THE MEDIATING EFFECT OF RESILIENCE ON THE RELATIONSHIP BETWEEN LONELINESS AND ACADEMIC PERFORMANCE IN WUHAN'S COLLEGE STUDENTS

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ABSTRACT

This research explored the mediating role of resilience in the relationship between loneliness in the independent-learning process and academic performance in Wuhan's college students. From three universities in Wuhan, China, 450 valid samples were obtained of college students. The sampling procedure was conducted between April 1, 2021, and April 5, 2021. The measurement and structural equation models consisted of loneliness, resilience, and academic performance scales. A measurement model was used to verify the reliability and validity of the measurement instruments. A structural model was used to test the mediating effect. The results of the models revealed that loneliness in independent learning was a negative predictor of academic performance and that resilience fully mediated the relationship between loneliness and academic performance. Accordingly, we concluded that resilience can fully neutralize the negative effect of loneliness on the academic performance of Wuhan's college students.

Keywords: Loneliness, Resilience, Academic Performance, College Students, Wuhan

INTRODUCTION

Coronavirus disease 2019 (COVID-19) transmission has greatly changed people's routines (World Health Organization, 2020), such as the learning of college students. Because of the risk of COVID-19, online teaching has become a method of coping with COVID-19 transmission (Bao, 2020; Yu et al., 2020). College students in Wuhan experienced prolonged online teaching because Wuhan city was the highest risk area for COVID-19 (Headquarters of Pneumonia Prevention and Control of New Coronavirus Infection in Hubei Province, 2020; Hubei Provincial Department of Education, 2020). However, an imbalance was found between teaching and learning (Yu et al., 2020) because the independent-learning level of college students did not reach the level of adaptation to online teaching (Yu et al., 2020). For independent learners, loneliness was an adversity for students who experienced emotional stress in the independent-learning process (Gerino, Rollè, Sechi, & Brustia, 2017; Marsh, 1997; Matthews et al., 2019; Matore, Khairani, & Abd Razak, 2020). The feelings of loneliness were dissatisfaction and displeasure because the individual's current social connections were insufficient to support and reduce the loneliness of the independent-learning process (Benoit & Ditommaso, 2020; Kaufmann & Vallade, 2020). Social support–buffering theory states that social relationships can buffer the effect of negative factors on outcomes (Cohen & Wills, 1985). Loneliness was a negative predictor of academic performance (Benner, 2011; Bek, 2017; Fan et al., 2021; Rosenstreich & Margalit, 2015; Stoliker & Lafreniere, 2015; Yalçin, Özkurt, Özmaden, & Yağmur, 2020) because individuals lack social support and the problem-solving strategies to ease academic stress (Cohen & Wills, 1985; Margalit, 1991; Stoliker & Lafreniere, 2015). Thus, individuals perceive

loneliness and academic stress in the independent-learning process (Marsh, 1997; Stoliker & Lafreniere, 2015), and then loneliness has a negative effect on academic outcomes (Benner, 2011; Fan et al., 2021; Stoliker & Lafreniere, 2015; Yalçın et al., 2020). Under conditions in which a social relationship lacks its buffering effect (Cohen & Wills, 1985), this study proposed that resilience has a compensatory and protective role against stressors (Goodkind, Brinkman, & Elliott, 2020). The compensatory theory of resilience describes it as a compensatory factor that can neutralize the effect of negative factors on outcomes (Wang, Zhang, & Zimmerman, 2015). The mechanism of the compensatory theory of resilience assumes that it can offer the psychological immunity needed to endure and neutralize the negative emotional stress of loneliness, thereby aiding in academic performance (Ayed, Toner, & Priebe, 2019; Wang et al., 2015). Therefore, this study explored the influence of loneliness in independent learning on academic performance and verified the mediating effect of resilience on the relationship between loneliness and academic performance.

CURRENT RESEARCH AND RESEARCH HYPOTHESES

Loneliness and Academic Performance

Loneliness is defined as a feeling of imbalance between intimate friendships and independence in an unstable social network (Barreto et al., 2020), and it acts as emotional stress for individuals (Gerino et al., 2017). In the independent-learning process, loneliness acts as negative emotional stress and negatively disturbs independent learning (Gerino et al., 2017; Marsh, 1997; Matthews et al., 2019; Matore et al., 2020). Loneliness theory states that loneliness occurs when individuals do not have a satisfying experience with social contact (Peplau & Perlman, 1979). Unsatisfying social relationships may occur because individuals spend more time on learning goals than on socializing (Peplau & Perlman, 1979; Stoliker & Lafreniere, 2015). Social support–buffering theory suggests that social relationships in stressful processes play a buffering role (Cohen & Wills, 1985). However, social support systems (such as having friends) may not offer the problem-solving strategies needed to reduce individual stress and protect outcomes for lonely individuals (Cohen & Wills, 1985; Peplau & Perlman, 1979). Thus, academic performance as a learning outcome was assumed to be affected by loneliness. The studies on loneliness and academic performance have consistently concluded that loneliness is a negative predictor of academic performance (Benner, 2011; Fan et al., 2021; Stoliker & Lafreniere, 2015; Yalçin et al., 2020). Therefore, Hypothesis 1 (H1) was developed as follows:

H1: Loneliness has a significant negative effect on academic performance in Wuhan college students.

Loneliness, Resilience, and Academic Performance

Resilience is an adaptive protective factor against stressors with a psychological buffering effect, and the function of the psychological buffering effect of resilience can withstand the stressful situations accompanying the suffering of psychological adversity and help individuals maintain outcomes (Ayed et al., 2019; Goodkind et al., 2020). Thus, resilient individuals can concentrate on their learning and life without the negative effect of stressors (Ayed et al., 2019). The compensatory model of resilience explains that resilience as a mediator has a compensation mechanism in the relationship between negative factors and outcomes, and the psychological buffering function of resilience can neutralize the negative effect of stressors on the outcome (Ayed et al., 2019; Wang & Zhang, 2015). In this study, loneliness was part of a situation in which social relationships were lacking (Barreto et al., 2020). The social support system may lack its buffering function for lonely emotional stress (Cohen & Wills, 1985; Peplau & Perlman, 1979). Thus, resilience was suggested as a

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psychological buffer in the relationship between stressors and outcomes (Ayed et al., 2019; Wang & Zhang, 2015). Based on the compensation mechanism of resilience (Ayed et al., 2019; Wang & Zhang, 2015), the negative effect of loneliness on academic performance may be neutralized by the psychological buffering function of resilience (Ayed et al., 2019; Benner, 2011; Fan et al., 2021; Stoliker & Lafreniere, 2015; Wang & Zhang, 2015; Yalçın et al., 2020). Therefore, Hypothesis 2 (H2) was proposed as follows:

H2: Resilience plays a mediating role in the relationship between loneliness and academic performance in Wuhan college students.

Hypothetical Model

The hypothetical model was assumed and constructed based on H1 and H2, as shown in Figure 1.

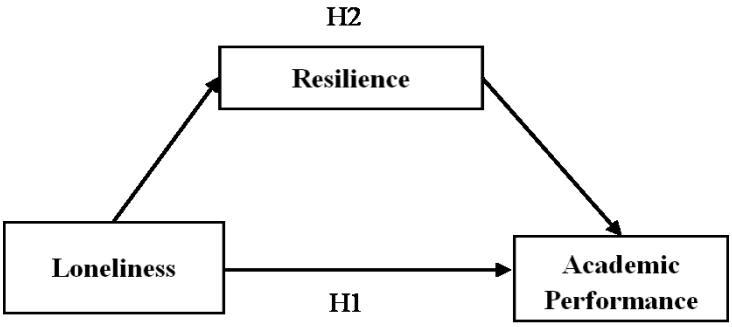

Figure 1. Hypothetical Model

MATERIALS AND METHODS

Participants

Considering that the Chinese COVID-19 policy did not permit our investigators to enter universities, the survey was conducted using an online questionnaire. On WeChat, 501 online questionnaires were sent to Chinese college students at three universities by university counselors in Wuhan, Hubei, China. The three universities all have psychological health and education centers for college students. The collection procedure was conducted between April 1, 2021, and April 5, 2021. Depending on the extremum, 51 invalid samples were deleted. Valid samples totaled 450, and the participant demographic characteristics are presented in Table 1.

Table 1. Sample Demographics

	Group	*Chinese Group (N = 450)*	
Gender	Male	215	47.8%
	Female	235	52.2%
Grade	Freshman	121	26.9%
	Sophomore	104	23.1%
	Junior	108	24%
	Senior	117	26%

The gender ratio was 1:1, which mimicked the gender ratio of Chinese college students. In the sampling process, the students understood the research purpose and the research ethics of voluntariness and confidentiality. To maintain the anonymity of the questionnaire, the

informed consent form and questionnaire were presented separately. Before completing the questionnaire, every participant read and signed the informed consent form online.

Table 2 The Items, Mean, SD, Standardized Regression Coefficients (SRC), and *t* Value in Loneliness, Resilience, and Academic Performance

	No	*Questionnaire Items*	*Mean*	*SD*	*SRC*	*t Value*
Loneliness	L1	I lack companionship	2.49	1.16	.66	14.00***
	L2	There is no one I can turn to	2.27	1.15	.74	13.49***
	L3	I am a withdrawn person	2.68	1.19	.64	14.11***
	L4	I feel left out	2.37	1.08	.79	12.81***
	L5	I feel isolation from others	2.36	1.14	.85	11.71***
	L6	I can not find companionship when I want it	2.37	1.12	.83	12.06***
	L7	I am unhappy being so withdrawn	2.28	1.15	.76	13.22***
	L8	People are around me but not with me	2.41	1.13	.75	13.39***
Resilience	R1	I am able to adapt to change	3.66	.86	.67	13.78***
	R2	I can deal with whatever comes	3.25	.93	.66	13.84***
	R3	I try to see humorous side of problems	3.63	.84	.66	13.85***
	R4	Coping with stress can strengthen me	3.56	.91	.73	13.31***
	R5	I tend to bounce back after illness or hardship	3.63	.92	.58	14.27***
	R6	I can achieve goals despite obstacles	3.64	.80	.68	13.77***
	R7	I can stay focused under pressure	3.50	.89	.73	13.35***
	R8	I am not easily discouraged by failure	3.47	.92	.72	13.45***
	R9	I think of self as strong person	3.68	.91	.69	13.66***
	R10	I can cope with unpleasant feelings	3.58	.86	.72	13.39***
Academic Performance	AP1	I can use the knowledge that I learned flexibly	3.48	.84	.75	12.61***
	AP2	I can easily understand what the teacher said in class	3.44	.89	.77	12.30***
	AP3	I can quickly grasp the key to solving the problem	3.47	.87	.84	10.28***
	AP4	I can always understand new knowledge and new skills quickly	3.50	.88	.79	11.78***
	AP5	I can communicate clearly with people	3.69	.85	.69	13.21***
	AP6	I know how to change the subject and can master the basic talking points	3.54	.88	.71	12.98***
	AP7	I am good at listening and don't like to interrupt others	3.79	.84	.61	13.86***
	AP8	I can communicate with others face to face	3.84	.79	.69	13.24***
	AP9	I am willing to take the initiative to communicate with others	3.69	.89	.70	13.11***
	AP10	I always take the initiative to help other classmates	3.68	.87	.74	12.57***
	AP11	I can take care of other classmates very well	3.69	.86	.75	12.37***
	AP12	In different situations, I can restrain my behavior well	3.88	.81	.68	13.29***
	AP13	I can cooperate very well with other classmates	3.80	.80	.72	12.80***
	AP14	I can get along well with other persons	3.95	.75	.73	12.72***

Materials

The latent concepts of loneliness, resilience, and academic performance were measured by three scales (Table 2). Their relationships were supported by the theoretical basis and the literature, and these scales were scored on 5-point Likert-type scales ranging from 1 ("strongly disagree") to 5 ("strongly agree"), defined as follows:

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(1) Loneliness: Loneliness was defined as a subjective feeling in which individuals experience a deficiency of social connections in their study lives (Hays & Dimatteo, 1987; Xu, Qiu, Hahne, Zhao, & Hu, 2018). Loneliness in independent-learning situations was measured by the extent of individual lonely feelings in the independent-learning process, and the measurement situation of independent learning was defined by instruction. The loneliness scale includes 8 items relating to the degree of an individual's perceived experience of being lonely (Hays & Dimatteo, 1987; Xu et al., 2018).

(2) Resilience: Resilience was defined as the ability to adapt to negative stressors (Campbell-Sills & Stein, 2007; Cheng, Dong, He, Zhong, & Yao, 2020). Resilience was used to measure the level of personal stress adaptation, and the scale contained 10 self-reported regarding coping with stressors (Campbell-Sills & Stein, 2007; Cheng et al., 2020).

(3) Academic Performance: Academic performance was the academic outcome of college students, and college students evaluated whether they achieved the adaptive ability to work (Li & Yang, 2016; Li, Yang, & Liu, 2016). Academic performance was used to measure the academic characteristics of learning cognitive, communication, and interpersonal abilities. The academic performance scale—with the three dimensions of learning cognitive, communication, and interpersonal abilities—contained 14 items related to the self-evaluation of learning cognition, communication, and interpersonal relationships (Li & Yang, 2016; Li et al., 2016).

Reliability and Validity

Before sampling, the loneliness, resilience, and academic performance scales were evaluated by using the index of item-objective congruence, and these scales reflected reasonable content validities. The measurement and structural models were constructed by structural equation modeling, depending on the samples of Wuhan college students (Bollen, 1989; Byrne, 2010; Kline, 2010). The original data were collated and coded in SPSS 21.0, and the models were constructed in AMOS 21.0. The measurement model was constructed to verify reliability and validity, and the structural model was constructed to test the mediating effect (Bollen, 1989; Byrne, 2010; Kline, 2010).

A confirmatory factor analysis (CFA) measurement model was constructed with 450 valid samples (Figure 2). First, according to the factor loadings per latent variable, every observed variable in the measurement model was reasonable, and their loadings were all greater than .50 (Byrne, 2010; Kline, 2010). Second, the Cronbach's alpha values were .91, .90, and .91 for the questionnaire items on loneliness, resilience, and academic performance, respectively. Third, the convergent and discriminate validities, as explained through the construct validity, was verified using the CFA: the factor loadings were between .58 and .85 (Table 2), there was no negative variance in the parameters, and the t values of all parameters reached significance (Bagozzi & Yi, 2012; Fornell & Larcker, 1981). Moreover, the model fit indices showed an acceptable fit for the samples: $\chi 2 = 1058.87$ ($p < .001$), $\chi 2/df = 2.33$, root mean square residual (RMR) = .04, root mean square error of approximation (RMSEA) = .05, goodness-of-fit (GFI) = .87, comparative fit index (CFI) = .92, Tucker-Lewis index (TLI) = .91, and parsimony-adjusted NFI (PNFI) = .80 (Bollen, 1989; Schumacker & Lomax, 2004). Fourth, the Composite Reliability (CR) was all greater than .6, the Average Variance Extracted (AVE) all exceeded .4. The CRs of the five latent structures in the measurement model were .91, .90, .87, .81, and .85. The AVEs of the five latent structures were .57, .47, .62, .46, and .52 (Hair, Anderson, Tatham, & Black, 1998). Based on these results, the measurement instruments of this study have acceptable and convergent validities. Moreover, the correlation coefficient at the 95% confidence interval in the bootstrap did not include 1;

thus, the measurement instruments have discriminant validities (Torkzadeh, Koufteros, & Pflughoeft, 2003).

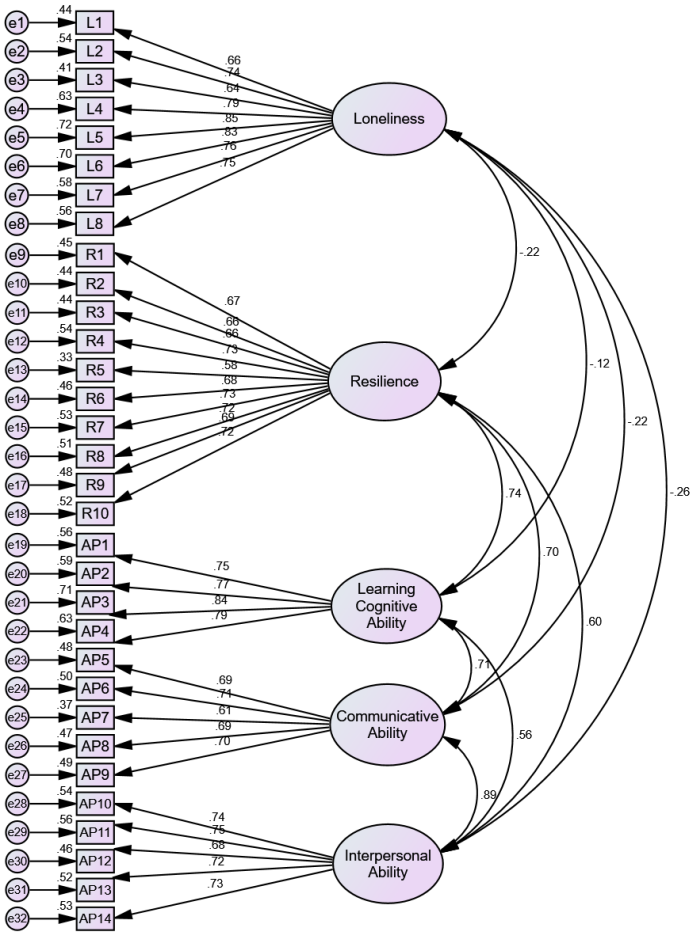

Figure 2. Measurement Model

RESULTS

Structural Mediating Model

A main effect model of loneliness and academic performance was first constructed based on H1 and valid samples. Loneliness explained 5% of the variance in academic performance, and the path coefficient of loneliness ($\gamma = -.23$, $p < .001$) for academic performance reached statistical significance. Thus, H1 was supported. Subsequently, depending on H2, resilience may play a mediating role in the relationship between loneliness and academic performance. Loneliness explained 5% of the variance in resilience, and the path coefficient of loneliness on resilience ($\gamma = -.22$, $p < .001$) reached statistical significance. Loneliness and resilience jointly explained 58% of the variance in academic performance, and the path coefficient of resilience ($\gamma = .61$, $p < .001$) on academic performance reached statistical significance. However, the path coefficient of loneliness ($\gamma = -.06$, $p > .05$) on academic performance did not reach statistical significance (Figure 3). Compared with the main and mediating effect models, the path coefficient of loneliness to academic performance was reduced from -.23 to -.06. In the mediating effect model, the standardized regression coefficients of all observed variables ranged from .58 to .85. The model fit demonstrated that the mediating effect model was acceptable for our samples: $\chi 2 = 1581.49$ ($p < .001$), $\chi 2/df = 3.43$, RMR = .05, RMSEA

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= .07, GFI = .80, CFI = .85, TLI = .84, and PNFI = .75 (Bollen, 1989; Schumacker & Lomax 2004).

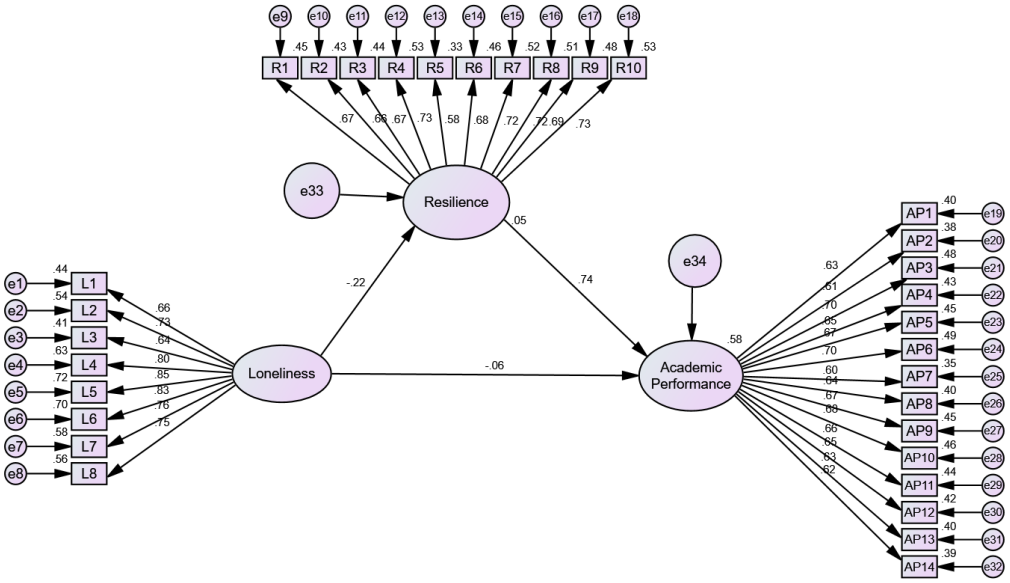

Figure 3. Structural Model

The total, direct, and indirect effects of the mediating effect model indicated that resilience fully mediated the relationship between loneliness and academic performance. In Table 3, the confidence interval estimates of the total and indirect effects did not include 0, indicating that their parameters all reached statistical significance. However, the confidence interval estimates of the direct effect included 0, indicating that the direct effect did not reach statistical significance. The total effect of loneliness on academic performance was -.15. Resilience fully mediated the relationship between loneliness and academic performance, resulting in the indirect effect of loneliness and academic performance reaching -.11 and the direct effect of loneliness on academic performance dropping to -.04. Therefore, H2 was supported.

Table 3 Bootstrap Method Estimates; 95% Confidence Interval

Total, Direct, and Indirect Effects	Path Coefficient	Bias-Corrected		Percentile	
		Lower	Upper	Lower	Upper
Total Effect (Loneliness→Academic Performance)	-.15***	-.24	-.08	-.24	-.07
Direct Effect (Loneliness→Academic Performance)	-.04	-.10	.02	-.10	.02
Indirect Effect (Loneliness→Academic Performance)	-.11***	-.19	-.05	-.19	-.05

*** $p < .001$

DISCUSSION

In this study, H1 was the main effect of loneliness and academic performance and supported by the main effect structural model. The result that loneliness was a negative predictor of academic performance is consistent with previous studies (Benner, 2011; Fan et al., 2021; Stoliker & Lafreniere, 2015; Yalçın et al., 2020). The results revealed that loneliness in independent-learning situations can distinctly affect academic performance. Loneliness is an unpleasant feeling that occurs when people do not have sufficient social relationships (Hays

& Dimatteo, 1987; Xu et al., 2018). This phenomenon may occur because the social support system does not effectively buffer individual lonely emotional stress (Cohen & Wills, 1985), thereby resulting in a negative effect on academic performance.

Next, H2 was supported by the mediating structural model because the main effects of loneliness and academic performance disappeared when resilience acted as a mediator between them. Loneliness results from a lack of social relationships (Hays & Dimatteo, 1987; Xu et al., 2018). The buffering function of the social support system did not play a role in perceived lonely individuals in the independent-learning situation (Cohen & Wills, 1985; Marsh, 1997). The perceived unpleasant feelings arising from the lack of social contact even brought about the emotional stress of loneliness (Barreto et al., 2020; Gerino et al., 2017). In the absence of a social support system, individuals experienced a detrimental influence on their academic performance as a negative effect of loneliness (Benner, 2011; Cohen & Wills, 1985; Fan et al., 2021; Stoliker & Lafreniere, 2015; Yalçın et al., 2020). Thus, this study suggested focusing on individual resilience because the psychological buffering effect of resilience can reduce the stressful effect on outcomes (Ayed et al., 2019; Goodkind et al., 2020). The results of the mediating structural model indicate that resilience acted as a complete mediator in the relationship between loneliness and academic performance. The results revealed that individual resilience in this study can absolutely counteract the effect of lonely emotional stress on academic outcomes. Based on the compensation theoretical model of resilience (Ayed et al., 2019; Wang & Zhang, 2015), the reason for the mediating effect was that resilience played a compensatory role and neutralized the effect of negative stress on outcomes (Ayed et al., 2019; Wang & Zhang, 2015). However, resilience can fully compensate for the effect of lonely emotional stress on the academic outcomes in this study. This result may indicate that lonely independent learners without sufficient social contact can maintain resilience to stress, thereby avoiding the negative effect of loneliness and protecting academic outcomes (Ayed et al., 2019; Cohen & Wills, 1985; Marsh, 1997; Wang & Zhang, 2015).

CONCLUSION

The findings revealed that resilience can fully neutralize the negative effect of the loneliness of independent learners on their academic performance in Wuhan's college students.

RESEARCH SUGGESTIONS

There are two suggestions for Chinese higher education and college counselors.

First, loneliness acted independently as emotional stress in the independent-learning process (Gerino et al., 2017; Marsh, 1997). Independent study is an essential learning method for adult college students (Morris, 2019). Therefore, the negative effect of loneliness on academic performance was an unavoidable problem in this study. Therefore, we suggest that Chinese higher education pay attention to the emotional stress accompanying loneliness for college students in independent-learning situations and to avoid the impact of loneliness on the learning performance of college students.

Second, resilience education is an effective method of enhancing the resilience of college students and helping them cope with stressors (DeRosier, Frank, Schwartz, & Leary, 2013). In this study, resilience was proposed as a mediator, and it fully neutralized the negative effect of loneliness on academic performance. Therefore, we suggest that Chinese college counselors who help college students adapt to university study and life should develop resilience education to help students be resilient to the emotional stress accompanying loneliness in independent learning.

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LIMITATIONS AND FUTURE DIRECTIONS

This study used only an online questionnaire to survey the topic of loneliness, resilience, and academic performance in Wuhan's college students. However, the topic of loneliness and independent learning was not a hot issue in higher education; thus, not much literature discusses the relationship between the two. Future studies should focus on the topic of independent learning and loneliness.

This study assumed that resilience was a psychological buffer only for the loneliness of independent learning and academic performance. However, resilience is a personal trait of coping with stressors and tends to play a positive role in males (You & Park, 2017). Follow-up studies can focus on comparing gender differences in the mediating model of this study.

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Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp