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Potential Implications of Optimism and Mental Health for the Independent Learning of Chinese University Students

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Abstract: This study investigated the potential implications of optimism and mental health in promoting independent learning among Chinese university students using a theoretical model related to loneliness, optimism, mental health, independent learning, and academic achievement and the relationships between them. Valid data were obtained from 509 participants from four universities in Wuhan, China, through a questionnaire with five-point Likert scales specific to loneliness, optimism, mental health, independent learning, and academic achievement in September 2021. These data were used to construct models to test measurement validity and mediating mechanisms through structural equation modeling. The results revealed that loneliness influences mental health, thereby influencing the academic achievement of Chinese university students, and optimism can reduce the partial negative effect of loneliness on students' mental health. Good mental health can support independent learning to promote academic achievement. This study provides recommendations for university managers to promote independent learning among Chinese university students.

Keywords: loneliness; optimism; mental health; independent learning; academic achievement

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1. Introduction

Independent learning is a learning method that enables adult university students to adapt to higher education [1]. During the COVID-19 pandemic, online teaching was one of the essential measures implemented by Chinese universities [2]. The development of active and independent learning skills helped Chinese university students adapt to this method of education [3]. However, students undertaking autonomous learning can feel lonely [4,5], and feelings of loneliness caused by independent learning can influence university students' mental health, therefore limiting their academic achievement [5–8].

Optimism and a good mental health state are two essential factors that help students face stress in learning [9,10]. Loneliness during independent learning is a negative emotional feeling associated with stress [8] and is a poor predictor of mental health [11]. In studies on stress, optimism, and psychological outcomes, optimism is defined as a psychological resource used to mediate the influence of stress on psychological outcomes [12]. This potential mediating relationship assumes that individuals may deplete their sense of optimism and perceived self-efficacy when coping with stress [12,13]. Thus, for lonely independent learners, optimism may be an important factor to cope with stress related to loneliness and protect their mental health.

Good mental health is a favorable contributor to learning achievement [14,15]. Research on mental health and learning outcomes has revealed that poor mental health can hinder independent learning behavior, negatively affecting students' academic achievement [14–16]. This indirect relationship indicates that learners require a positive psychological state to support their active learning, thereby promoting learning achievement [17,18]. Thus, good mental health may support students' independent learning to promote their academic achievement.

Optimism and mental health, as two essential factors in education, have corresponding courses. For instance, a positive thinking course aims to train an optimistic mind to reduce academic stress and a mindfulness course aims to teach an individual techniques to reduce stress and improve mental health [19,20]. However, the idea that optimism and mental health have potential significance for independent learners remains a hypothesis. Therefore, this study explores the relationships among loneliness, optimism, mental health, independent learning, and academic achievement. Based on the research results, this study provides recommendations for university managers to promote independent learning among Chinese university students.

2. Literature Review and Hypotheses

Feelings of loneliness are an intrinsic characteristic of autonomous learning [4]. Perceived loneliness is derived from dissatisfaction with social communication [6] and is transformed into stress [8]. Research on loneliness and academic achievement has reported that feelings of loneliness can negatively predict students' learning achievements [6,7]. However, research on loneliness, mental health, and performance has verified that mental health is a key mediator of the effect of loneliness on outcomes [5,8]. According to needs and mental health theories, the potential development of students relies on learners being mentally healthy. The mediating function of good mental health could help individuals to cope with the stress of learning and life and effectively achieve learning outcomes [21,22]. However, no matter the state of one's mental health, the effects of stress cannot be avoided. Being exposed to enough stress (such as emotional stress related to loneliness during autonomous learning) may influence an individual's mental state, thereby limiting their learning achievement [5,8,21,22]. We propose the first hypothesis based on these definitions, studies, and theories, as follows:

Hypothesis 1 (H1). *Mental health entirely mediates the effect of loneliness on academic achievement*.

Optimism is defined in terms of positive expectations [23], and it serves as a positive psychological resource, mediating the effect of negative factors on mental health [12]. According to the theory of self-efficacy, optimistic individuals can maintain strong positivity when facing threatening situations; they are less vulnerable to stress, thereby protecting their psychological health outcomes [13,24]. Research on loneliness and mental health has revealed that feelings of loneliness are a negative predictor, resulting in poor mental health [25,26]. Research on negative factors, optimism, and mental health has further revealed that negative factors can deplete feelings of optimism [12]. However, individuals with a strong sense of optimism are able to cope with threats, ensuring their positive mental health outcomes [12,27]. Therefore, optimism is assumed to potentially mediate and weaken the influence of loneliness on mental health. The second hypothesis is therefore proposed as follows:

Hypothesis 2 (H2). *Optimism mediates the effect of loneliness on mental health.*

Independent learning is defined as a spontaneous learning method [28]. According to needs theory and self-determination theory, good psychological health is essential for achieving learning outcomes [17,22]; thus, promoting learner autonomy will lead to better learning outcomes [18]. Individuals are therefore supported through positive mental health, which may drive their spontaneous learning for academic achievement [17,18,22]. Studies on mental health and academic achievement suggest that positive mental health promotes learners' educational achievement [14,15]. Furthermore, studies related to learning and outcomes reveal that a positive psychological state can support independent thinking and learning and can benefit students' academic achievement [1,29,30]. Therefore, our third hypothesis is that of independent learning plays a mediating role in the relationship between mental health and academic achievement is, as follows:

Hypothesis 3 (H3). *Independent learning mediates the influence of mental health on academic achievement*.

The hypothetical theoretical model is illustrated in Figure 1.

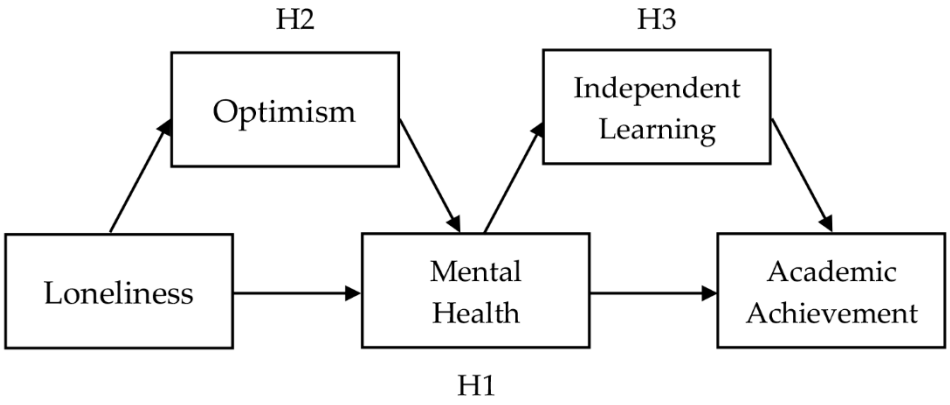

Figure 1. Hypothetical theoretical model.

3. Methods

3.1. Participants

Due to the Chinese policy of closing university campuses and buildings in response to COVID-19 [31], the survey for this study was conducted online. Purposive sampling was conducted for four universities in Wuhan, Hubei, China. These four universities, which have the same educational objective, encourage their students to be independent learners. University students in Wuhan experienced periods of prolonged independent learning at home during a period of online teaching in the past. To recruit participants from each major, investigators joined the dormitory management WeChat groups with the permission of the managers. To ensure anonymity, the informed consent form and questionnaire were separated. Investigators explained the research goals, voluntary nature of participation, and confidentiality to participants verbally and directed students to complete the informed consent forms and questionnaires. A total of 285 students completed the survey as a pretest between 13 September and 15 September 2021. All 285 pretests were of high quality and were retained for preliminary reliability and validity testing. A total of 531 samples were obtained in the formal test between 20 September and 27 September 2021. Of these, 22 samples were classified as straight-line responses and were deleted, leaving a total of 509 valid questionnaires. The average age of all participants was 21 years old, with ages ranging from 18 to 23. The demographics of the participants for the 509 valid samples are summarized in Table 1.

Table 1. Demographics from the formal test.

Background Factor	Demographic Characteristic	Group Proportion (n = 509)
Gender	Male	245 (48.1%)
	Female	264 (51.9%)
Grade	Freshman	151 (29.7%)
	Sophomore	111 (21.8%)
	Junior	130 (25.5%)
	Senior	117 (23%)

3.2. Measurement Structures

This study examined the concepts and structures for loneliness, optimism, mental health, independent learning, and academic achievement, which have potential relationships with each other, identified through theories and research. The five measurement

concepts were assessed using their respective measurement scales alongside a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The scale items passed a content validity evaluation by five experts, and a construct validity assessment of 285 samples was performed using exploratory factor analysis (EFA) and SPSS 21.0 software. The measurement concepts and structures also exhibited reasonable reliability and validity in a confirmatory factor analysis (CFA).

1. Loneliness is a subjective experience of isolation that causes emotional stress when learning alone [6,8]. The loneliness scale comprises eight loneliness-related items that measure feelings of isolation caused by a lack of companionship [32]. The eight items jointly determine loneliness with reasonable reliability (Cronbach's $\alpha = 0.89$) and factor structure (factor loadings ranged from 0.62 to 0.85 in the EFA). One of the items of the loneliness scale is "I feel left out".
2. Optimism is defined as having positive expectations, with a stress-reduction function [23]. The optimism scale measures positive thinking and expectations through eight optimism-related items [33]. Three items that did not jointly measure optimism were deleted, and the five remaining items could be used collectively to evaluate the measurement structure of optimism (Cronbach's $\alpha = 0.86$; factor loadings were between 0.78 and 0.85 in the EFA). One of the items of the optimism scale is "I'm always optimistic about my future".
3. Mental health is viewed as a state of well-being that enables potential realization [22]. Six mental health-related items comprise the mental health scale, which assesses the current cognitive state of self and life [34]. The six items are used to evaluate the structure of mental health (Cronbach's $\alpha = 0.85$; factor loadings ranged from 0.66 to 0.80 in the EFA). One of the items of the mental health scale is "I feel that my life is meaningful".
4. Independent learning is active learning through a process of making goals and plans and completing evaluations [28]. The independent learning scale measures active learning management and learning expectations through five independent learning-related items [35]. The five items collectively measure independent learning (Cronbach's $\alpha = 0.81$; factor loadings ranged from 0.68 to 0.80 in the EFA). One of the items of independent learning is "I carry out my own study plan".
5. Academic achievement is defined as a learning outcome that requires the competence to develop good interpersonal relationships [5]. The original academic achievement scale with three dimensions evaluates competence in learning, communication, and interpersonal relationships for learners in Chinese higher education through 14 academic achievement-related items [5]. In the EFA, only two dimensions were extracted for the academic achievement scale. Four items of the scale are related to cognitive learning. The remaining 10 items, related to communication and interpersonal relationships, were extracted as a common factor. Following an expert review and the EFA, the 10 items for communication and interpersonal relationships were renamed as "interpersonal competence". One item related to interpersonal competence was deleted from the cross-factor loading, leaving a total of 13 items used to evaluate academic achievement (Cronbach's $\alpha = 0.91$; factor loadings ranged from 0.54 to 0.84). One of the items of the academic achievement scale is "I can easily understand what the teacher said in class".

3.3. Measurement Structure Evaluation

After verifying the validity of the content and constructs through expert reviews and EFA, we used the SPSS Amos 21.0 software for structural equation modeling (SEM). Two items in the loneliness scale, three items in the optimism scale, one item on the mental health scale, two items in the independent learning scale, and three items in the academic achievement scale were deleted from the CFA measurement model because their factor loadings were lower than 0.70. With 509 samples, the modified measurement model, with 27 valid items, demonstrated an excellent fit: chi-square/df (χ^2/df) = 2.13

($p < 0.001$), root mean square error of approximation (RMSEA) = 0.05, root mean square residual (RMR) = 0.04, goodness-of-fit index (GFI) = 0.91, comparative fit index (CFI) = 0.95, incremental fit index (IFI) = 0.95, and parsimony goodness-of-fit index (PGFI) = 0.74 [36] (Figure 2 and Table 2). According to the parameters of the measurement model, the 509 samples met univariate (skew values ranged from −0.51 to 0.48; kurtosis values were between −0.90 and 0.25) and multiple (the Mardia value was 222.17 lower than 27 × (27 + 2); 27 questionnaire items) normalities [37,38]. Moreover, the parameters for variance were all positive and significant, the correlations ranged from −0.35 to 0.80, and the factor loadings, with reasonable standard errors, were between 0.67 and 0.86 [36]. These parameters verified that the measurement model is an excellent basis for evaluating measurement validity between the data and items.

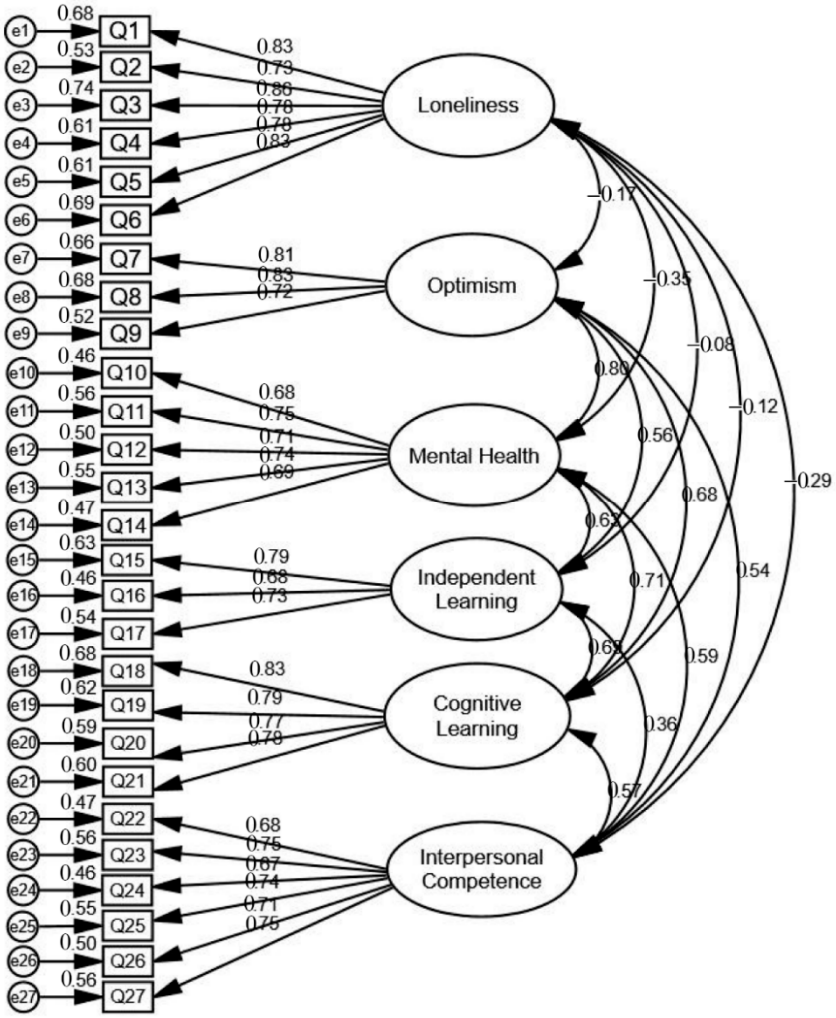

Figure 2. Measurement model.

The Cronbach α values of the measurement structures for loneliness, optimism, mental health, independent learning, and academic achievement (0.91, 0.83, 0.84, 0.80, and 0.88, respectively) were reasonable, and the composite reliability (CR) and average variance extracted (AVE) for the six potential structures in the measurement model exhibited excellent convergent validity. The CRs for these structures were 0.92, 0.83, 0.84, 0.78, 0.87, and 0.86, respectively (all > 0.60), and the AVEs were 0.65, 0.62, 0.51, 0.54, 0.63, and 0.52, respectively (all > 0.50). We calculated the correlations with a 95% confidence interval, resampling 2000 times using the bootstrap method, and the absence of 1 in the lower and upper parameters revealed the favorable discriminant validity of the six potential structures [39]. This evaluation verifies that the measurement structures of this study are

credible and valid, the measurement items fully explain the corresponding latent structures, and reasonable differences can be identified between the various latent structures.

Table 2. Valid questions and their factor loadings in the measurement model.

No	Items	Loadings
Loneliness		
Q1	I feel left out	0.83
Q2	I cannot find companionship when I want it	0.73
Q3	There is no one I can turn to	0.86
Q4	I am unhappy being so withdrawn	0.78
Q5	I feel isolated from others	0.78
Q6	People are around me but not with me	0.83
Optimism		
Q7	I'm always optimistic about my future	0.81
Q8	Things always work out the way I want them to	0.83
Q9	I always look on the bright side of things	0.72
Mental Health		
Q10	I feel that my life is meaningful	0.68
Q11	I enjoy my life	0.75
Q12	I can accept my appearance	0.71
Q13	I am satisfied with myself	0.74
Q14	I can concentrate (thinking, studying, remembering) on what I want to do	0.69
Independent Learning		
Q15	I carry out my own study plan	0.79
Q16	I manage time well	0.68
Q17	I set up my learning goals	0.73
Academic Achievement		
Q18	I can quickly grasp the key to solving the problem	0.83
Q19	I can easily understand what the teacher said in class	0.79
Q20	I can use the knowledge that I learned flexibly	0.77
Q21	I can always understand new knowledge and new skills quickly	0.78
Q22	I am willing to take initiative to communicate with others	0.68
Q23	I can take care of other classmates very well	0.75
Q24	I can communicate with others face to face	0.67
Q25	I always take initiative to help other classmates	0.74
Q26	I can get along well with other people	0.71
Q27	I can cooperate very well with other classmates	0.75

Finally, 27 measurement items were used to estimate a single-factor structure (χ^2/df = 8.96, $p < 0.001$, RMR = 0.17, RMSEA = 0.14, GFI = 0.54, CFI = 0.54, IFI = 0.54, and PGFI = 0.46), revealing no significant common method variance between the measurement structures [40].

4. Results

4.1. Main Mediating Structural Model

After ensuring the measurement validity using the CFA measurement model, we constructed a mediating structural model as the basis for an overall mediating model by combining the 21 items for loneliness, mental health, and academic achievement (Figure 3; χ^2/df = 2.66, $p < 0.001$, RMR = 0.05, GFI = 0.91, IFI = 0.95, CFI = 0.95, RMSEA = 0.06, and PGFI = 0.73).

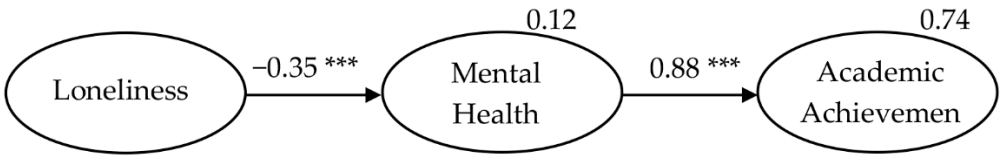

Figure 3. Mediating structure for loneliness, mental health, and academic achievement. *** $p < 0.001$.

First, we constructed the path of loneliness and academic achievement, revealing that loneliness significantly negatively predicted academic achievement (R^2 = 6%, $\gamma = -0.25$, $p < 0.001$). Second, we applied mental health as a mediator between loneliness and academic achievement (Figure 3). The path value between loneliness and academic achievement increased from −0.25 ($p < 0.001$) to 0.07 ($p > 0.05$), becoming non-significant. Thus, the paths between loneliness, mental health, and academic achievement exhibited a complete mediation structure. Loneliness negatively predicted mental health (R^2 = 12%, $\gamma = -0.35$, $p < 0.001$), whereas mental health positively predicted academic achievement (R^2 = 74%, $\gamma = 0.88$, $p < 0.001$). By performing bootstrap resampling 2000 times with 95% confidence intervals (Table 3), we revealed that the indirect effect of loneliness on academic achievement ($\lambda = -0.20$, $p < 0.01$) fully replaced the direct effect of loneliness on academic achievement ($\lambda = 0.04$, $p > 0.05$); thus, loneliness exhibited a total effect ($\lambda = -0.16$, $p < 0.01$). Therefore, mental health in the structure of loneliness, mental health, and academic achievement served as a complete mediator. Hypothesis 1 is therefore accepted.

Table 3. Interval estimation results for the structure of loneliness (L), mental health (MH), and academic achievement (AA).

Mediating Effect	Path Value	Bias-Corrected		Percentile	
		Lower	Upper	Lower	Upper
Total effect (L → AA)	−0.16 **	−0.25	−0.08	−0.24	−0.07
Direct effect (L → AA)	0.04	−0.02	0.12	−0.02	0.12
Indirect effect (L → AA)	−0.20 **	−0.29	−0.14	−0.28	−0.14

** $p < 0.01$.

4.2. Overall Mediating Structural Model

Subsequently, the mediating effects of optimism and independent learning were constructed on the basis of the mediating structure of loneliness, mental health, and academic achievement (Figure 4; $\chi^2/df = 2.28$, $p < 0.001$, RMR = 0.05, GFI = 0.90, IFI = 0.95, CFI = 0.95, RMSEA = 0.05, and PGFI = 0.75). First, optimism was used as a mediator between loneliness and mental health. The path value between loneliness and mental health increased from −0.35 ($p < 0.001$) to −0.18 ($p < 0.001$). The paths for loneliness, optimism, and mental health therefore exhibited a partial mediating structure. Loneliness ($\gamma = -0.18$, $p < 0.001$) and optimism ($\gamma = 0.79$, $p < 0.001$) significantly predicted mental health (R^2 = 71%), and loneliness negatively predicted optimism (R^2 = 3%, $\gamma = -0.17$, $p < 0.001$). Using the bootstrap method to determine the total, direct, and indirect effects of loneliness on mental health with 95% confidence intervals (Table 4), we revealed that the total effect of loneliness on mental health ($\lambda = -0.23$, $p < 0.01$) was partially mediated by optimism; thus, loneliness had an indirect effect on mental health ($\lambda = -0.10$, $p < 0.01$). Consequently, the direct effect of loneliness on mental health ($\lambda = -0.13$, $p < 0.01$) was only partially maintained. These results revealed that optimism has a partial mediating role in the relationship between loneliness and mental health. Hypothesis 2 is therefore accepted.

Furthermore, we applied independent learning as a mediator in the relationship between mental health and academic achievement. The path value between mental health and academic achievement decreased from 0.88 ($p < 0.001$) to 0.65 ($p < 0.001$). The paths of mental health, independent learning, and academic achievement exhibited a partial mediating structure. Mental health ($\gamma = 0.65$, $p < 0.001$) and independent learning ($\gamma = 0.33$, $p < 0.001$) significantly predicted academic achievement (R^2 = 80%), and mental health significantly predicted independent learning (R^2 = 40%, $\gamma = 0.64$, $p < 0.001$). By calculating the total, direct, and indirect effects of mental health and academic achievement with 95% confidence intervals (Table 4), we revealed that the total effect of mental health on academic achievement ($\lambda = 0.86$, $p < 0.01$) was partially mediated by independent learning; thus,

mental health had a partial indirect effect on academic achievement (λ = 0.21, $p < 0.01$) and a partial direct effect on academic achievement (λ = 0.65, $p < 0.01$). This indicates that independent learning is a partial mediator in the relationship between mental health and academic achievement. Hypothesis 3 is therefore accepted.

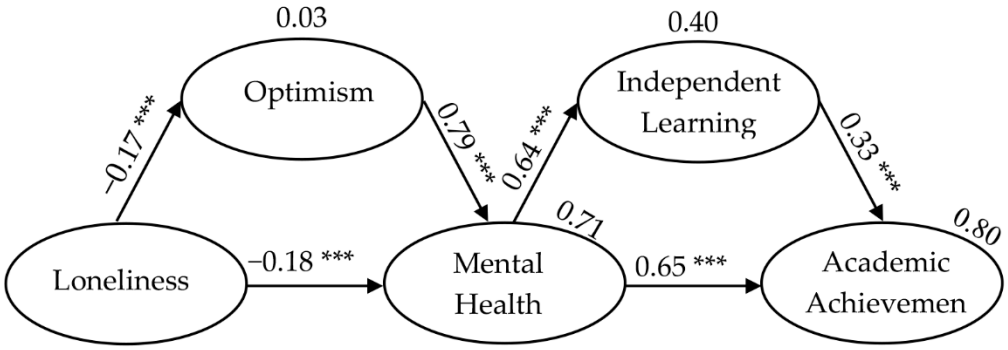

Figure 4. Overall mediating structure. *** $p < 0.001$.

Table 4. Interval estimation results for the overall mediating structure.

Mediating Effect	Path Value	Bias-Corrected		Percentile	
		Lower	Upper	Lower	Upper
		L and MH			
Total effect (L → MH)	−0.23 **	−0.33	−0.15	−0.32	−0.14
Direct effect (L → MH)	−0.13 **	−0.20	−0.07	−0.20	−0.07
Indirect effect (L → MH)	−0.10 **	−0.17	−0.04	−0.16	−0.03
		MH and AA			
Total effect (MH → AA)	0.86 **	0.69	1.03	0.70	1.05
Direct effect (MH → AA)	0.65 **	0.46	0.85	0.47	0.87
Indirect effect (MH → AA)	0.21 **	0.10	0.35	0.09	0.34

** $p < 0.01$. L, loneliness; MH, mental health; AA, academic achievement.

Finally, the overall mediating structure was constructed using male and female structural models. By performing a multi-group analysis comparison, the three mediating mechanisms that this study assumed all existed in male and female university students. Thus, the model results were all valid for male and female university students.

5. Discussion

This study confirmed Hypothesis 1, which states that mental health is a complete mediator in the relationship between loneliness and academic achievement. This result is consistent with those of studies on the mediating role of mental health [5,8]. Consequently, loneliness, mental health, and academic achievement have an indirect relationship; loneliness affects mental health, which influences academic achievement. This relationship confirmed Hypotheses 2 and 3. According to Hypothesis 2, optimism partially mediates the influence of loneliness on mental health. Thus, optimism is a positive mechanism similar to those identified in other studies [12,27]. The findings for Hypothesis 3 also indicate an advantageous mechanism consistent with those described in studies on learning and performance [1,29,30]; that is, independent learning partially mediates the influence of mental health on academic achievement. These results collectively reveal the potential significance of optimism and mental health for independent learners.

After establishing the complete mediating relationship between loneliness, mental health, and academic achievement in this study, we identified loneliness as a characteristic of independent learning [4], which causes emotional stress [8]. Feelings of loneliness caused by independent learning may negatively influence a learner's psychological state, thereby affecting their academic achievement in higher education [5,8,21,22]. With regard to needs and mental health theories, the results of Hypothesis 1 may suggest that a healthy psychological state is essential for learning and related outcomes. However, mental health is also vulnerable to threats of stress, therefore limiting learning behavior and outcomes [21,22]. Therefore, independent learning, the learning method that Chinese college students used to adapt to online education during the COVID-19 pandemic [2,3], may have limitations. For example, students can feel lonely due to independent learning [4,5], and perceived loneliness due to independent learning can influence university students' mental health, therefore limiting their learning achievement [5–8].

Furthermore, optimism partially mediates the influence of loneliness on mental health in Hypothesis 2. This result may be attributable to the protective effect of optimism on psychological state [12]. Self-efficacy theory reveals that, by their nature, optimistic individuals are strong enough to resist stress and protect their mental health [13,24]. Therefore, optimistic learners may be more able to face the challenge of emotional stress caused by loneliness during independent learning. Those who face loneliness during independent learning may resist it through a sense of optimism, thereby reducing the partial influence of loneliness and retaining a healthy psychological state [12,13,24,27]. Therefore, for lonely independent learners, optimism may be an essential factor to cope with stress related to loneliness and protect their mental health.

Moreover, independent learning partially mediates the effect of mental health on academic achievement in Hypothesis 3. This finding revealed that mental health not only directly contributes to academic achievement but also indirectly supports independent learning to impact academic achievement. Theoretical views on needs and self-determination suggest that a healthy psychological state is a precondition for learning and achieving outcomes, and that it can promote learners' initiative for learning, developing potential for academic success [17,18,22]. Learners with a healthy mental state may therefore be able to maintain their independent thinking and learning and achieve learning outcomes [1,29,30]. Therefore, good mental health may support students' independent learning to promote their academic achievement.

Based on these findings of Hypotheses 1, 2, and 3, this research highlights the implications of optimism and mental health for independent learners in Chinese higher education. Emotional stress caused by loneliness during independent learning may negatively influence an individual's psychological state, thereby limiting their development in terms of learning achievements. However, optimistic learners may be able to resist this stress, reducing the influence of feelings of loneliness on their psychological state. In addition, by maintaining a healthy psychological state, learners can use their initiative for learning to perform better in higher education. Therefore, optimism and a good mental health state are two essential factors that help students cope with stress related to loneliness and maintain independent learning [9,10]. These results also revealed that the courses developing college students' optimism and mental health (such as positive thinking courses and mindfulness courses) may promote independent learning [19,20].

6. Conclusions

The findings of this study revealed the mediating effects of mental health, optimism, and independent learning. Mental health fully mediates the influence of loneliness on academic achievement, optimism partially mediates the influence of loneliness on mental health, and independent learning partially mediates the influence of mental health on academic achievement.

6.1. Research Implications

This study has one theoretical implication and two practical implications.

First, this study revealed three mediating effects based on theories, other studies, and SEM results, clarifying the potential mediating mechanisms of mental health, optimism, and independent learning.

Second, in this study, the measurement validity test for the loneliness, optimism, mental health, independent learning, and academic achievement scales was modified based on expert validity and the results of EFA and CFA. The modified scale can be used for related research.

Third, online education became an indispensable educational mode during the pandemic [2]. Independent learning can be used by students to adapt to online teaching [3]. However, feelings of loneliness during independent learning [4] may negatively influence an independent learner's mental state, limiting their learning performance [5,8]. However, this study highlights that optimism is a potential protector, safeguarding mental health from the effects of loneliness caused by independent learning [12,27]. Good mental health may support students' independent learning, helping them to achieve academic success [1,29,30]. Therefore, this study suggests that Chinese university managers can provide related courses (such as positive thinking courses and mindfulness courses) to improve Chinese university students' optimism and mental health [19,20]. This way, they can develop optimistic and healthy minds to cope with the emotional stress caused by the loneliness resulting from independent learning and develop their independent learning skills.

6.2. Limitations and Future Research

This research investigated and constructed potential models to explain the value of optimism and mental health for independent learning. Follow-up research should conduct interviews to reveal the implications of optimism and mental health for independent learners.

This study is a cross-sectional study, and the mechanism promoting independent learning is mainly interpreted through theories and other studies. Therefore, the results may not be generalizable to all Chinese university students. To further verify the mechanism proposed, follow-up studies should use other representative groups and longitudinal research designs.

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References

1. Morris, T.H. Adaptivity through self-directed learning to meet the challenges of our ever-changing world. *Adult Learn.* **2019**, *30*, 56–66. [CrossRef]
2. Yang, B.; Huang, C. Turn crisis into opportunity in response to COVID-19: Experience from a Chinese University and future prospects. *Stud. High. Educ.* **2021**, *46*, 121–132. [CrossRef]
3. Zhang, W.; Wang, Y.; Yang, L.; Wang, C. Suspending classes without stopping learning: China's education emergency management policy in the COVID-19 outbreak. *J. Risk Financ. Manag.* **2020**, *13*, 55. [CrossRef]

4. Leathwood, C. Gender, equity and the discourse of the independent learner in higher education. *High. Educ.* **2006**, *52*, 611–633. [CrossRef]
5. Yang, D.; Swekwi, U. The influence mechanism of loneliness to learning and its coping strategies in Chinese college students. *Int. J. Learn. Teach. Educ. Res.* **2021**, *20*, 68–85. [CrossRef]
6. Rosenstreich, E.; Margalit, M. Loneliness, mindfulness, and academic achievements: A moderation effect among first-year college students. *Open Psychol. J.* **2015**, *8*, 138–145. [CrossRef]
7. Yalçin, I.; Özkurt, B.; Özmaden, M.; Yağmur, R. Effect of smartphone addiction on loneliness levels and academic achievement of z generation. *Int. J. Psychol. Educ. Stud.* **2020**, *7*, 208–214. [CrossRef]
8. Gerino, E.; Rollè, L.; Sechi, C.; Brustia, P. Loneliness, resilience, mental health, and quality of life in old age: A structural equation model. *Front. Psychol.* **2017**, *8*, 2003. [CrossRef]
9. Akpınar, E. The effect of online learning on tertiary level students mental health during the COVID-19 lockdown. *Eur. J. Soc. Behav. Sci.* **2021**, *30*, 52–62. [CrossRef]
10. Usán, P.; Salavera, C.; Quílez-Robres, A. Self-efficacy, optimism, and academic performance as psychoeducational variables: Mediation approach in students. *Children* **2022**, *9*, 420. [CrossRef]
11. Wang, J.; Lloyd-Evans, B.; Marston, L.; Mann, F.; Ma, R.; Johnson, S. Loneliness as a predictor of outcomes in mental disorders among people who have experienced a mental health crisis: A 4-month prospective study. *BMC Psychiatry* **2020**, *20*, 249. [CrossRef] [PubMed]
12. Ben-Zur, H. Loneliness, optimism, and well-being among married, divorced, and widowed individuals. *J. Psychol.* **2012**, *146*, 23–36. [CrossRef] [PubMed]
13. Bandura, A. Self-efficacy. In *The Corsini Encyclopedia of Psychology*; John Wiley & Sons: Hoboken, NJ, USA, 2010.
14. Leung, C.W.; Farooqui, S.; Wolfson, J.A.; Cohen, A.J. Understanding the cumulative burden of basic needs insecurities: Associations with health and academic achievement among college students. *Am. J. Health Promot.* **2020**, *35*, 275–278. [CrossRef] [PubMed]
15. Eisenberg, D.; Golberstein, E.; Hunt, J.B. Mental health and academic success in college. *BE J. Econ. Anal. Policy* **2009**, *9*, 40. [CrossRef]
16. Puskar, K.R.; Marie Bernardo, L. Mental health and academic achievement: Role of school nurses. *J. Spec. Pediatr. Nurs.* **2007**, *12*, 215–223. [CrossRef]
17. Maslow, A.H. A theory of human motivation. *Psychol. Rev.* **1943**, *50*, 370–396. [CrossRef]
18. Ryan, R.M.; Deci, E.L. Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemp. Educ. Psychol.* **2020**, *61*, 101860. [CrossRef]
19. Crowley, C.; Kapitula, L.R.; Munk, D. Mindfulness, happiness, and anxiety in a sample of college students before and after taking a meditation course. *J. Am. Coll. Health* **2022**, *70*, 493–500. [CrossRef] [PubMed]
20. Melhe, M.A.; Salah, B.M.; Hayajneh, W.S. Impact of training on positive thinking for improving psychological hardiness and reducing academic stresses among academically-late students. *Educ. Sci. Theory Pract.* **2021**, *21*, 132–146.
21. Farmer, R. Humanistic education and self-actualization theory. *Education* **1984**, *105*, 162–172.
22. WHO. Promoting Mental Health: Concepts, Emerging Evidence, Practice (Summary Report). 2004. Available online: https://apps.who.int/iris/handle/10665/42940 (accessed on 13 February 2022).
23. Fitzpatrick, K.M. How positive is their future? Assessing the role of optimism and social support in understanding mental health symptomatology among homeless adults. *Stress Health* **2017**, *33*, 92–101. [CrossRef] [PubMed]
24. Bandura, A. *Encyclopedia of Human Behavior*; Academic Press: New York, NY, USA, 1994.
25. Lee, E.E.; Depp, C.; Palmer, B.W.; Glorioso, D.; Daly, R.; Liu, J.; Tu, X.M.; Kim, H.C.; Tarr, P.; Yamada, Y.; et al. High prevalence and adverse health effects of loneliness in community-dwelling adults across the lifespan: Role of wisdom as a protective factor. *Int. Psychogeriatr.* **2019**, *31*, 1447–1462. [CrossRef] [PubMed]
26. Matthews, T.; Danese, A.; Gregory, A.M.; Caspi, A.; Moffitt, T.E.; Arseneault, L. Sleeping with one eye open: Loneliness and sleep quality in young adults. *Psychol. Med.* **2017**, *47*, 2177–2186. [CrossRef] [PubMed]
27. Chang, E.C.; Chang, O.D.; Martos, T.; Sallay, V.; Li, X.; Lucas, A.G.; Lee, J. Does optimism weaken the negative effects of being lonely on suicide risk? *Death Stud.* **2018**, *42*, 63–68. [CrossRef] [PubMed]
28. Tekkol, İ.A.; Demirel, M. An investigation of self-directed learning skills of undergraduate students. *Front. Psychol.* **2018**, *9*, 2324. [CrossRef] [PubMed]
29. Harris, J.L.; Murray, B.J. Educational Grit and psychological trauma. In Proceedings of the Developments in Business Simulation and Experiential Learning, Annual ABSEL Conference, Seattle, WA, USA, 5–8 May 2017; Volume 44, pp. 86–94.
30. Legault, L. Self-determination theory. In *Encyclopedia of Personality and Individual Differences*; Ziegler-Hill, V., Shackelfold, T., Eds.; Springer: New York, NY, USA, 2014; pp. 1–9.
31. Ministry of Education of the People's Republic of China. Notice on the Issuance of Technical Plans for the Prevention and Control of the New Pneumonia Epidemic in Autumn and Winter in Colleges, Primary and Secondary Schools, and Kindergartens. 2020. Available online: http://www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1779/202008/t20200813_477911.html (accessed on 13 February 2022).
32. Hays, R.D.; DiMatteo, M.R. A short-form measure of loneliness. *J. Pers. Assess.* **1987**, *51*, 69–81. [CrossRef]

33. Scheier, M.F.; Carver, C.S. Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychol.* **1985**, *4*, 219. [CrossRef]
34. Yao, G.; Chung, C.W.; Yu, C.F.; Wang, J.D. Development and verification of validity and reliability of the WHOQOL-BREF Taiwan version. *J. Formos. Med. Assoc.* **2002**, *101*, 342–351.
35. Hung, M.L.; Chou, C.; Chen, C.H.; Own, Z.Y. Learner readiness for online learning: Scale development and student perceptions. *Comput. Educ.* **2010**, *55*, 1080–1090. [CrossRef]
36. Byrne, B.B. *Structural Equation Modeling Using AMOS: Basic Concepts, Applications, and Programming*, 2nd ed.; Taylor & Francis Group: New York, NY, USA, 2010.
37. Bollen, K.A. *Structural Equations with Latent Variables*; John Wiley and Sons: New York, NY, USA, 1989.
38. Bollen, K.A.; Long, J.S. *Testing Structural Equation Models*; SAGE: Newbury Park, CA, USA, 1993.
39. Torkzadeh, G.; Koufteros, X.; Pflughoeft, K. Confirmatory analysis of computer self-efficacy. *Struct. Equ. Model.* **2003**, *10*, 263–275. [CrossRef]
40. Verhagen, T.; van Dolen, W. The influence of online store beliefs on consumer online impulse buying: A model and empirical application. *Inf. Manag.* **2011**, *48*, 320–327. [CrossRef]