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Self-transitioning or other-transitioning? The positive effects of LGBTQ + college students' positive coping and perceived academic support

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Abstract

Background Stigmatisation directed towards LGBTQ+ individuals poses a considerable threat to their psychological well-being. LGBTQ+ college students frequently report exposure to perceived stress and microaggressions. Research indicates that self-regulation and proactive coping mechanisms can act as a protective buffer against the stigma and bias faced by sexual minorities. Consequently, this study investigated whether and to what extent proactive coping and perceived academic support moderate the relationship between perceived stress specific to LGBTQ+ college students, their psychological well-being, and academic performance.

Methods This study surveyed 359 Chinese LGBTQ+ college students with an average age of 20.65 years old through snowball sampling and online recruitment. Structural equation modeling was used to test the hypotheses.

Results Employing structural equation modelling analysis, the study revealed that (a) proactive coping moderated the relationship between perceived stress and psychological well-being, and (b) perceived academic support moderated the relationship between perceived stress and academic performance.

Conclusion These findings suggest that Chinese colleges should implement adequate support and counselling services to enhance the proactive coping abilities of LGBTQ+ students and create an academically supportive environment to alleviate the adverse effects of perceived stress on psychological well-being.

Keywords LGBTQ+, Psychological well-being, Academic performance, Proactive coping, Perceived academic support, Perceived stress, Stigma

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Introduction

With the removal of “homosexuality” from the psychiatric register by the World Health Organization (WHO) in 1990 [1], the LGBTQ+ (lesbian, gay, bisexual, transgender, questioning, and other sexual or gender minority identities) community has gradually been accepted and recognised by the society as a minority group of sexual orientation and gender identity [2–4]. However, it is difficult to eliminate the persistent physical and emotional violence [2], discrimination, and stigma inflicted on the LGBTQ+ community [2], especially in countries and regions that have not yet recognised the legality of same-sex marriage [1]. In higher education contexts, research suggests that LGBTQ+ students tend to have a worse college experience due to higher perceived stress from discrimination [5] and stigmatisation [2], even bullying [6]. However, the global emphasis on equality and diversity within universities is geared towards safeguarding the civil rights of sexual minorities [7]; most existing studies are restricted to regions where same-sex marriage is legal, such as European countries and the United States. Limited knowledge exists regarding the campus environment for sexual minority students in countries and regions where same-sex marriage is prohibited, resulting in a research gap that needs to be addressed.

In China, where same-sex marriage is not legalized, Confucian culture and traditional family values have contributed to moral objections against the LGBTQ+ community. Unlike universities in Europe and the United States, social support and protective measures for LGBTQ+ students in Chinese universities are predominantly facilitated by student-initiated clubs, informal organizations, and/or non-profit entities with a social welfare focus [8]. The lack of support from government and academic administrative departments intensifies the environmental pressures experienced by LGBTQ+ college students [8]. Consequently, a significant number of Chinese LGBTQ+ college students frequently opt to endure discrimination and disparate treatment in silence [9]. As an important resource, social support contributes to the well-being and resilience of LGBTQ+ students. Studies have shown that social support can help alleviate anxiety, depression, and other negative emotions, facilitating individual recovery [10, 11]. Academic support is a critical dimension of social support [12]. Using a sample of Chinese higher education students, this study seeks to explore the impact of perceived stress on the psychological well-being and academic performance of sexual minority youth. Additionally, the research aims to ascertain whether proactive coping strategies and perceived academic support can effectively mitigate the adverse effects of perceived stress on LGBTQ+ college students in China.

Theory and hypotheses

The Conservation of Resources (COR) theory provides insight into individuals' responses to stress. According to the theory, Hobfoll argued that when individuals perceive stress, they take measures to prevent further depletion of personal resources [13]. For LGBTQ+ college students, stress may be perceived as a loss of resources, such as social capital and/or interpersonal relationships, prompting them to reduce their academic commitment to prevent further resource loss. Unfortunately, this response is detrimental to their academic performance, which refers to a student's ability to attain their academic or educational goals [14]. Research indicates that victimization can result in decreased academic performance among LGBTQ+ youth [15].

The COR theory also posits that individuals employ proactive coping strategies when they perceive resource depletion [16]. Proactive coping is defined as actions aimed at achieving desired future outcomes and averting undesired changes [17]. Strategies associated with proactive coping involve individuals' efforts to build general resources to manage challenging stressors and foster personal growth [18]. In response to external stressors, LGBTQ+ college students who exhibit high levels of proactive coping deploy various strategies to prevent further resource loss, thereby mitigating the impact of perceived stress on their psychological well-being. Additionally, support is recognized as a protective resource aiding students in effectively managing stress, distress, and depression [19]. Perceived academic support involves students' emotional and material assistance from individuals they consider academically significant [20].

Perceived stress and psychological well-being

Perceived stress refers to an individual's assessment of an unfavourable event or situation in their environment [16]. Research indicates that sexual minorities encounter elevated levels of stress and marginalisation in comparison to heterosexual individuals [21]. The minority stress model posits that LGBTQ+ college students are more prone to experiencing stress compared to their heterosexual counterparts [1]. LGBTQ+ individuals undergo additional stressors that are absent in heterosexual individuals. These stressors encompass instances of prejudice such as discrimination, harassment, and violence, along with expectations of rejection, the need for identity concealment, and negative societal attitudes such as homophobia [1], resulting in psychological well-being issues for LGBTQ+ college students [6]. A qualitative study revealed that the stigmatisation of LGBTQ+ individuals is linked to four cultural factors: social status and relationships, family values, perceptions of immorality and abnormality, and stereotypes of the male gender [22].

Family and social status can subject LGBTQ+ college students to greater stigmatisation, which in turn creates stress and anxiety [22], thereby impacting the psychological well-being of LGBTQ+ college students. Especially for LGBTQ+ college students in China, the deep-rooted Confucian ideology exacerbates the intensified campus climate, resulting in multiple stressors originating from societal perceptions, parental attitudes, and the opinions of their peers and teachers [9]. Studies have demonstrated that strict gender norms can substantially affect the psychological well-being of LGBTQ+ individuals [17]. Essentially, when LGBTQ+ college students confront their stressors, it often leads to adverse effects on their psychological well-being.

Building upon the aforementioned factors, we propose that LGBTQ+ college students may experience higher levels of stress compared to their heterosexual peers. Prolonged exposure to high stress levels can negatively affect psychological well-being. Accordingly, we suggest:

Hypothesis 1 *Perceived stress is negatively related to psychological well-being.*

Perceived stress and academic performance

Academic performance typically refers to a student's ability to achieve academic or educational goals [14]. LGBTQ+ college students experience more significant stress than their heterosexual peers [18]; this additional stress can present challenges for them to dedicate sufficient energy to their academics. Research has shown that many LGBTQ+ college students face issues such as absenteeism, poor grades, and lower graduation rates for various reasons [15]. Some studies have identified contributing factors to these situations, including stress related to being exposed as LGBTQ+ [19], stigmatisation [6], and disapproval of one's identity by others. These factors can lead to increased vulnerability to persecution and higher stress levels, making it challenging to allocate energy to academic pursuits.

According to Conservation of Resources (COR) theory, individuals respond to stress by protecting their remaining resources to prevent further depletion [13]. For LGBTQ+ college students in China, when depletion of resources is perceived, they frequently refrain from investing additional resources in their studies to prevent further loss, resulting in lower academic performance. The experience of chronic stress may induce emotional exhaustion, ultimately resulting in a decrease in intrinsic motivation. This, in turn, leads to a reluctance to invest resources in studies, ultimately resulting in lower academic performance [20]. Consequently, we propose a negative correlation between the perceived stress levels of LGBTQ+ college students and their academic performance and the following hypothesis:

Hypothesis 2 *Perceived stress is negatively related to Academic performance.*

Proactive coping as a moderator between perceived stress and psychological well-being

Proactive coping refers to the promotion of desired future outcomes and the prevention of undesired changes [23]. For LGBTQ+ college students, who often find themselves in high-intensity stressful environments [18], it is important to adopt appropriate proactive coping strategies to manage the loss of personal resources. Proactive coping strategies refer to an individual's efforts to build general resources to cope with challenging stressors and promote personal growth [24]. This approach focuses on future events that are perceived to be self-promoting and thus more helpful in overcoming the negative consequences of stress [25]. Proactive coping can alleviate emotional distress caused by stressful events perceived as threatening, detrimental, or beyond one's control [26]. LGBTQ+ college students are more likely to experience unhealthy psychological conditions, such as anxiety and depression, due to a lack of identity or other reasons. Individuals with high levels of proactive coping perceive themselves as more capable of achieving their goals or taking proactive coping steps to deal with stress [27]. Therefore, LGBTQ+ college students with high proactive coping skills will use coping measures to buffer the effects of stress and restore their psychological well-being.

To prevent further depletion of resources when threatened, individuals strive to preserve existing resources and take a proactive approach to help them gain access to resources and reduce the threat of future resource depletion [28]. Coping is an individual's response to stress relief [29]. For college students who identify as LGBTQ+, experiencing stress related to their identity can lead to a depletion of resources. However, those with high levels of proactive coping can acquire resources through various means, preventing a spiral of resource loss [25]. Therefore, proactive coping can help compensate for adverse conditions such as anxiety and depression that arise during times of stress. Individuals with higher proactive coping skills strive to accumulate general resources to facilitate coping with challenging events [26]. Related research suggests that proactivity reduces burnout and increases work engagement and well-being [26]. Thus, we suggest that LGBTQ+ college students with high proactive coping skills will mitigate the adverse effects of perceived stress on their psychological well-being as follows:

Hypothesis 3 *Proactive coping moderates the negative relationship between perceived stress and psychological well-being, such that the relationship is weaker when proactive coping is high rather than low.*

Perceived academic support as a moderator between perceived stress and academic performance

Perceived social support refers to an individual's subjective assessment of the availability and adequacy of support from their social environment, influencing their sense of social acceptance and respect [5]. Research has demonstrated a positive correlation between social support and individual resilience [11]. Perceived academic support is the emotional and material assistance students perceive from those they consider important in their academic pursuits [30]. Research indicates that perceived academic support is a protective factor against anxiety and depression among students [31], particularly among LGBTQ+ college students who are more susceptible to these conditions for various reasons [22]. Social support plays a crucial role in students' academic and personal development as an essential environmental factor [12]. Within higher education, academic support represents the most direct form of social support experienced by college students [10, 11]. LGBTQ+ college students may reduce their commitment to academics when experiencing stress to protect their resources from further loss. However, when they perceive academic support, they are more likely to reconsider reducing their commitment to academics. Furthermore, academic support positively impacts students' success, motivation, engagement, and well-being [32]. Therefore, we posit that more excellent perceived academic support mitigates the stress experienced by LGBTQ+ college students, motivating them to allocate more resources to their studies.

Support is acknowledged as a protective resource that helps students cope better with stress, pain, and depression [33]. According to the COR theory [13], perceived academic support, as a crucial resource, helps to offset the loss of resources indicated by emotional exhaustion, which, in turn, results in a reduction of negative behaviours, such as a decrease in commitment to learning.

Simultaneously, support also offers students chances for positive interactions with others [34]. Positive communication with teachers, peers, and parents helps to regulate personal emotions and alleviate negative burnout [35], which, in turn, facilitates the recovery of adverse emotions such as depression and anxiety. Additionally, according to Reyes et al. (2022), academic support for LGBTQ+ college students is perceived to come from parents, teachers, and peers [30]. As a means of facilitating interpersonal communication, social support can reduce stress and restore individual resources by fostering social relationships [36]. Accordingly, we propose that academic support perception mitigates the negative correlation between stress perception and academic performance among college students who identify as LGBTQ+:

Hypothesis 4 *Perceived academic support moderates the negative relationship between perceived stress and academic performance, such that the relationship is weaker when perceived academic support is high rather than low.*

The primary objective of this study is to investigate the relationship between perceived stress among LGBTQ+ college students and their psychological well-being and academic performance within the Chinese context. Additionally, the study explores the potential positive influences of proactive coping and perceived academic support on these students. By examining the four hypotheses, this research seeks to offer insights and strategies to address the challenges encountered by LGBTQ+ college students in the context of their unique identities, as illustrated in Fig. 1.

Method

Sample

Before data collection, we briefly interviewed several LGBTQ+ college students from different universities. The interviews revealed that they perceive experiencing

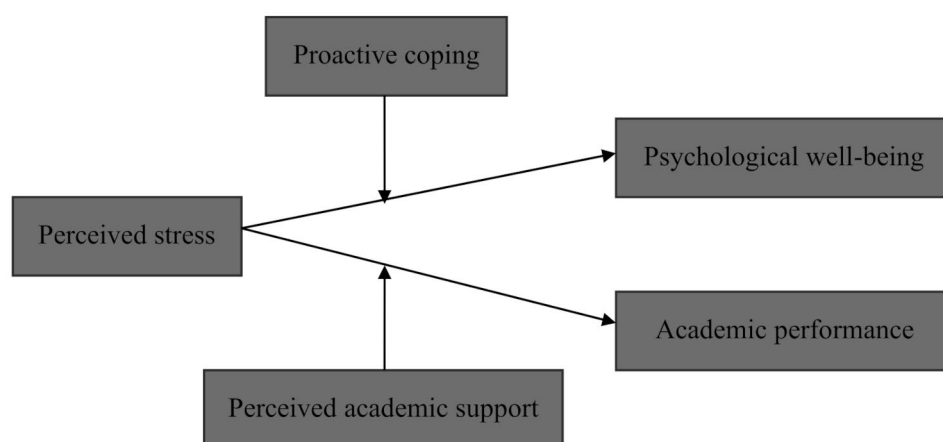


Fig. 1 A conceptual model linking perceived stress, proactive coping, psychological well-being, perceived academic support, and academic performance

more stress compared to their heterosexual peers. Subsequently, this study utilized snowball sampling [37] and online platform recruitment for data collection. The research questionnaire was distributed across several social media platforms commonly used by the LGBTQ+ community in China, including Xiaohongshu, Douban LGBTQ+ forums, and Hot Drawing to recruit LGBTQ+ college students interested in voluntarily completing it. We informed all participants that the questionnaire data would be kept strictly confidential. The study was conducted in the form of an online questionnaire. The questionnaire was initially distributed to our LGBTQ+ acquaintances, who were asked to refer classmates or friends who met the survey requirements. Additionally, we posted the questionnaire online to reach a wider audience of LGBTQ+ college students.

A total of 382 responses were collected—190 through snowball sampling and 192 via direct recruitment through social media. After excluding incomplete responses and those with more than 10 identical consecutive answers, 359 valid questionnaires were retained for analysis. Of these, 52.9% were male and 47.1% were female. The average age was 20.65 years. Among the respondents, 29.8% were studying in higher vocational colleges and universities, 28.4% in non-focused universities, 41.2% in focused universities, and 0.6% in colleges and universities outside China. The fields of study pursued by the participants were primarily focused on Arts (22%), Economics (Business) (20.6%), Management (25.9%), Science (11.4%), and Education (10.6%). The percentage of participants who identified as lesbian was 45.7%, gay 26.2%, bisexual 25.3%, and other (pansexual, asexual, or other sexual minorities) 0.8%, with 11.1% identifying as indeterminate.

Measures

The variables in our study were measured using well-established scales published in the research literature. To ensure the quality of translation and avoid language ambiguity, our study strictly followed the “translation-back translation” procedure to translate the scales initially developed in English into Chinese. Each variable was measured to ensure validity, and all met the required KMO value greater than 0.7 [38].

Perceived stress. Perceived stress has ten items [21]. Sample items are, “I will be upset by something that happens unexpectedly.” Participants responded on a five-point response scale from 1 = *strongly disagree* to 5 = *strongly agree*. Internal consistency for this scale was $\alpha = 0.873$ in the current study.

Psychological well-being. The World Health Organization-Five Well-Being Index (WHO-5) measures participants’ psychological well-being [39]. Sample items are “My daily life is full of things that interest me.”

Participants were rated on a 5-point scale, from 1 = *at no time* to 5 = *all the time*. A sample item was, “I have felt cheerful and in good spirits.” The internal consistency for this scale was $\alpha = 0.899$.

Academic performance. Academic performance was measured using a seven-item scale [40]. Sample items are, “I can accurately complete more assignments relative to my batch mates.” Participants responded on a five-point response scale from 1 = *strongly disagree* to 5 = *strongly agree*. Internal consistency for this scale was $\alpha = 0.968$ in the current study.

Proactive coping. Proactive coping was measured using a twenty-one-item scale [23]. Sample items are “I can find alternatives when a program does not work.” A five-point response scale was used, ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The internal consistency for this scale was $\alpha = 0.976$.

Perceived academic support. Perceived academic support was measured using a twelve-item scale [30] with three dimensions. Self-reporting from students. Three items each for teacher and peer support, and six for parental support. Sample items are, “In my school, there is a teacher who cares about me.” A five-point response scale was used, ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The internal consistency for this scale was $\alpha = 0.980$. The Cronbach’s α of teacher, peer, and parental support were 0.921, 0.941, and 0.963, respectively.

Control variables. Prior research has shown some influence of demographic variables on psychological well-being and academic performance, i.e., age, gender [14], gender identity, and school type [15]. In addition, there may be learning difficulties in different subjects. Therefore, this study also controlled for the discipline category as a control variable. Therefore, we decided to control these factors, which may affect the selected variables in this study. Gender was measured as a dichotomous variable coded as 1 = *male* and 2 = *female*. School type was coded as an ordinal variable (1 = *higher education institutions*, 2 = *major university*, and 3 = *general university*, 4 = *out-of-state colleges and universities (where gay marriage is legal)*, 5 = *out-of-state colleges and universities (where gay marriage is not legal)*, 6 = *out-of-state colleges and universities (not sure if gay marriage is legal in their region)*, 7 = *others*). Subject coded as an ordinal variable (1 = *science*, 2 = *engineering*, 3 = *liberal arts*, 4 = *philosophy*, 5 = *economics (business)*, 6 = *law*, 7 = *history*, 8 = *management studies*, 9 = *military science*, 10 = *arts*, 10 = *medicine*, 11 = *education*, 12 = *other social sciences*, 13 = *other cross-disciplines*, 14 = *other*). Identity is coded as an ordinal variable (1 = *lesbian*, 2 = *gay*, 3 = *bisexual*, 4 = *transgender*, 5 = *other (pansexual, asexual, or another sexual minority)*, 6 = *uncertain*).

Table 1 Measurement model and reliability measures

Construct	Composite reliability	Cronbach's alpha	AVE	KMO
Perceived stress	0.874	0.873	0.426	0.921
Psychological well-being	0.906	0.899	0.660	0.864
Proactive coping	0.987	0.976	0.611	0.980
Academic performance	0.969	0.968	0.815	0.950
Perceived academic support	0.984	0.980	0.801	0.969

Note. AVE = Average variance extracted

All loadings are significant at $p < .001$

Table 2 Goodness-of-fit information for the alternative factor models

Structure	Chi-squared	df	Chi-squared/df	CFI	TLI	RMSEA	SRMR
5-factor model	2525.912	1420	1.779	0.943	0.941	0.047	0.040
4-factor model ^a	3836.771	1424	2.694	0.876	0.871	0.069	0.107
3-factor model ^b	8312.596	1427	5.825	0.647	0.633	0.116	0.156
2-factor model ^c	9358.525	1430	6.544	0.594	0.578	0.124	0.178
1-factor model ^d	11898.990	1431	8.315	0.463	0.443	0.143	0.185

Note. CFI comparative fit index, TLI Tucker–Lewis's index, RMSEA root mean square error of approximation

^a perceived stress and proactive coping combined into a single factor

^b Perceived stress, proactive coping, and perceived academic support combined into a factor

^c Perceived stress and proactive coping, perceived academic support, and psychological well-being combined into a single factor

^d Perceived stress and proactive coping, perceived academic support, psychological well-being, and academic performance are combined into a single factor

Data analysis

Data analysis was conducted using SPSS 27.0 and Amos 24.0. SPSS was utilised for reliability testing, descriptive statistics, and correlation analysis, while Amos was employed for confirmatory factor analysis and hypothesis testing. Mediation and moderation effects were examined using bias-corrected bootstrapping with 2,000 resamples and 95% confidence intervals (CIs).

Results

The following analyses used Amos's structural equation modelling (SEM). Before hypothesis testing, this study analysed the reliability and validity of all variables. In terms of reliability, as shown in Table 1, the Cronbach's α values of the four variables involved in this study are all greater than 0.70; the standardised factor loadings are all greater than 0.60; the CR (composite reliability) values are all greater than 0.70; and the AVE (average variance extracted) values are all greater than 0.50 (except perceived stress). According to Fornell and Larcker (1981), convergent validity is also acceptable if the AVE is less than 0.5, but the CR is higher than 0.6 [41]. In a word, these indicators suggest that the variables in this study have good measurement reliability. In terms of validity, Table 2 shows that the four-factor model has the best fit ($\chi^2 = 2525.912$; $df = 1420$; $\chi^2 / df = 1.779$; CFI = 0.943; TLI = 0.941; RMSEA = 0.047; SRMR = 0.040). Together, these results indicate that the variables involved in this study can be effectively differentiated from each other.

The self-reported data could easily lead to common method variance (CMV). The results of Harman's one-way analysis of variance showed that the unrotated

exploratory factor analysis analysed five factors, which accounted for 70.24% of the total variance explained, and the first principal component factor explained 39.27% of the variance, which was less than 50% [42]. Furthermore, Table 2 illustrates how much less superior the one-factor model fit was compared to the four-factor model. The findings suggest that the study's common method bias is insignificant.

The means, standard deviations, and intercorrelation matrix for all the variables are shown in Table 3. In addition, according to Table 3, the correlation coefficients between variables are less than 0.7, indicating no serious multicollinearity.

Hypothesis tests

Hypothesis 1 proposed that perceived stress is negatively related to psychological well-being. From Table 4, we can see that perceived stress had a negative relationship with psychological well-being ($B = -0.282$, $SE = 0.080$, $p < .001$). Supporting *Hypothesis 1*.

Hypothesis 2 proposed that perceived stress is negatively related to academic performance. From Table 4, we can see that perceived stress had a negative relationship with academic performance ($B = -0.594$, $SE = 0.072$, $p < .001$). Supporting *Hypothesis 2*.

The moderation effect of proactive coping is presented in Table 4. The interaction term of perceived stress and proactive coping was significant ($B = 0.126$, $SE = 0.041$, $p = .001$). In addition, from Table 5; Fig. 2, although proactive coping was low ($B = -0.170$, $SE = 0.122$, 95% CI = [-0.407, 0.038]), it was insignificant; high ($B = -0.396$,

Table 3 Means, standard deviations, and correlations

Variables	1	2	3	4	5	6	7	8	9	10
1. Gender ^a	-									
2. Age	-0.01	-								
3. Type ^b	-0.02	0.18**	-							
4. Subject ^c	0.05	0.01	0.04	-						
5. Identity ^d	0.04	0.13*	0.13*	-0.05	-					
6. Perceived stress	-0.04	-0.13*	-0.13*	-0.01	-0.07	-				
7. Psychological well-being	0.01	0.07	0.06	0.06	-0.04	-0.28**	-			
8. Proactive coping	0.02	0.03	0.04	-0.01	-0.01	-0.16**	0.54**	-		
9. Academic performance	0.00	0.17**	0.14*	0.02	0.01	-0.57**	0.30**	0.31**	-	
10. Perceived academic support	0.02	-0.05	0.08	0.00	-0.07	-0.27**	0.25**	0.46**	0.59**	-
Mean	1.53	20.65	2.62	2.13	5.82	3.84	3.25	3.39	2.77	3.50
Standard Deviations	0.50	1.97	0.50	0.86	3.44	0.89	0.76	0.95	1.12	1.19

Note. *N* = 359;

^a Gender coded as (1 = male, 2 = female);

^b Type coded as (1 = higher education institutions, 2 = major university, and 3 = general university, 4 = out-of-state colleges and universities (where gay marriage is legal), 5 = out-of-state colleges and universities (where gay marriage is not legal), 6 = out-of-state colleges and universities (not sure if gay marriage is legal in their region), 7 = others);

^c Subject coded as (1 = science, 2 = engineering, 3 = liberal arts, 4 = philosophy, 5 = economics (business), 6 = law, 7 = history, 8 = management studies, 9 = military science, 10 = arts, 10 = medicine, 11 = education, 12 = other social sciences, 13 = other cross-disciplines, 14 = other);

Identity coded as (1 = lesbian, 2 = gay, 3 = bisexual, 4 = transgender, 5 = other (pansexual, asexual, or another sexual minority), 6 = uncertain);

+*p* < .1; **p* < .05; ***p* < .01; ****p* < .001

Table 4 Summary of path-analytic results

Variables	Psychological well-being		Academic performance	
	B	SE	B	SE
Perceived stress	-0.282***	0.080	-0.594***	0.072
Proactive coping	0.664***	0.068		
Perceived stress × Proactive coping	0.126**	0.041		
Perceived academic support			0.444***	0.038
Perceived stress × Perceived academic support			0.196***	0.056
Gender ^a	-0.031	0.101	-0.042	0.074
age	0.007	0.026	0.070***	0.019
Type ^b	0.015	0.061	0.056	0.045
Subject ^c	0.016	0.015	-0.003	0.011
Identity ^d	-0.026	0.057	0.006	0.042

Note. B = Path coefficients; SE = Standardized errors; Path coefficients are unstandardized

The number of bootstrap samples is 2000; the confidence level is 95%

^a Gender coded as (1 = male, 2 = female)

^b Type coded as (1 = higher education institutions, 2 = major university, and 3 = general university, 4 = out-of-state colleges and universities (where gay marriage is legal), 5 = out-of-state colleges and universities (where gay marriage is not legal), 6 = out-of-state colleges and universities (not sure if gay marriage is legal in their region), 7 = others)

^c Subject coded as (1 = science, 2 = engineering, 3 = liberal arts, 4 = philosophy, 5 = economics (business), 6 = law, 7 = history, 8 = management studies, 9 = military science, 10 = arts, 10 = medicine, 11 = education, 12 = other social sciences, 13 = other cross-disciplines, 14 = other)

^d Identity coded as (1 = lesbian, 2 = gay, 3 = bisexual, 4 = transgender, 5 = other (pansexual, asexual or another sexual minority), 6 = uncertain)

+*p* < .1; **p* < .05; ***p* < .01; ****p* < .001

SE = 0.086, 95% CI = [-0.568, -0.231] was significant. Furthermore, the difference between high and low was also significant (B = -0.226, SE = 0.077, 95% CI = [-0.369, -0.080]). This result indicates that proactive coping moderated the negative relationship between perceived stress and psychological well-being, supporting Hypothesis 3.

The moderation effect of perceived academic support is presented in Table 4. The interaction term of perceived stress and perceived academic support was

significant (B = 0.196, SE = 0.056, *p* < .001). In addition, From Table 5; Fig. 3 low perceived academic support (B = 0.368, SE = 0.110, 95% CI = [-0.595, -0.156]) was significant, and high (B = -0.820, SE = 0.111, 95% CI = [-1.055, -0.626]) was also significant. Furthermore, the difference between high and low was also significant (B = -0.451, SE = 0.150, 95% CI = [-0.762, -0.187]). This result indicates that perceived academic support moderated the negative

Table 5 Bootstrapping results for testing the moderation effect

	B	SE	95% Boot CI
Perceived stress → Psychological well-being			
High ^a (+SD)	-0.396**	0.086	[-0.568, -0.231]
Low ^a (-SD)	-0.170	0.112	[-0.407, 0.038]
Difference ^a	-0.226**	0.077	[-0.369, -0.080]
Perceived stress → Academic performance			
High ^b (+SD)	-0.820**	0.111	[-1.055, -0.626]
Low ^b (-SD)	-0.368**	0.110	[-0.595, -0.156]
Difference ^b	-0.451**	0.150	[-0.762, -0.187]

Note. B Path coefficients; SE = Standardized errors; CI that excludes zero indicates that the indirect effects are significant; Path coefficients are unstandardized

Low ^a refers to one standard deviation below the mean of the moderator–proactive coping; high ^a refers to one standard deviation above the mean of the moderator–proactive coping

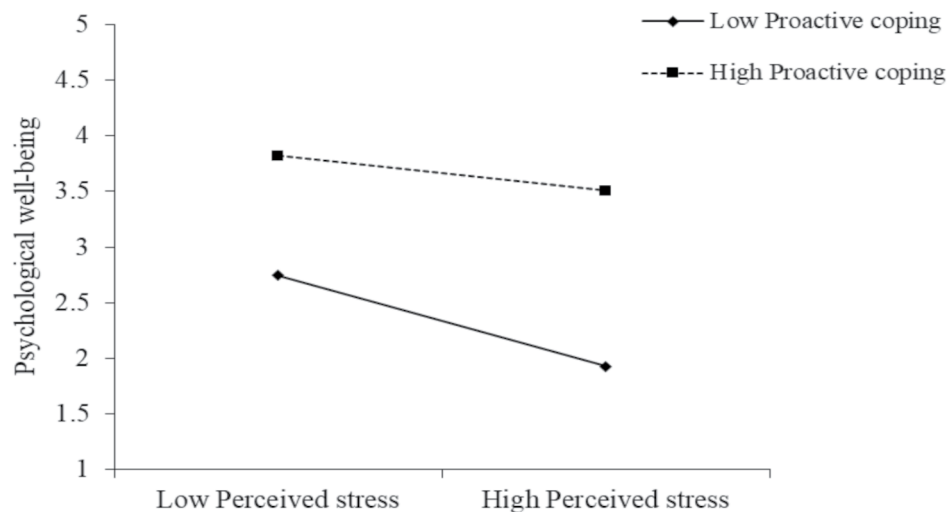
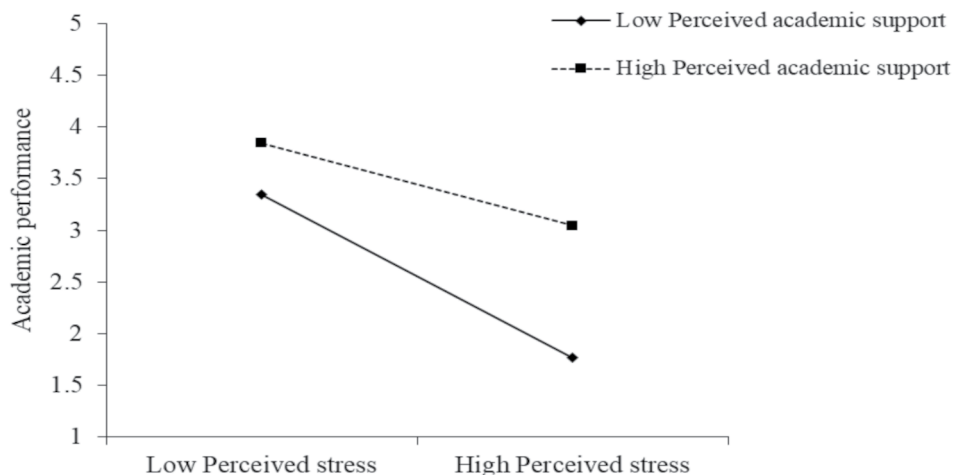
Low ^b refers to one standard deviation below the mean of the moderator–perceived academic support; high ^b refers to one standard deviation above the mean

+*p* < .1; **p* < .05; ***p* < .01; ****p* < .001

relationship between perceived stress and academic performance, supporting *Hypothesis 4*.

Discussion

This study conducted interviews and surveys with LGBTQ+ college students at public universities in China. The findings indicate that most LGBTQ+ college students experience more significant stress and suffer from varying degrees of depression, anxiety, and other unhealthy psychological conditions. The adverse effects of perceived stress on the psychological well-being and academic performance of LGBTQ+ college students were verified in the Chinese context using the sexual minority stress model and COR theory. Using proactive coping as a personal factor and perceived academic support as an environmental factor, this study found that proactive coping weakened the effect of perceived stress on psychological well-being, and perceived academic support

**Fig. 2** The moderation effect of proactive coping on the relationship between perceived stress and psychological well-being**Fig. 3** The moderation effect of perceived academic support on the relationship between perceived stress and academic performance

weakened the effect of perceived stress on academic performance. This fills a gap in research on LGBTQ+ college students in mainland China and addresses shortcomings in existing literature on the topic.

Perceived stress, psychological Well-Being, and academic performance

Although previous research suggests that younger individuals and those with higher levels of education tend to be more accepting of LGBTQ+ peers [43], and thus identifying as LGBTQ+ may be associated with lower stress levels, our study found that perceived stress remains high among LGBTQ+ college students ($M=3.84$). This aligns with existing research indicating that LGBTQ+ individuals continue to experience significant stress due to social stigma and discrimination [6, 44]. Our findings further highlight that, within the context of Chinese higher education, LGBTQ+ students still face substantial stress despite increasing societal acceptance.

Interestingly, while high stress levels were observed, our study found that the psychological well-being of LGBTQ+ college students ($M=3.25$) was not as low as expected. This may be attributed to their relatively high levels of active coping ($M=3.39$), which has been identified as an important resilience factor within the LGBTQ+ community [44]. Our findings on academic performance ($M=2.77$) differ slightly from previous studies [45, 46], suggesting that high stress levels negatively impact academic outcomes. One possible explanation is that LGBTQ+ students may allocate more resources to maintaining psychological well-being, potentially diverting attention from academics. This highlights the complex interplay between stress, coping strategies, and academic performance.

Moderating effects of proactive coping and perceived academic support

Our study examined the moderating role of perceived academic support in the relationship between perceived stress and academic performance among college students. While previous research has primarily emphasised social support as a buffer against negative emotions such as fear and anxiety [11, 47], our findings highlight the significance of academic support, particularly for LGBTQ+ students.

Results indicate that LGBTQ+ college students reported high perceived academic support ($M=3.50$), consistent with prior studies suggesting that faculty support is crucial in enhancing their academic performance. Additionally, we found that Chinese LGBTQ+ students demonstrated strong, active coping strategies ($M=3.39$), aligning with existing research on active coping within the LGBTQ+ community [44]. This suggests a positive link between active coping and psychological well-being.

Our findings indicate that academic support for LGBTQ+ students in China, particularly within rapidly developing higher education institutions, is relatively strong. However, despite high levels of academic support, students may still face stress and discrimination related to their sexual orientation. This underscores the need for ongoing efforts to foster inclusive and supportive academic environments that address structural and psychological challenges.

Theoretical implications

The study presents the main theoretical contributions: first, it uses the sexual minority stress model and COR theory to explain the consequences and boundaries of perceived stress among LGBTQ+ college students in a mainland Chinese university context. Secondly, it demonstrates that perceived stress negatively affects the psychological well-being and academic performance of LGBTQ+ college students, further expanding the extrapolated value of COR theory. While numerous studies have examined the social pressures experienced by LGBTQ+ persons and the resulting negative consequences (Evangelista et al., 2022; Lau et al., 2020), there is a dearth of research on the psychological well-being and academic performance of LGBTQ+ college students in mainland China. This study fills a gap in research on LGBTQ+ college students in mainland China and contributes to the existing literature on the topic.

Second, this study aims to enhance the understanding of the impact of perceived stress on the psychological well-being and academic performance of LGBTQ+ college students. The study also examines the moderating effects of proactive coping and perceived academic support, revealing the boundary conditions of the consequences of perceived stress on this population. Researchers have investigated the impact of perceived academic support on the academic performance of LGBTQ+ youth [15]. However, focusing solely on teachers as the source of support is not consistent with the context of Chinese college students' lives. Additionally, academic performance is often measured exclusively by outcomes and GPA, without considering an individual's self-assessment of their academic performance. The study measured the perceived academic support from teachers, parents, and peers to investigate the negative moderating effect of perceived academic support on perceived stress and academic performance among LGBTQ+ college students. Previous studies have not explored the positive role of proactive coping in the LGBTQ+ population. Therefore, this study aims to explore the negative moderating effect of proactive coping on the relationship between perceived stress and psychological well-being among LGBTQ+ college students by using proactive coping as a personal factor.

Finally, in this study, the gay male population participated less in the survey compared to the lesbian population. Alternatively, only a minority of men recognised their identity as gay. Since the ratio of men to women in this survey was generally balanced, the percentage of lesbian participants was significantly higher than the percentage of gay participants. Since this study used snowball sampling and recruited subjects who voluntarily supported the study through an online platform, we believed that the gay male community is more reluctant to admit their identity. We hypothesise that this is related to the context of mainland China. It has been suggested that gay men may suffer more pressure due to the traditional belief of needing to maintain family lineage [8]. Moreover, they are more reluctant to reveal their identity. This is consistent with previous research [8].

Practical implications

This study has practical implications for society. First, as international trade, global cultural exchanges, and education continue to grow [9], there is a need for more inclusive and diverse attitudes towards LGBTQ+ persons. This will help reduce the incidence of stereotyping, stigmatisation, and discrimination. “Love is love” is essential for society to present a more diverse and inclusive attitude. Psychological services for LGBTQ+ persons can be established to provide a safe space for university students to communicate with one another.

Second, universities ought to provide adequate support and counselling services to mitigate the adverse effects of perceived stress among LGBTQ+ college students. Research suggests that LGBTQ+ college students experience higher levels of stress than their heterosexual counterparts [6]. Additionally, perceived academic support can help alleviate the adverse effects of perceived stress. Therefore, college administrators should establish counselling services to guide the thoughts of LGBTQ+ college students and prevent unnecessary losses. Additionally, support should be provided to help them recover from the stress and loss of resources. Universities ought to strengthen the ideological education of all university students to reduce the occurrence of homophobia.

Third, LGBTQ+ college students should improve their proactive coping abilities to reduce the negative impact of stress. This study suggests that proactive coping can alleviate the adverse effects of perceived stress on psychological well-being. Therefore, LGBTQ+ college students should continue strengthening their inner selves and reducing the adverse effects of external stress.

Finally, although our study focused on the academic and psychological well-being experiences of LGBTQ+ students, it has important implications for healthcare education and practice. Our study explored the relationship between perceived stress, psychological

well-being, academic performance, proactive coping, and perceived academic support among LGBTQ+ students. In terms of relevance to medical education, much current research addresses the challenges experienced by the LGBTQ+ community in healthcare settings. For example, scholars have explored medical students' perceptions of the LGBTQ+ community, emphasizing the importance of future healthcare professionals raising community awareness [48]. Our study contributes new insights in this area, shedding light on the challenges faced by LGBTQ+ college students and thus providing useful information for medical education. In addition, several studies have shown that medical students' understanding of LGBTQ+ related issues remains inadequate [49]. By examining the psychological well-being and academic challenges of LGBTQ+ college students, our study could help healthcare professionals better understand the population, ultimately facilitating their ability to provide more comprehensive and empathetic care to LGBTQ+ patients. Additionally, previous research has shown that healthcare professionals often have limited knowledge of the LGBTQ+ community, which can lead to discrimination [50]. By fostering greater awareness of LGBTQ+ students' experiences, our study aims to contribute to reducing stigma and discrimination within healthcare settings. As societal acceptance of LGBTQ+ individuals grows, more students from these communities are visible in educational institutions. However, research has shown that LGBTQ+ college students often face hostile campus environments [3, 51]. Despite such challenges, many persist in their education [3]. Understanding the protective factors that support this persistence is essential for student affairs professionals and educators. This study contributes to that understanding by offering insights into the psychological and academic needs of LGBTQ+ students. Medical and mental health educators can use these findings to provide more inclusive care and tailored mental health support. Finally, there is evidence that the LGBTQ+ community is at a higher risk for mental health disorders such as depression [6]. Our research highlights the need for medical students to be better equipped to understand and address the specific mental health needs of LGBTQ+ individuals, which will ultimately improve patient care and the overall well-being of the LGBTQ+ community. Overall, this study can contribute to the quality of healthcare for LGBTQ+ individuals and advance the community's psychological well-being and overall well-being.

Limitations and future research

This study has several limitations that should be addressed in future research. First, using cross-sectional data limits the ability to establish causal relationships between perceived stress, coping strategies, and

academic outcomes. Future studies should employ longitudinal designs to capture changes over time and better understand these dynamics.

Second, while statistical analyses indicated that common method bias was not a significant issue, the reliance on self-reported data may introduce subjectivity. To enhance validity, future research should incorporate objective measures, such as academic performance evaluations by faculty or standardized psychological assessments.

Additionally, this study focused on the moderating roles of proactive coping and perceived academic support, but other influential factors, such as resilience and broader social support networks, warrant further investigation. Expanding the research framework to include these variables would provide a more comprehensive understanding of LGBTQ+ college students' experiences in Chinese higher education.

Most importantly, the data used in this study were self-reported. Biological sex as well as self-identity rely on individual evaluations, which may be subject to bias. Future interviews could be used to gain insight into the gender and self-identity of the LGBTQ+ community. Although the study aimed to recruit a diverse and representative sample of LGBTQ+ participants, no self-identified transgender individuals were captured in the responses. This may be attributed to two main factors. First, transgender individuals often remain hidden in school settings [4] due to heightened stigma under traditional Confucian values [52, 53]. Second, some transgender individuals may self-identify based on their post-transition gender, making it difficult to capture their identity accurately using standard questionnaires. Future research should employ qualitative methods such as in-depth interviews to better explore the unique experiences and challenges of transgender individuals in educational contexts. The small sample size is also a limitation of this study. In the future, the sample size can be further expanded for more in-depth investigation and research.

Finally, the study's reliance on quantitative methods may not fully capture the complexities of LGBTQ+ students' lived experiences. Future research should integrate qualitative approaches, such as in-depth interviews and focus groups, to explore how proactive coping and academic support influence their well-being and academic performance. By addressing these limitations, future studies can build a more robust and holistic understanding of the challenges and support systems affecting LGBTQ+ students in higher education.

Conclusions

This study is among the first to examine the moderating role of proactive coping in the negative relationship between perceived stress and psychological well-being,

and the moderating role of perceived academic support in the negative relationship between perceived stress and academic performance among LGBTQ+ college students in China. Findings suggest that while many LGBTQ+ students in Chinese higher education institutions report substantial academic support and manageable stress levels, challenges remain.

Proactive coping emerged as a key personal factor, while academic support was identified as a critical environmental factor influencing student well-being and performance. By highlighting the interplay between stress, coping mechanisms, and external support systems, this study contributes to a deeper understanding of the experiences of LGBTQ+ college students in China.

To foster an inclusive and supportive academic environment, Chinese higher education institutions should adopt more pluralistic and inclusive policies to reduce stigma, stereotyping, and discrimination. Strengthening institutional support systems and promoting psychological well-being among sexual minorities can contribute to improved public health outcomes and social progress.

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Author contributions

C.M. and J.L. conceived and designed the research and wrote the first draft. C.M. and J.L. managed the acquisition of data. C.M. and J.L. managed the analysis and interpretation of data. C.M. and J.L. wrote the first draft. All authors read, revised, wrote and approved the final version of manuscript.

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Data availability

The data supporting this study's findings are available on request from the corresponding author. However, the data are not publicly available due to privacy or ethical restrictions.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the School of Public Administration of Sichuan University (approval date: 18 September 2023). After obtaining committee approval, we explained the purpose and confidentiality of the study to respondents at the beginning of the questionnaire and set the option of informed consent; those who chose no would simply withdraw from the survey.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

- Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull.* 2003;129:674–97.
- Gonzales G, Loret De Mola E, Gavulic KA, McKay T, Purcell C. Mental health needs among lesbian, gay, bisexual, and transgender college students during the COVID-19 pandemic. *J Adolesc Health.* 2020;67:645–8.
- Pitcher EN, Camacho TP, Renn KA, Woodford MR. Affirming policies, programs, and supportive services: using an organizational perspective to understand LGBTQ+ college student success. *J Divers High Educ.* 2018;11:117–32.
- Lin Y, Xie H, Huang Z, Zhang Q, Wilson A, Hou J, et al. The mental health of transgender and gender non-conforming people in China: A systematic review. *Lancet Public Health.* 2021;6:e954–69.
- Hossain MU, Arefin MS, Yukongdi V. Personality traits, social self-efficacy, social support, and social entrepreneurial intention: the moderating role of gender. *J Soc Entrep.* 2024;15:119–39.
- Evangelista ZM, Lido C, Swingler M, Bohan J. Exploring LGBT+ campus climate in the UK and Philippines: how prejudice and belonging shape inclusion in higher education. *Eur J Soc Psychol.* 2022;52:342–60.
- Reggiani M, Gagnon JD, Lunn RJ. LGBT+ academics' PhD students' experiences of visibility in STEM: more than Raising the rainbow flag. *High Educ.* 2023. <https://doi.org/10.1007/s10734-023-00993-2>
- Liu X, Jiang D, Chen X, Tan A, Hou Y, He M, et al. Mental health status and associated contributing factors among gay men in China. *Int J Environ Res Public Health.* 2018;15:1065.
- Lau CC, Chong ESK, Choi CW. A study of mental health and the role of mindfulness in promoting positive mental health for Hong Kong Chinese gay men. *China J Soc Work.* 2020;13:267–82.
- Mauer VA, Littleton H, Lim S, Sall KE, Siller L, Edwards KM. Fear of COVID-19, anxiety, and social support among college students. *J Am Coll Health.* 2024;72:631–8.
- Nguyen TT. Do resilience and social support buffer Vietnamese college students' mental health during the COVID-19 pandemic? A pilot study. *Asia Pac J Soc Work Dev.* 2024;34:356–65.
- Lyu C. Relations between perceived social support and prosocial behavior among Chinese college students during online learning: testing mediation and moderation models of meaning in life. *Heliyon.* 2024;10:e37677.
- Hobfoll SE. Conservation of resources. *Am Psychol.* 1989. <https://doi.org/10.1037/0003-066X.44.3.513>
- Garg N, Talukdar A, Ganguly A, Kumar C. Knowledge hiding in academia: an empirical study of Indian higher education students. *J Knowl Manag.* 2021;25:2196–219.
- Poteat VP, Watson RJ, Fish JN. Teacher support moderates associations among sexual orientation identity outness, victimization, and academic performance among LGBTQ+ Youth. *J Youth Adolesc.* 2021;50:1634–48.
- Lazarus RS. From psychological stress to the emotions: A history of changing outlooks. *Annu Rev Psychol.* 1993;44:1–22.
- Ellis SJ. Diversity and inclusivity at University: a survey of the experiences of lesbian, gay, bisexual and trans (LGBT) students in the UK. *High Educ.* 2009;57:723–39.
- Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Sex Orientat Gend Divers.* 2013;1 S:3–26.
- Aragon SR, Poteat VP, Espelage DL, Koenig BW. The influence of peer victimization on educational outcomes for LGBTQ and Non-LGBTQ high school students. *J LGBT Youth.* 2014;11:1–19.
- Hur W-M, Moon T, Jun J-K. The effect of workplace incivility on service employee creativity: the mediating role of emotional exhaustion and intrinsic motivation. *J Serv Mark.* 2016;30:302–15.
- Mozumder MK. Validation of the Bengali perceived stress scale among the LGBT population. *BMC Psychiatry.* 2017;17:314.
- Liu JX, Choi K. Experiences of social discrimination among men who have sex with men in Shanghai, China. *AIDS Behav.* 2006;10:2533.
- Bode C, De Ridder DTD, Kuijer RG, Bensing JM. Effects of an intervention promoting proactive coping competencies in middle and late adulthood. *Gerontologist.* 2007;47:4251.
- Schwarzer R, Taubert S. Tenacious goal pursuits and striving toward personal growth: proactive coping. *Beyond coping.* Oxford University Press; 2002. pp. 19–36.
- Ângelo RP, Chambel MJ. The role of proactive coping in the job Demands–Resources model: A cross-section study with firefighters. *Eur J Work Organ Psychol.* 2014;23:203–16.
- Llorens S, Salanova M, Chambel MJ, Torrente P, Ângelo RP. Organizational drivers of burnout and work engagement: A multilevel study in Portuguese firefighter brigades. *Int J Environ Res Public Health.* 2022;19:4053.
- Jex SM, Bliese PD, Buzzell S, Primeau J. The impact of self-efficacy on stressor–strain relations: coping style as an explanatory mechanism. *J Appl Psychol.* 2001;86:401–9.
- Westman M, Hobfoll SE, Chen S, Davidson OB, Laski S. Organizational stress through the lens of resources' conservation (COR) theory. *Research in occupational stress and Well-being.* Bingley: Emerald (MCB UP); 2004. pp. 167–220.
- Stiglbauer B, Batinic B. Proactive coping with job insecurity: is it always beneficial to well-being? *Work Stress.* 2015;29:264–85.
- Reyes B, Martínez-Gregorio S, Galiana L, Tomás JM, De Los Santos S. Validation of perceived academic support questionnaire (PASQ): a study using a sample of Dominican Republic high-school students. *J Child Fam Stud.* 2022;31:3425–34.
- Chou K-L. Assessing Chinese adolescents' social support: the multidimensional scale of perceived social support. *Personal Individ Differ.* 2000;28:299–307.
- Sands T, Plunkett SW. A new scale to measure adolescent reports of academic support by mothers, fathers, teachers, and friends in Latino immigrant families. *Hisp J Behav Sci.* 2005;27:24453.
- Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *J Pers Assess.* 1988;52:3041.
- Li J, Han X, Wang W, Sun G, Cheng Z. How social support influences university students' academic achievement and emotional exhaustion: the mediating role of self-esteem. *Learn Individual Differences.* 2018;61:120–6.
- Byron K, Khazanchi S, Nazarian D. The relationship between stressors and creativity: A meta-analysis examining competing theoretical models. *J Appl Psychol.* 2010;95:201–12.
- Viswesvaran C, Sanchez JI, Fisher J. The role of social support in the process of work stress: A Meta-Analysis. *J Vocat Behav.* 1999;54:314–34.
- Valente MJ, Rijnhart JJM, Miočević M. Causal mediation effects in single case experimental designs. *Psychol Methods.* 2023;28:488–506.
- Rourke L, Anderson T. Validity in quantitative content analysis. *Educ Technol Res Dev.* 2004;52:5–18.
- Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 Well-Being index: A systematic review of the literature. *Psychother Psychosom.* 2015;84:167–76.
- DuPaul GJ, Rapport MD, Perriello LM. Teacher ratings of academic skills: the development of the academic performance rating scale. *Sch Psychol Rev.* 1991;20:284300.
- Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res.* 1981;18:39.
- Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J Appl Psychol.* 2003;88:879–903.
- Brewer PR. Public opinion about gay rights and gay marriage. *Int J Public Opin Res.* 2014;26:279–82.
- Ma C, Li J. Perceived stress and outness: examining the coping mediation framework among Chinese LGBTQ+ community. *Behav Sci.* 2024;14:978.
- Ranasinghe P, Wathurapatha WS, Mathangasinghe Y, Ponnampuruma G. Emotional intelligence, perceived stress and academic performance of Sri Lankan medical undergraduates. *BMC Med Educ.* 2017;17:41.
- Samaha M, Hawi NS. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Comput Hum Behav.* 2016;57:321–5.
- Story CR, Smith EA, Harvey IS, Thareja G, Hayes J. Exploration of how emotional social support predicts food insecurity among college students. *J Am Coll Health.* 2024;72:2338–42.
- Macedo A, Aurindo M, Febra C. Effectiveness of undergraduate medical students training on LGBTQIA+ people health: A systematic review and meta-analysis. *BMC Med Educ.* 2024;24:63.
- Yu H, Flores DD, Bonett S, Bauermeister JA. LGBTQ+ cultural competency training for health professionals: A systematic review. *BMC Med Educ.* 2023;23:558.
- Morris M, Cooper RL, Ramesh A, Tabatabai M, Arcury TA, Shinn M, et al. Training to reduce LGBTQ-related bias among medical, nursing, and dental students and providers: A systematic review. *BMC Med Educ.* 2019;19:325.
- Klein LB, Dawes HC, James G, Hall WJ, Rizo CF, Potter SJ, et al. Sexual and relationship violence among LGBTQ+ college students: A scoping review. *Trauma Violence Abuse.* 2023;24:2196–209.

52. Zhang Y, Best J, Tang W, Tso LS, Liu F, Huang S, et al. Transgender sexual health in China: A cross-sectional online survey in China. *Sex Transm Infect.* 2016;92:515–9.
53. Zhu X, Gao Y, Gillespie A, Xin Y, Qi J, Ou J, et al. Health care and mental wellbeing in the transgender and gender-diverse Chinese population. *Lancet Diabetes Endocrinol.* 2019;7:339–41.

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