consider employing cohort or longitudinal study designs to understand better the causal relationships between cyberbullying experience, poor psychological well-being, and sedentary behaviour. Future research should consider incorporating qualitative measures to gain a more comprehensive understanding of participants' responses. Authors should also explore additional variables and refine model specifications to improve model fit, particularly addressing issues related to the Normed Fit Index (NFI). For university management, implementing an online system for reporting cyberbullying incidents could help prevent further adverse impacts. Additionally, universities could develop a self-reporting tool for psychological well-being to enhance student's awareness of their mental health issues and reduce their vulnerability to cyberbullying experiences linked to poor psychological well-being. The study's limitations also stem from the restricted scope of variables, as it did not include other potentially influential demographic factors such as parental education levels, parenting style of their parents, family income, and similar indicators that may affect the primary associations examined.

8. Conclusion

A significant relationship exists between cyberbullying experiences and psychological well-being, as well as between psychological well-being and sedentary behaviour. However, there is no direct association between cyberbullying experiences and sedentary behaviour. Psychological well-being fully mediates the relationship between cyberbullying experiences and sedentary behaviour. Essentially, the impact of cyberbullying experiences on sedentary behaviour is entirely mediated by its effect on psychological well-being. This indicates that reduced psychological well-being serves as the mechanism through which cyberbullying experiences lead to sedentary behaviour, potentially as a maladaptive coping response.

CRediT authorship contribution statement

Purwo Setiyo Nugroho: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Bhubate Samutachak:** Writing – review & editing, Supervision, Methodology, Formal analysis, Conceptualization, Investigation, Writing – original draft. **Tawanchai Jirapramukpitak:** Writing – review & editing, Supervision, Formal analysis, Conceptualization. **Ghozali:** Supervision, Methodology, Writing – review & editing, Formal analysis. **Fatimah Ahmad Fauzi:** Writing – review & editing, Methodology, Formal analysis. **Aphichat Chamratrithirong:** Writing – review & editing, Supervision, Formal analysis.

Relationship

There is no additional relationship to disclose.

Patent and intellectual property

There are no patent to disclose.

Other activity

There are no additional activities to disclose.

Ethical approval

This study is approved by the Institutional Review Board (IRB) at the Institute for Population and Social Research, Mahidol University (ID of ethics approval: no. COA 2023/12-242). Participants gave informed consent to participate in the study before taking part.

Research support

This study received partial funding from Mahidol University, contract no. MUGR SDGs67-04.

Declaration of competing interest

All the authors declare that there are no conflicts of interest.

Acknowledgment

The authors express their gratitude to all study participants for their honest responses. Appreciation is also extended to Universitas Muhammadiyah Kalimantan Timur and the Institute for Population and Social Research, Mahidol University, for their support in facilitating this research.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2025.105616.

Data availability

Data will be made available on request.

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