

Article

Psychological Distress Mediates Between Autonomous Learning and Academic Engagement Among University Students

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Abstract

Grounded in self-determination theory, the present study examined the role of psychological distress as a mediator between autonomous learning and academic engagement among university students in China. In this cross-sectional study, survey data from 234 Chinese university students were collected to evaluate autonomous learning, psychological distress including symptoms of depression, anxiety, and stress, and academic engagement. Structural equation modeling indicated that autonomous learning was positively associated with academic engagement and negatively related to psychological distress. Psychological distress, in turn, was negatively associated with academic engagement and mediated the relation between autonomous learning and academic engagement. Additional analyses further revealed significant alternative directionality of effects between psychological distress and autonomous learning, thereby suggesting that the relation may be bidirectional. These findings highlight the importance of fostering autonomous learning and addressing psychological distress to enhance engagement among Chinese students in higher education.

Keywords: autonomous learning; academic engagement; psychological distress; university students

1. Psychological Distress Mediates Between Autonomous Learning and Academic Engagement Among University Students

University students are at risk for psychological distress, with research showing elevated depression and anxiety symptoms within this demographic (Arnett et al., 2014; Granieri et al., 2021; Matud et al., 2020). In China, university students face similar challenges with sleep problems, depressive symptoms, and self-harm being major concerns (Chen et al., 2022). Given that students' psychological distress is linked to their overall well-being, health, and learning outcomes (Cheung et al., 2019; Cullinan et al., 2024), understanding the psychological distress process and correlates is crucial. Based on self-determination theory (Deci & Ryan, 1985), the present study aims to investigate the relations among psychological distress, autonomous learning, and academic engagement in university students. To this end, this study extends the application of self-determination theory in the higher education context of China and provides evidence that may inform applied research on interventions aiming to promote students' autonomous learning, psychological well-being, and academic engagement.

Self-determination theory (Deci & Ryan, 1985) proposes that the satisfaction of the basic psychological needs for autonomy, competence, and relatedness is essential for students to achieve optimal functioning (Deci et al., 2013). A lack of adequate satisfaction



Academic Editors: Eleanor Dommett,
Chuan-Chung Hsieh,
Chih-Hung Wang and Juihsuan Hung

Received: 16 June 2026

Revised: 28 July 2026

Accepted: 3 August 2026

Published: 7 August 2026

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of these needs is likely to give rise to frustration and elevated psychological distress among students (Vansteenkiste et al., 2020). Among these three basic psychological needs, autonomy is central because having autonomous control over one's behavior facilitates intrinsic motivation and persisting engagement (Ryan & Deci, 2020). Autonomy refers to an individual's sense of volition and choice in their actions, i.e., the capacity to self-determine one's behavior to some extent (Deci & Ryan, 2000). Previous research suggests that autonomy increases learning motivation, encourages exploratory behaviors, and improves learning outcomes (Wielenga-Meijer et al., 2011). When the learning environment supports students' basic psychological need for autonomy, students are more likely to maintain their learning motivation and actively participate in academic tasks (Opdenakker & Minnaert, 2011).

2. The Role of Autonomous Learning in Academic Behavior

Autonomous learning refers to the learner's capacity to independently acquire valued knowledge and skills through self-determined processes (Chene, 1983). Autonomous learning enables learners to participate in learning activities actively, identify and utilize learning resources, sustain perseverance, and flexibly manage available resources (Ponton et al., 2000). Autonomy plays a principal role in learning among adult learners (Rogers, 1996). Over the last few decades, the link between autonomous learning and psychological distress has become a focal point in the literature (Merç, 2015; Zhao et al., 2022). Notably, Black and Deci (2000) reported that university students exhibiting a stronger autonomous learning motivation at the beginning of a course reported a more positive learning experience, characterized by higher perceived interest and competence, along with lower anxiety. They also showed a greater focus on the learning process, rather than grades, by the end of the course. Cultivating students' autonomous learning skills can also improve their academic study habits and performance, such as reading achievements (Aryanjam et al., 2021). For instance, students receiving a 12-week training in autonomous learning showed significant improvements in assignment and project preparation, note-taking, and reading skills, as well as enhanced organizational abilities when completing academic tasks (Merç, 2015).

Recent studies revealed that autonomy serves as a significant predictor of academic engagement (Alley, 2019; Guo, 2018; Hafen et al., 2012; Y. Wang et al., 2024). Autonomous learners are inclined to engage actively in learning and gradually acquire knowledge (Fotiadou et al., 2017). Motivated by autonomy and academic skills, they set goals, confront difficulties, and gradually build their knowledge base (Zimmerman, 2000). When autonomy is thwarted, students experience external pressure and feel compelled to comply with external contingencies (Reeve et al., 2003). By undermining students' freedom of choice and willingness to engage in independent learning (Ni & Wu, 2011), teachers who rely on controlling styles also often overlook or even impede students' autonomous learning motivation and classroom participation (Reeve, 2009). Taken together, autonomous learning is positively linked to self-determined processes, such as greater learning motivation and academic engagement.

3. Psychological Distress as a Factor

Being autonomous in learning may be essential for managing academic pressure and promoting psychological well-being as well (Field et al., 2015). Existing empirical studies demonstrate that enhancing students' autonomy in learning is directly associated with reduced psychological distress (Deng & Liu, 2025). For instance, university students diagnosed with anxiety disorders who participated in a three-month autonomy-supportive oral teaching program demonstrated greater reductions in depressive mood and anxiety than those in the control group, indicating that fostering learner autonomy can alleviate

depressed mood and anxiety symptoms (Zhao et al., 2022). A plausible mechanism is that satisfying autonomy needs nurtures self-esteem, reducing reliance on external performance standards as the sole basis for self-worth (Shih, 2013), thereby sustaining intrinsic motivation and mitigating stress, anxiety, and overall psychological distress (Zheng et al., 2020). However, the relation between autonomous learning and psychological distress may be bidirectional: Higher levels of autonomy and good study habits may alleviate psychological distress (Black & Deci, 2000; Zhao et al., 2022), whereas elevated anxiety, depression, and stress may undermine students' ability to engage in autonomous learning (Bai et al., 2020; Savaskan, 2017). When students experience higher levels of anxiety, their levels of learning autonomy also decrease (Savaskan, 2017).

Psychological distress may also undermine classroom and academic engagement (Mou et al., 2022; Sinval et al., 2025; Tang & He, 2023). Students exhibiting more pronounced symptoms of depression, anxiety, and stress tend to have greater trouble adapting to campus life and show lower academic engagement (Klinck et al., 2020; Oral, 2020; Öztekin, 2024). Because depression, anxiety, and stress can disrupt physiological and psychological functioning, university students may experience difficulties in engaging in self-regulation, participating fully in the learning process, and feeling positive about school (Öztekin, 2024). These challenges may further weaken academic engagement (Öztekin, 2024). Supporting these links, a study showed that students experiencing depressive symptoms show lower levels of academic engagement (Gao et al., 2020). Against the backdrop of the COVID-19 pandemic, researchers similarly found a negative relation between university students' psychological distress and academic engagement (Imdad & Dawood, 2024; Tang & He, 2023). Another large-scale study involving 8625 adolescents demonstrated that psychological distress directly and negatively predicted academic engagement (Yin et al., 2023). This relation was further substantiated by a prospective study involving 351 medical students, which showed that psychological distress was associated with lower academic engagement; academic engagement, in turn, undermined academic outcomes (Sinval et al., 2025).

4. The Present Study

Grounded in self-determination theory (Deci & Ryan, 1985), the present study examined the role of autonomous learning and psychological distress in academic engagement within the cultural context of China, where psychological distress is both prevalent and increasing (Chen et al., 2022). As discussed earlier, autonomous learning could potentially mitigate psychological distress (Bekker & Belt, 2006; Patall et al., 2018; Thompson et al., 2021). Such a relationship may also be bidirectional, i.e., higher levels of autonomy could alleviate psychological distress (Black & Deci, 2000; Zhao et al., 2022), whereas elevated psychological distress could undermine students' ability to learn autonomously (Bai et al., 2020; Ji et al., 2021; Savaskan, 2017). Importantly, psychological distress may impose substantial affective strain and cognitive load that undermine attention, motivation, and persistence in learning (Moreira de Sousa et al., 2018).

Given the plausibility of a bidirectional relation between autonomous learning and psychological distress, the present study tested two competing models. In the first model, autonomous learning was hypothesized to be positively associated with academic engagement (H1) and negatively with psychological distress (H2). Psychological distress, in turn, was hypothesized to be negatively associated with academic engagement (H3). Psychological distress was further hypothesized to mediate the relation between autonomous learning and academic engagement (H4). In the competing model, psychological distress was hypothesized to be negatively associated with academic engagement (H5) and autonomous learning (H6). Autonomous learning, in turn, was hypothesized to be positively associ-

ated with academic engagement (H7). Autonomous learning was further hypothesized to mediate the relation between autonomous learning and academic engagement (H8).

5. Method

5.1. Participants

A total of 268 university students were recruited from both public and private universities through online advertisements and mass emails. Ethics approval by the University Research Ethics Review Panel was sought at the authors' affiliated university prior to the implementation of the study. Informed consent for participation was obtained from all subjects involved in the study. Upon consent, participants completed an online questionnaire via Wenjuanxing, an online survey platform. Following prespecified data-quality procedures, 12.7% ($n = 34$) participants were excluded. Specifically, three reported they were not university students and 11.5% ($n = 31$) failed attention checks (i.e., answered at least two of three attention-check items incorrectly).

The final analytic sample comprised 234 participants (men = 84; women = 150), aged between 18 and 28 years ($M = 19.76$, $SD = 2.54$), of whom 85.0% were undergraduate students ($n = 199$) and 15.0% were master's students or above ($n = 35$). Most participants were full-time students, accounting for 98.7% of the sample ($n = 231$), while 1.3% were part-time students ($n = 3$). The median monthly household income fell within the range of ¥10,000–¥19,999.

5.2. Measures

Following established back-translation procedures (Brislin, 1970), all English-language measures were translated into Chinese.

5.2.1. Autonomous Learning

The 12-item Autonomous Learning Scale (ALS; Macaskill & Taylor, 2010) was used to assess students' tendencies toward autonomous learning. The measure comprised two internally consistent sub-scales: Independence of Learning, "I enjoy finding information about new topics on my own", and Study Habits, "I plan my time for study effectively." The ALS was previously used among Chinese college English learners and demonstrated adequate reliability (Qi et al., 2025). Each item was rated on a five-point Likert scale ranging from 1 (*very unlike me*) to 5 (*very like me*). Negatively worded items were reverse-coded prior to computing composite mean scores for the subscales of Independence of Learning and Study Habits. Higher scores will indicate greater learner autonomy. The subscales were used as indicators in the structural equation modeling (SEM) analyses. In the present Chinese sample, the ALS demonstrated good internal consistency. Confirmatory factor analysis (CFA) showed the two-factor structure of Autonomous Learning, comprising Independence of Learning and Study Habits, fit the data well, $\chi^2(50) = 126.28$, $p < 0.001$, CFI = 0.94, TLI = 0.93, RMSEA = 0.08. In this study, Cronbach's α was 0.71 for Independence of Learning and 0.79 for Study Habits.

5.2.2. Psychological Distress

The 21-item Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) were employed to measure the severity of depression, anxiety, and stress symptoms experienced over the past week. Representative items included "I felt that life was meaningless" and "I found it difficult to relax". The measure was previously validated in China among university students, demonstrating good reliability and validity (K. Wang et al., 2016). Each item was rated on a four-point scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*). Item scores were summed to create three subscale

scores of Depression, Anxiety, and Stress, each ranging from 0 to 21 each; higher scores indicated greater symptom severity. DASS-21 has been widely used with Chinese samples (Gong et al., 2010). Evidence from cross-sectional and longitudinal surveys indicates that the Chinese version exhibits high internal consistency, with Cronbach's α for the three subscales ranging from 0.86 to 0.92 (Cao et al., 2023). In this study, the Cronbach's α was 0.87 for Depression, 0.86 for Anxiety, and 0.88 for Stress.

5.2.3. Academic Engagement

The 29-item Services for Active Participation and Inclusion of University Students (SInAPSi) Academic Engagement Scale (SAES; Freda et al., 2023) was used to assess students' academic engagement. The scale consisted of six sub-dimensions. For example, two of these were Value of University Course and Engagement with University Peers. Sample items included "I like the course of study I'm attending" and "I like to meet friends at university." Each item was rated on a five-point Likert scale ranging from 1 (*never*) to 5 (*always*). Item scores were averaged within each subscale to create composite scores, with higher scores indicating higher levels of academic engagement.

To evaluate the factor structure of the SAES in this study, a CFA model was tested. Model fit was unsatisfactory, as indicated by $\chi^2 (362) = 1044.02$, $p < 0.001$, CFI = 0.90, TLI = 0.89, RMSEA = 0.09. Further inspection showed that the factor, Perception of the Capability to Persist in the University Choice, was unrelated to the other factors. This factor captures students' perceived ability to persist with their university choice and includes the following items: "I would leave University right away if I had an alternative", "Sometimes I think about leaving university", "I had better do other things than go to University" and "In my opinion, University education is not worth all the time, money and effort it takes me" (Freda et al., 2023). In this study, 70.5% of the sample ($n = 165$) were 18 to 19 years old and were at their beginning years of university life. A majority of the participants might not have formed stable cognitions about other choices reflected in this subscale. Therefore, the factor was removed from subsequent analyses, and the five-factor model was re-estimated: The model fit improved substantially, $\chi^2 (260) = 684.34$, $p < 0.001$, CFI = 0.93, TLI = 0.92, RMSEA = 0.08. In this sample, the Cronbach's α coefficients ranged from 0.78 to 0.95.

6. Results

Means and zero-order correlations (see Table 1) for all study variables were computed as preliminary analyses prior to conducting SEM using MPLUS 8.3 (Muthén & Muthén, 2019). All of the variables under study were correlated, $ps < 0.05$. Demographic variables including gender, age, education, and monthly household income were not correlated with the study variables, $ps > 0.05$.

6.1. Primary Model

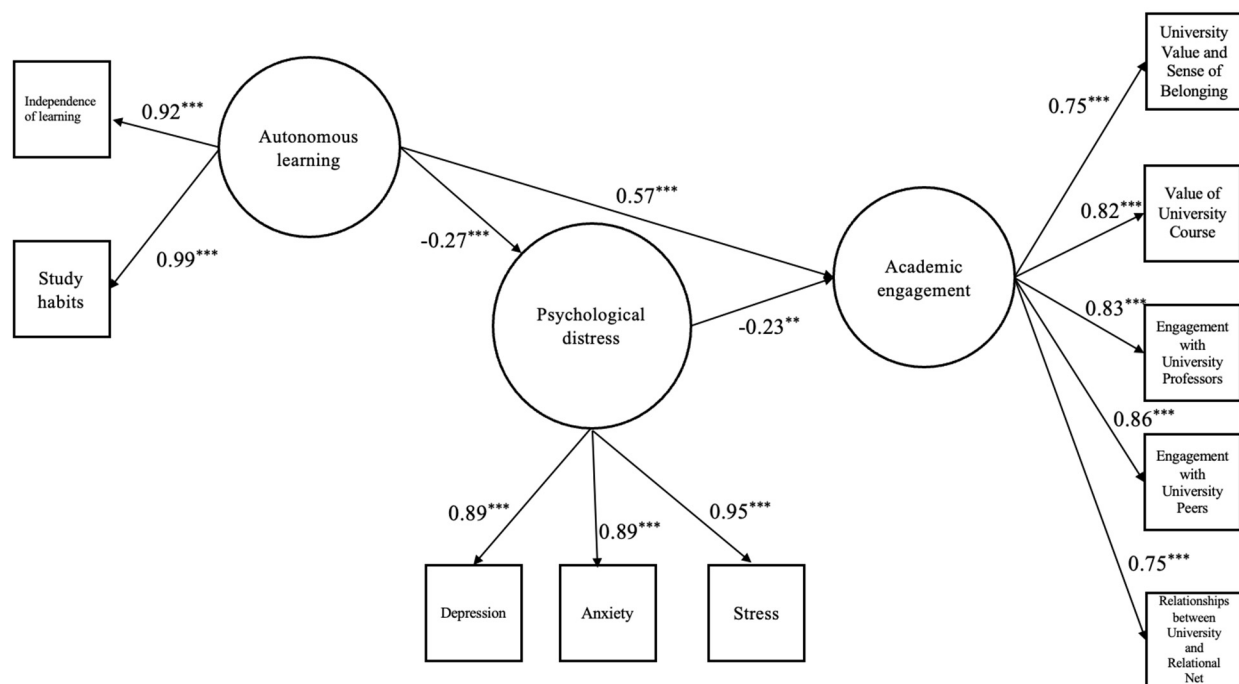
The primary model, which hypothesized psychological distress as a mediator between autonomous learning and academic engagement, yielded adequate fit to the data, $\chi^2 (52) = 122.26$, $p < 0.001$; CFI = 0.96; TLI = 0.95; RMSEA = 0.08 (see Table 2 and Figure 1). In the measurement model, all latent constructs (autonomous learning, psychological distress, and academic engagement) were significantly indicated by their respective manifest variables, with standardized loadings ranging from 0.75 to 0.99, all $ps < 0.001$.

Table 1. Correlations and means of the variables under study. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Household monthly income ranged from 1 to 11: 1 = ¥0–¥9999, 2 = ¥10,000–¥19,999, 3 = ¥20,000–¥29,999, 4 = ¥30,000–¥39,999, 5 = ¥40,000–¥49,999, 6 = ¥50,000–¥59,999, 7 = ¥60,000–¥69,999, 8 = ¥70,000–¥79,999, 9 = ¥80,000–¥89,999, 10 = ¥90,000–¥99,999, 11 = ¥100,000 or above.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Independence of Learning	1.00													
2. Study Habits	0.91 ***	1.00												
3. Depression	−0.23 **	−0.31 ***	1.00											
4. Anxiety	−0.15 *	−0.24 ***	0.79 ***	1.00										
5. Stress	−0.14 *	−0.24 ***	0.84 ***	0.85 ***	1.00									
6. University Value & Sense of Belonging	0.48 ***	0.49 ***	−0.36 ***	−0.30 ***	−0.29 ***	1.00								
7. Value of University Course	0.51 ***	0.57 ***	−0.33 ***	−0.24 ***	−0.25 ***	0.77 ***	1.00							
8. Engagement with University Professors	0.47 ***	0.49 ***	−0.27 ***	−0.23 ***	−0.27 ***	0.60 ***	0.73 ***	1.00						
9. Engagement with University Peers	0.49 ***	0.51 ***	−0.32 ***	−0.29 ***	−0.30 ***	0.70 ***	0.69 ***	0.69 ***	1.00					
10. Relationships between University & Relational Net	0.41 ***	0.46 ***	−0.29 ***	−0.29 ***	−0.31 ***	0.48 ***	0.56 ***	0.65 ***	0.68 ***	1.00				
11. Gender (0 = men; 1 = women)	0.06	0.00	0.09	0.09	0.16 *	−0.04	−0.05	0.04	0.06	0.02	1.00			
12. Age	−0.03	−0.04	0.07	−0.00	0.08	0.06	−0.03	0.09	0.09	0.06	0.41 ***	1.00		
13. Education (0 = undergraduate; 1 = master or above)	−0.02	−0.04	0.08	0.02	0.08	0.02	−0.01	0.09	0.09	0.13	0.31 ***	0.68 ***	1.00	
14. Monthly household income	0.03	0.05	−0.09	−0.03	−0.06	0.03	0.07	−0.02	0.06	0.08	0.08	0.18 **	0.27 ***	1.00
M	3.68	3.63	0.46	0.57	0.70	4.14	3.81	3.64	4.10	3.69	-	19.76	-	2.42
SD	0.50	0.54	0.51	0.54	0.60	0.71	0.83	0.80	0.76	1.01	-	2.54	-	2.13

Table 2. Parameter estimates of the hypothesized primary structural equation model.

Parameter	Unstandardized Estimate (SE)	Unstandardized Estimate [95% C.I.]	Standardized Estimate	Standardized Estimate [95% C.I.]
Measurement Model				
Autonomous Learning				
→Independence of learning	1.00 (—)	[1.00, 1.00]	0.92 ***	[0.86, 0.97]
→Study Habits	1.16 (0.07)	[1.05, 1.31]	0.99 ***	[0.94, 1.05]
Psychological Distress				
→Depression	1.00 (—)	[1.00, 1.00]	0.89 ***	[0.84, 0.92]
→Anxiety	1.06 (0.06)	[0.96, 1.19]	0.89 ***	[0.84, 0.93]
→Stress	1.26 (0.07)	[1.14, 1.43]	0.95 ***	[0.92, 0.98]
Academic Engagement				
→University Value and Sense of Belonging	1.00 (—)	[1.00, 1.00]	0.75 ***	[0.66, 0.83]
→Value of University Course	1.28 (0.09)	[1.12, 1.48]	0.82 ***	[0.74, 0.88]
→Engagement with University Professors	1.24 (0.11)	[1.06, 1.49]	0.83 ***	[0.77, 0.89]
→Engagement with University Peers	1.22 (0.09)	[1.07, 1.43]	0.86 ***	[0.80, 0.91]
→Relationships between University and	1.42 (0.15)	[1.17, 1.76]	0.75 ***	[0.66, 0.83]
Relational Net				
Structural Model				
Autonomous Learning				
→Psychological Distress	−0.27 (0.07)	[−0.39, −0.12]	−0.27 ***	[−0.40, −0.12]
→Academic Engagement	0.65 (0.10)	[0.46, 0.87]	0.57 ***	[0.42, 0.67]
Psychological Distress				
→Academic Engagement	−0.28 (0.10)	[−0.48, −0.11]	−0.23 **	[−0.38, −0.10]

** $p < 0.01$; *** $p < 0.001$.**Figure 1.** Mediating role of psychological distress for the relation between autonomous learning and academic engagement. $\chi^2 (52) = 122.26$, $p < 0.001$; CFI = 0.96; TLI = 0.95; RMSEA = 0.08; SRMR = 0.03. ** $p < 0.01$; *** $p < 0.001$.

Consistent with H1, autonomous learning was significantly and positively associated with academic engagement in the structural model ($B = 0.65$, $SE = 0.10$; $\beta = 0.57$; $p < 0.001$). Consistent with H2, autonomous learning was significantly and negatively associated with psychological distress, as indicated by depression, anxiety, and stress ($B = -0.27$, $SE = 0.07$; $\beta = -0.27$; $p < 0.001$). Supporting H3, higher psychological distress was significantly associated with lower academic engagement in the structural model ($B = -0.28$, $SE = 0.10$; $\beta = -0.23$; $p = 0.002$). In H4, psychological distress was specified as a mediator of the relation between autonomous learning and academic engagement. Bias-corrected bootstrapping

with 10,000 resamples revealed a positive and significant indirect effect of autonomous learning on academic engagement via psychological distress ($B = 0.07$, $SE = 0.03$; $\beta = 0.06$; $p = 0.003$). The 95% bias-corrected bootstrap confidence interval [0.02, 0.13] did not include zero, indicating an indirect effect and supporting H4. Hence, psychological distress was a mediator between autonomous learning and academic engagement.

6.2. Competing Model

In the competing model, psychological distress was specified as an antecedent of autonomous learning, which in turn predicted academic engagement, while a direct path from psychological distress to academic engagement was retained. This competing model exhibited identical fit to the primary model, $\chi^2(52) = 122.26$, $p < 0.001$; CFI = 0.96; TLI = 0.95; RMSEA = 0.08 (see Figure 2). Consistent with H5, psychological distress was significantly and negatively associated with academic engagement ($B = -0.29$, $SE = 0.08$; $\beta = -0.23$, $p < 0.001$). Consistent with H6, psychological distress was significantly and negatively associated with autonomous learning ($B = -0.28$, $SE = 0.07$; $\beta = -0.28$, $p < 0.001$). Supporting H7, autonomous learning was significantly and positively associated with academic engagement ($B = 0.71$, $SE = 0.08$; $\beta = 0.57$, $p < 0.001$). Thus, the pattern of associations in the alternative model mirrored the key relationships observed in the primary model. H8 evaluated the indirect pathway from psychological distress to academic engagement via autonomous learning through a bias-corrected bootstrap procedure with 10,000 resamples. The specific indirect effect was statistically significant ($B = -0.20$, $SE = 0.05$; $\beta = -0.16$, $p < 0.001$; 95% bias-corrected confidence interval $[-0.24, -0.07]$) and the confidence interval did not include zero, supporting H8 with autonomous learning as a mediator.

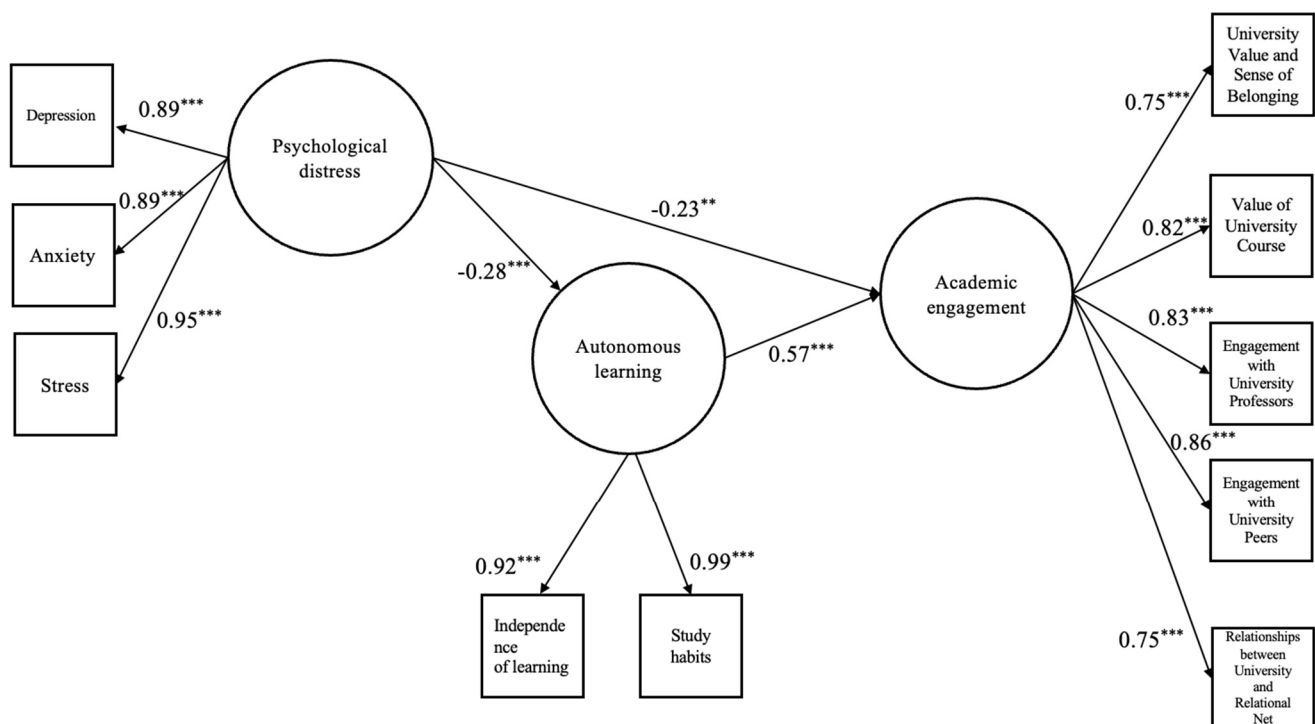


Figure 2. Mediating role of autonomous learning for the relation between psychological distress and academic engagement. $\chi^2(52) = 122.26$, $p < 0.001$; CFI = 0.96; TLI = 0.95; RMSEA = 0.08; SRMR = 0.03. ** $p < 0.01$; *** $p < 0.001$.

7. Discussion

Grounded in self-determination theory (Deci & Ryan, 1985), this cross-sectional study revealed psychological distress as a mediator for the relation between autonomous learn-

ing and academic engagement. The findings converged with existing research and self-determination theory, which posits that satisfying the basic psychological need for autonomy is linked to positive learning motivation, academic engagement, and lower psychological stress (Opdenakker & Minnaert, 2011; Vansteenkiste et al., 2020; Wielenga-Meijer et al., 2011). In the context of Chinese higher education, students often faced considerable uncertainties as well as pressure related to postgraduate studies and employment (Wu et al., 2020). Therefore, autonomous learning may have helped students develop a stronger sense of control over the learning process, which is crucial for mental health and academic engagement (e.g., Deng & Liu, 2025).

In terms of specific associations, our findings indicated a negative relation between autonomous learning and psychological distress, suggesting that students with stronger autonomous learning abilities reported lower levels of depression, anxiety, and stress. This finding indicates that autonomous learning may buffer psychological distress by helping students cope more effectively with stress and by enhancing self-control and self-efficacy (Black & Deci, 2000; Merç, 2015; Zhao et al., 2022). Future research may further identify the processes between autonomous learning and psychological distress. Applied research on interventions may also evaluate autonomy-supportive environments (e.g., opportunities for autonomous learning, constructive feedback, emotional support) as means to foster academic engagement and mental health in China (Zhao et al., 2022; Zheng et al., 2020).

Consistent with self-determination theory, autonomous learning was positively associated with academic engagement. Support for students' need for autonomy enhances their sense of volition and promotes sustained behavioral engagement (Deci & Ryan, 1985; Ryan & Deci, 2020). Students who plan their learning, select appropriate resources, and regulate their study process autonomously may therefore be more motivated and invest more time and effort in academic activities (Guo, 2018; Zimmerman, 2000). On the contrary, psychological distress was negatively related to academic engagement. This result was consistent with prior research, which indicated that depression, stress, and anxiety undermine learning motivation and reduce academic engagement (Sinval et al., 2025; Tang & He, 2023). Symptoms of depression, anxiety, and stress deplete cognitive and affective resources, which diminish students' motivation, attention, and persistence, resulting in poorer academic engagement and academic performance (Ji et al., 2021; Sinval et al., 2025).

The present findings converged with existing studies conducted in other developmental periods and cultural contexts (Sinval et al., 2025; Tang & He, 2023; Zhao et al., 2022). Notably, psychological distress mediated the relation between autonomous learning and academic engagement, thereby delineating a key pathway of psychological distress. This pattern extends the application of self-determination theory (Deci & Ryan, 1985) by demonstrating that autonomy-supportive contexts could simultaneously satisfy autonomy needs and mitigate psychological distress to foster academic engagement (Nielsen et al., 2017). The competing mediation model revealed that autonomous learning could also mediate the relation between psychological distress and academic engagement, i.e., elevated distress could weaken students' capacity for autonomous learning (Bai et al., 2020; Savaskan, 2017). Given that both mediation models are valid, a potential bidirectional association has emerged between autonomous and psychological distress (Bai et al., 2020; Merç, 2015; Patall et al., 2018). Therefore, longitudinal research should explicitly examine bidirectional effects: High levels of distress may erode motivational foundations, which weaken autonomous learning. Compromised autonomy may also lower academic self-efficacy and increase academic pressure, thereby worsening psychological distress. Taken together, these findings informed the literature by delineating the potential mechanisms of academic engagement and extended the applicability of self-determination theory in the context of Chinese university students.

8. Limitations and Future Directions

Several methodological and contextual limitations highlight priorities for future research. Firstly, the present cross-sectional data cannot establish causality or temporal ordering among variables. Future research should utilize longitudinal and experimental approaches to clarify temporal sequences and causal mechanisms among the variables. Moreover, exclusive dependence on self-report instruments may increase the risk of common method bias. Therefore, future studies are encouraged to incorporate multiple data sources, such as teacher evaluations, academic records (e.g., grades, completion rates, attendance), and behavioral indicators, to increase the credibility and validity of the results. Next, the representativeness of the university sample is limited. Most participants were aged 18–19 years, and the sample included a predominance of female students, which might restrict the generalizability of the findings. Future research should further broaden the sampling frame to include different institution types and educational stages. Finally, key demographic information including academic department, university type, and their respective percentages were missing in this study. Future research should include additional demographic variables for transparency and clarity.

9. Research Implications

The findings of this study have important research implications for higher education. At the theoretical level, the study extends the application of self-determination theory (Deci & Ryan, 1985) by showing that autonomous learning may indirectly foster academic engagement through alleviated psychological distress (Mou et al., 2022; Sinval et al., 2025; Tang & He, 2023). In addition, the findings suggest that the relations among the variables may be bidirectional, indicating that future theoretical work should place greater emphasis on dynamic processes and interactions rather than on simple linear associations. Moreover, this study informs future applied research on interventions aiming to promote students' autonomous learning, psychological well-being, and academic engagement in higher education in China.

In sum, this study indicates that autonomous learning is associated with university students' academic engagement both directly and indirectly through lower psychological distress. The findings also suggest a viable bidirectional association between autonomous learning and psychological distress, which warrants longitudinal investigation. Interventions geared toward enhancing autonomous learning and mental health also merit future investigation.

Author Contributions: Conceptualization, Y.Z. and R.Y.M.C.; methodology, Y.Z. and R.Y.M.C.; formal analysis, Y.Z.; investigation, Y.Z. and R.Y.M.C.; data curation, Y.Z.; writing—original draft preparation, Y.Z.; writing—review and editing, R.Y.M.C.; supervision, R.Y.M.C.; project administration, Y.Z.; funding acquisition, R.Y.M.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Academy of Future Education, Xi'an Jiaotong-Liverpool University.

Institutional Review Board Statement: This study was approved by the Ethics Review Panel at Xi'an Jiaotong-Liverpool University (Ref: 11000187120250812104936, 16 June 2026). It was conducted in accordance with the ethical standards in the 1964 Declaration of Helsinki and its later amendments.

Informed Consent Statement: Prior to the study's administration, written informed consent was obtained from all participants.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: We have not used AI-assisted technologies in creating this article.

Conflicts of Interest: The authors declare no conflicts of interest.

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