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Research paper

The influence of interpersonal relationships on school adaptation among Chinese university students during COVID-19 control period: Multiple mediating roles of social support and resilience

Xing Zhang [a,*], Peng-fei Huang [a], Bi-qin Li [a,*], Wen-jian Xu [b,c], Wen Li [d], Bin Zhou [e]

[a] School of Psychology, Jiangxi Normal University, Nanchang, China
[b] Department of Sociology & Psychology, School of Public Administration, Sichuan University, Chengdu, Sichuan, China
[c] Institute of Psychology, Sichuan University, Chengdu, Sichuan, China
[d] Jiangxi College of Construction, Nanchang, China
[e] Fuzhou Medical College of Nanchang University, Fuzhou, China

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ABSTRACT

Background: Owing to the government's effective epidemic control measures, universities in some areas of China gradually resumed offline teaching six months after the COVID-19 outbreak. Although attention should now be paid to the experiences of students after they returned to campus, few studies have explored the factors and mechanisms that have influenced these students' school adaptation. The present study investigated the multiple roles of social support and resilience in mediating associations the relationship between Chinese university students' interpersonal relationships and their school adaptation during COVID-19 control period.

Methods: A cross-sectional survey was conducted with 4534 Chinese university students (Mage = 19.70, SD = 1.14) at two universities in Jiangxi provinces. The independent variable was interpersonal relationships; mediating variables were social support and resilience; and the dependent variable was school adaptation. Multiple mediation analysis was performed using the MPlus software.

Results: Controlling for demographic variables, the quality of students' interpersonal relationships was significantly and positively related to their school adaptation, with students' ratings of social support and resilience mediating these associations. More interestingly, social support and resilience played multiple mediating roles in the relationship between interpersonal relationships and school adaptation.

Limitations: The age stage of the sample and the methods in which the data were collected may affect the generalizability of the results.

Conclusions: During COVID-19 control period, interpersonal relationships can influence school adaptation either directly or indirectly by enhancing social support or resilience (parallel mediation) or by activating resilience via the experience of social support (serial mediation). This study's results emphasize the role of interpersonal relationships, as well as the contributions of positive external and internal factors on students' school adaptation during the epidemic control period. Accordingly, these findings may have implications for the mental health education of college students in the post-epidemic era.

1. Introduction

The year of 2020 was an uneasy time. The novel coronavirus (COVID-2019) spread very rapidly across China and then around the world, causing an outbreak of acute infectious pneumonia (Bao et al., 2020). According to the official statistics, 87,805 confirmed cases (including 11,977 severe cases) and 5248 suspected cases of COVID-19 in China as of 19 February 2020 have reported (National Health Commission of China, 2020). Such a large, infectious, public health event imposed enormous pressure on the Chinese government, medical and healthcare providers, and the general public (Pan et al., 2020; Wang et al., 2020). Thanks to the effective measures of the government and the active cooperation of the public, COVID-19 was gradually brought under effective control and the economy of the whole society is now

* Corresponding author at: School of Psychology, Jiangxi Normal University, 99, Ziyang Avenue, Nanchang, Jiangxi Province, 330022, Nanchang, China.
E-mail addresses: zhangxing@jxnu.edu.cn (X. Zhang), 18146612680@163.com (B.-q. Li).

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recovering.

During the outbreak of COVID-19, public mental health issues became more prominent and attracted greater attention from researchers, resulting in many studies on mental health distress. These studies involved groups of all ages, including children (C.H. Liu et al., 2020a), adolescents (Duan et al., 2020), young adults (Son et al., 2020), and older adults (Yang et al., 2020). The COVID-19 epidemic has had an especially profound impact on youth mental health, with nearly 40.4% of the sampled youth found to be prone to psychological problems (Liu et al., 2020b; Liang et al., 2020). As university students have been specifically identified as a vulnerable population to the mental health consequences of the COVID-19 pandemic, their mental health has attracted considerable attention from researchers (Cao et al., 2020; Chen et al., 2020; Sun et al., 2020; Wang et al., 2020). Given the government's strict and effective epidemic control efforts, college students have experienced school closures, a transition to internet-based learning offline, and isolation from peers due to the COVID-19 pandemic. This has led to massive disruption in the lives and education of university students in China. Compared with students at other age stages (e.g., junior or high school), college students need to leave home to live on campus, and faced with more choices of professional and personal opportunities. The impact of the outbreak and related prevention and control measures on college students' mental health may be even more pronounced, the mental health of college students should be monitored effectively during epidemics (Cao et al., 2020). A growing number of studies have explored the mental health of college students in the context of the epidemic (Cao et al., 2020; Kecojevic et al., 2020; Sun et al., 2020; Tang et al., 2020). Their findings indicate that the psychological consequences of the COVID-19 among university students have been serious (Tang et al., 2020), and reflect mental health problems associated with anxiety, depression, and stress. Therefore, the COVID-19 epidemic continues to threaten the mental health of college students, even as schools in some areas of China have resumed offline teaching and university students are gradually returning to their campuses. According to the national requirements for epidemic prevention and control, until the epidemic is eliminated, current prevention and control efforts will remain in force. As a result, most universities continue to restrict students from going off campus to socialize with others. The ongoing requirements of epidemic prevention and control, along with college students' anxiety and fear about COVID-19 thus may continue to negatively impact not only students' campus life, but also their school adaptation, current studies, and future employment. School adaptation plays an important role in an individual's academic performance and well-being from early childhood to college (Shoshani and Slone, 2013). It is thus important to explore the factors that influence and predict college students' school adaptation as countries enter the post-pandemic period. However, to our knowledge, no such prospective studies have been conducted to date.

School adaptation generally refers to the degree to which students' interactions with various features of the school environment enhance their comfort and success (Ladd et al., 1997). The quality of students' interpersonal relationships within this environment is a particularly important feature that has been shown to positively predict students' adaptation of school life (Chang et al., 2020; Song, 2017; Zeng et al., 2010). However, little is known about the mechanisms associated with this relationship in the epidemic control context. The purpose of the present study is to explore the means by which interpersonal relationships affect college students' school adaptation in the context of epidemic control. As such, study findings may have theoretical and practical significance for mental health education at school in the post-epidemic era.

Interpersonal relationships can be conceptualized as the patterns of emotion, thought, and behavior that individuals engage in when they interact with others (Plutchik, 1997). Indeed, some important aspects of the interpersonal relationships (i.e., teacher-student relationships and the quality of friendships) may predict adolescent's social adaptation (Zeng et al., 2010) by favorably influencing their perceptions of school climate (Zhang et al., 2014). On the other hand, problematic interpersonal relationships are likely to contribute to depression (Stoetzer et al., 2009) and be experienced as sources of stress (Cohen and Wills, 1985; Graham, 2012). Therefore, based on the findings of these relevant studies, we first hypothesized that the quality of university students' interpersonal relationships would positively predict their school adaptation levels during the COVID-19 control period (H1) (see Fig. 1).

The quality of students' interpersonal relationships is also likely to influence their experience of social support in one of two main ways: (a) through provision of a variety of resources (i.e., trust and security) and (b) by influencing cognition, emotions, and actions but without explicitly aiming to help (Cohen et al., 2000). On the other hand, individuals who report having poor quality of relationships with others were less likely to experience adequate support from these relationships (Gumpel and Ish-Shalom, 2003; Malecki and Demaray, 2003; Zhang et al., 2015). Previous studies found that the receipt of social support from family, friends, teachers, and social groups is related to college students' reports of fewer psychological problems (Elliott and Gramling, 1990), whereas the lack of social support has been associated with various indicators of psychological distress (i.e., depression, loneliness) (Eskin, 2003). In general, social support reflects one of the important sources of school belonging with the potential of enhancing university students' social adaptation and stress-related coping. Indeed, across several investigations, social support has demonstrated positive associations with both potential antecedent (e.g. social skills, self-efficacy) and outcome variables (Sylvia-Bobiak and Caldwell, 2006; Yeh and Inose, 2003) that are likely to significantly predict the level of school adaptation (Du and Cai, 2014; Peng et al., 2011). Other studies have found that social support mediated observed associations between interpersonal relationships and mental health problems (i.e., depressive symptoms and loneliness) (Masi et al., 2011; Lasgaard et al., 2011; Luo et al., 2017; Zhang et al., 2015). Therefore, our second hypothesis proposed that the quality of interpersonal relationships would favorably influence university students' school adaptation levels during COVID-19 control period (H2) through the mediating role of social support (see Fig. 1).

In addition to social support, resilience may another important factor influencing the relationship between quality of university students' interpersonal relationships and their school adaptation. In general, resilience refers to a person's capacity to dynamically self-regulate and adjust to the external environment (White et al., 2010) in the face of difficulties (Sang et al., 2016). Resilience is thus considered a personal quality and social resource that can positively influence adverse outcomes (Connor and Davidson, 2003) by helping people cope with negative stressors and maintain health (Ong et al., 2006). Indeed, the quality of adolescents' interpersonal has been shown to predict their resilience and to mediate observed associations between their interpersonal relationships and their reports of depressive symptoms (Lee

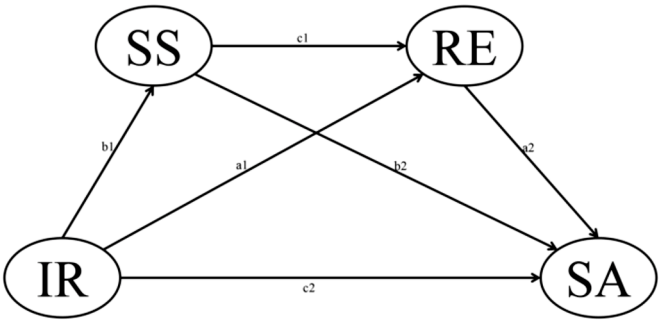

Fig. 1. Mediating effect model with all hypothesized mediation pathways between variables of interest.

Note. IR = interpersonal relationships, SS = social support, RE = resilience, SA = school adaptation.

H1: IR → SA; H2: IR → SS → SA; H3: IR → RE SA; H4: IR → SS → RE → SA;.

et al., 2020). Thus, our third hypothesis proposed that the quality of university students' interpersonal relationships during COVID-19 control period (H3) would influence their school adaptation levels through the mediating role of resilience (see Fig. 1).

Lastly, according to the organism-environment interaction model (Lerner et al., 2006), the dynamic interactions between internal factors and external environmental factors facilitate an individual's adaptation. School adaptation may thus be influenced by both external factors, such as the school environment and social support, as well as by internal factors, such as resilience (Chen et al., 2019; Zhang et al., 2014). Numerous studies have found that social support is closely related to resilience (Luthar et al., 2000; Ruiz-Robledillo et al., 2014; Yao et al., 2016), and thus may directly predict (Song et al., 2014; Yao et al., 2016) or enhance resilience (Ozbay et al., 2007) Some studies have even suggested that resilience may mediate the relationship between social support and mental health (i.e., posttraumatic growth, depression, loneliness and satisfaction with life) (Pietrzak et al., 2010; Xin et al., 2019; Song et al., 2014;Yıldırım and Tanrıverdi, 2020; Zhao et al., 2014). Furthermore, findings from several studies suggest that social support and resilience have unique protective effects on mental health (Haddadi and Besharat, 2010; Hu et al., 2015; Thoits, 2011; Werner--Seidler et al., 2017; M. Zhang et al., 2018). Therefore, our fourth and final hypothesis proposed that the quality of university students' interpersonal relationships during the COVID-19 control period (H4) would influence their school adaptation levels among university students through the serial mediation of social support and resilience (see Fig. 1).

2. Methods

2.1. Participants

With the COVID-19 pandemic under effective control, many universities on mainland China gradually returned to offline teaching. About a month after college students returned to school, and with the approval of the ethics board for scientific research at Jiangxi Normal University, we began collecting data through the internet. A total of 4700 college students were recruited from 2 universities in Jiangxi province, China. One hundred and sixty-six students who had not yet returned to school were excluded, resulting in a 3.5% missing rate. The final sample consisted of 4534 college students, ranging in age from 15 to 28 years ($M = 19.70$, SD = 1.14), and contained 2907 males and 1627 females. Study participants included 3418 students from rural areas and 1116 students from urban areas in the province.

2.2. Measurements

2.2.1. Interpersonal relationships

The quality of interpersonal relationships was measured by the Relationship Comprehensive Assessment Questionnaire (Zheng, 1999). This 28-item measure is composed of four subscales: making conversations, making friends, the ways to get along with others, and heterosexual relationships. One sample item is "you will feel nervous in social situations". Each item is responded to as 0 (no) and 1(yes) on a 0–1 Likert-type scale. The scale has been widely used in Chinese populations and has demonstrated good validity and reliability in independent studies (Guo et al., 2020; Li et al., 2010; Ye et al., 2019; Zhang et al., 2007). Total scores were then computed, with lower scale scores indicating a higher quality of interpersonal relationships. In this study, Cronbach's alpha coefficient for scale scores was 0.89.

2.2.2. Social support

Social support was measured by Social Support Rating Scale (SSRS) (Xiao, 1994). This 10-item measure is composed of three subscales: subjective support, objective support, and availability of support. One item example is "How many close friends do you have that you could get support and help from?". The scale has been widely used in Chinese populations and proved to have good validity and reliability (Dong, 2010; Lin et al., 2020; Wu, 2008; Xie et al., 2018; S. Zhang et al., 2018). Total scores were computed, with higher scores indicating higher levels of social support. The Cronbach's alpha coefficient for scores on this scale in the current study was 0.69.

2.2.3. Resilience

Resilience was measured by Chinese version of Connor-Davidson Resilience Scale (CD-RISC). The CD-RISC is a 25-item self-report questionnaire that assesses an individuals' psychological flexibility and capacity to protect their mental health (Connor and Davidson, 2003). A sample scale item is "I can adapt to change." Each item is rated on a five-point Likert scale ranging from 1 (never) to 5 (always). The Chinese version of CD-RISC supports a 3-factor model (i.e., tenacity, strength, and optimism) and has demonstrated good psychometric properties in other investigations (Xie et al., 2016; Yu et al., 2011; Zhou et al., 2020). Total scores were computed, with higher scores indicating higher levels of resilience. In the present study, the obtained Cronbach's alpha coefficient for scores on this scale was 0.97.

2.2.4. School adaptation

The quality of school adaptation was measured by the school adaptation difficulties subscale of the College Students Mental Health Screening Scale developed by Fang et al. (2018). This subscale includes four items, such as "Not adapted to college life style", that are rated on a 4-point Likert scale ranging from 1 (not like me at all) to 4 (very like me). The College Students Mental Health Screening Scale has been widely used in Chinese populations and proved to have good validity and reliability (He et al., 2020; Zhang, 2021). Dimension scores were computed, with higher scores indicating lower levels of school adaptation. In present investigation, the obtained Cronbach's alpha coefficient for scores on this measure was 0.80.

2.3. Statistical analysis

SPSS 21.0 was used to calculate descriptive statistics and correlations of all the key variables. To test the mediating effect of social support and resilience, we adopted the two-step procedure suggested by numerous previous researches (Anderson and Gerbing, 1988; X. Zhang et al., 2016). First, the measurement model was tested to assess whether each of the latent variables could be represented by its indicators using the Mplus 8.3 program; Second, if the measurement model was satisfactory, the structural model using maximum likelihood estimation (Muthén and Muthén 1998–2019) would be tested using the Mplus 8.3 program.

Multiple items for the unidimensional latent variable would cause inflated measurement errors, hence, a parceling approach procedure was used to aggregate items to form manifest indicators for each unidimensional construct, and we use the highest loadings to anchor each of the two or three parcels, and then match lower loaded items with higher loaded items to create relatively balanced parcels (Little et al., 2002; X. Zhang et al., 2016). As the school adaptation was a unidimensional variable but with only four items, we created a latent variable with two parcels.

On the other hand, to assess whether the measurement model and structural model fit the data, we chose the following standard fit indices suggested by previous researchers (Markus, 2012): CFI, TLI, RMSEA and SRMR. When the CFI and TLI values are above 0.90, and the RMSEA and SRMR values are below 0.08 (Hu and Bentler, 1999), the measurement model and structural model would be considered acceptable. The bias-corrected bootstrap estimation procedure was used to test the significance of the indirect effects. In the estimation procedure, the given sample size was randomly resampled 10,000 times with replacement, and the 10,000 estimations of the indirect effect were calculated. According to MacKinnon et al. (2004), when the 95% confidence interval (CI) for an indirect effect does not include 0, the indirect effect can be considered significant.

3. Results

3.1. Common method bias testing

According to the method suggested by Zhou and Long (2004), Harman's single factor test was used to check for the potential effects of common method bias (Guo et al., 2018; Jin et al., 2020; Zuo et al., 2020). All items in the interpersonal relationships, social support, resilience, and school adaptation questionnaires were subjected to an exploratory factor analysis in SPSS to test for common method variance. The results indicated that the eigenvalues of 3 factors were > 1 and of the first common factor was 17.78 in the unrotated factor structure, accounting for 26.53% of the variance among the items. Therefore, common method bias was unlikely to be a serious concern in the study analyses.

3.2. Descriptive statistics and correlation coefficients of variables

Table 1 shows the results of descriptive statistics for all variables. The relationships between most variables were statistically significant. The dimensions of interpersonal relationships were negatively associated with the dimensions of social support and of resilience, respectively, and positively associated with school adaptation scores; social support dimensions were positively associated with the resilience dimensions, and negatively associated with school adaptation, and the dimensions of resilience were also negatively associated with school adaptation.

3.3. Measurement model

The measurement model consisted of 4 latent constructs (interpersonal relationships, social support, resilience, and school adaptation). Results of the measurement model indicated that all loadings were significant ($p < 0.001$). The measurement model also showed good fit to the data ($\chi^2(48) = 286.033$, $p < 0.001$; CFI = 0.984, TLI = 0.978, RMSEA = 0.047, SRMR = 0.023).

3.4. Structural model

Controlling for the participants' sex, age, and location of home, results of the structural model (see Fig. 2) indicated that, the higher quality of interpersonal relationships significantly predicted higher social support, β = - 0.41, SE = 0.02, $p < 0.001$, higher resilience, $\beta = -0.09$, SE = 0.02, $p < 0.001$, and better school adaptation, $\beta = 0.28$, SE = 0.02, $p < 0.001$; the higher social support significantly predicted higher resilience, $\beta = 0.61$, SE = 0.02, $p < 0.001$, and better school adaptation, $\beta = -0.15$, SE = 0.03, $p < 0.001$; higher resilience scores also significantly predicted better school adaptation, $\beta = -0.24$, SE = 0.03, $p < 0.001$. Furthermore, as presented in the Table 2, the direct effect of interpersonal relationships on school adaptation was significant ($\beta = 0.28$, $p < 0.0001$, 95% CI = 0.250 to 0.313), the mediation effect of interpersonal relationships on social support to school adaptation was significant ($\beta = 0.060$, $p < 0.0001$, 95% CI = 0.041 to 0.080), the mediation effect of interpersonal relationships on resilience to school adaptation was significant ($\beta = 0.021$, $p < 0.0001$, 95% CI = 0.013 to 0.030). Moreover, the indirect effect of social support and resilience as serial mediators in the relation between interpersonal relationships and school adaptation was significant ($\beta = 0.06$, $p < 0.0001$, 95% CI = 0.050 to 0.072).

4. Discussion

The present study utilized SEM to examine, within a large sample of Chinese university students living on campus during COVID-19 control period, the relations among these students' quality of interpersonal relationships, social support, resilience, and school adaptation. Findings

Table 1
Descriptive statistic and correlations for variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Age	1													
2 Sex	0.07**	1												
3 location of home	0.11**	0.01	1											
Interpersonal Relationships:														
4 Making Conversations	−0.03	−0.04	0.02	1										
5 Making Friends	−0.05**	−0.14**	0.01	0.77**	1									
6 The Ways To Get Along With Others	−0.02	−0.02	−0.03*	0.58**	0.58**	1								
7 Heterosexual Relationships	−0.02	−0.07	0.03	0.64**	0.68**	0.47**	1							
Social Support:														
8 Subjective Support	0.06**	0.01	0.07**	−0.28**	−0.27**	−0.20**	−0.24**	1						
9 Objective Support	0.02	−0.03	−0.02	−0.16**	−0.12**	−0.13**	−0.13**	0.44**	1					
10 Availability of Support	0.04**	−0.11**	0.01	−0.28**	−0.23**	−0.15**	−0.24**	0.45**	0.34**	1				
Resilience:														
11 tenacity	0.03*	0.10**	−0.03*	−0.31**	−0.31**	−0.19**	−0.25**	0.42**	0.30**	0.43**	1			
12 strength	0.02	0.04	0.03	−0.29**	−0.27**	−0.18**	−0.22**	0.42**	0.33**	0.45**	0.89**	1		
13 optimism	0.00	0.02	−0.05**	−0.29**	−0.28**	−0.17**	−0.24**	0.38**	0.29**	0.43**	0.76**	0.81**	1	
School Adaptation:														
14 School Adaptation Difficulties	0.04**	−0.12**	0.01	0.34**	0.34**	0.23**	0.25**	−0.27**	−0.18**	−0.24**	−0.36**	−0.37**	−0.28**	1
M	19.70	64.12	75.39	1.11	1.43	0.51	1.03	17.75	7.94	7.88	43.95	28.37	12.91	6.31
SD	1.14	0.48	0.43	1.54	1.83	0.89	1.43	4.83	2.54	2.10	10.43	6.34	3.14	2.13

Note: $N = 4534$. Variables 1, 2 and 3 are control variables; sex is a dummy variable, with male = 1 and female = 0, and the mean represents the proportion of males, location of home is a dummy variable, with from rural area = 1 and from urban area = 0, and the mean represents the proportion of students from rural area.

* $p < 0.05$.

** $p < 0.01$.

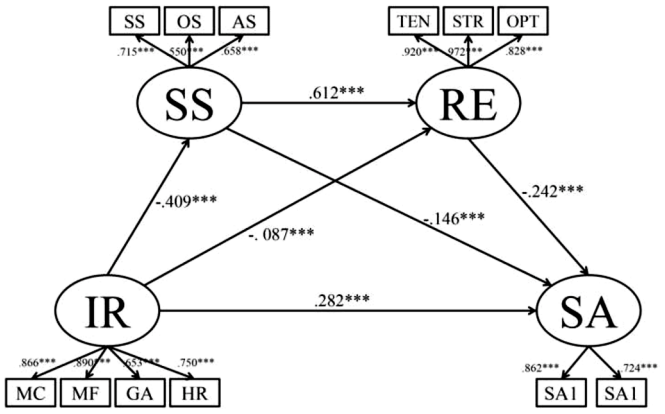

Fig. 2. Final mediating effect model with variables of interest.
Note. IR interpersonal relationships, MC making conversations, MF making friends, GA the ways to get along with others, HR heterosexual relationships; SS (bigger) social support, SS(smaller) subjective support, OS objective support, AS availability of support; RE resilience, TEN tenacity, STR strength, OPT optimism; SA school adaptation, SA1-SA2 two parcels of school adaptation difficulties dimension. The mediation model was adjusted for demographic covariates.
$^{***}P < 0.0001$.

Table 2
Standardized indirect effect for the model.

Model pathways	Estimated	95%-confidence interval	
		LO	UP
Direct			
IR-SA	0.282	0.250	0.313
Indirect			
IR-SS-SA	0.060	0.041	0.080
IR- RE-SA	0.021	0.013	0.030
IR- SS -RE-SA	0.061	0.050	0.072
Total Indirect			
IR-SA	0.141	0.126	0.157
Total			
IR-SA	0.423	0.397	0.450

Note: IR = Interpersonal Relationships, SS = Social Support, RE = Resilience, SA = School Adaptation.

showed that the quality of students' interpersonal relationships positively predicted their school adaptation levels during COVID-19 control period, and that their reported levels of social support and resilience independently mediated the influence of interpersonal relationships on their school adaptation. More importantly, social support and resilience were found to function as serial mediators in the relation between quality of interpersonal relationships and school adaptation. These findings thus have some important implications for the mental health education in schools in the post-epidemic period that will be considered near the end of this concluding section.

First, however, study findings supported our initial hypothesis that the quality of students' interpersonal relationships would positively predict their school adaptation levels during the challenging time of the COVID-19 control period. Developing and maintaining meaningful, intimate and committed relationships with others is one of the important developmental tasks of college students (Kandell, 1998), and one that can directly reflect their level of social functioning under difficult life circumstances. Consistent with previous findings, our results confirmed a significant association between students' quality of interpersonal relationships and their school adaptation (Zeng et al., 2010; Zhang et al., 2014). Although students were allowed to return to school at the beginning of the epidemic control period, they were not subsequently allowed to freely enter and leave campus, and their social activities were thus notably constrained. Nonetheless, those students who reported higher quality interpersonal relationships also acknowledged more favorable school adaption despite these constraints.

Next, with respect to our second hypothesis, we found that students' reported levels of social support partially mediated the association between the quality of their interpersonal relationships and their school adaptation. Numerous studies have shown the quality of students' interpersonal relationships can effectively predict their levels of school adaptation (Zeng et al., 2010; Zhang et al., 2014). In addition, such associations have been closely related to students' experience of social support (Gumpel and Ish-Shalom, 2003; Malecki and Demaray, 2003; Sun et al., 2014), and students' reported levels of social support could also significantly predict their level of school adaptation (Du and Cai, 2014; Peng et al., 2011). Consistent with these previous studies, the current study found that students' reports of their interpersonal relationships, social support, and school adaptation were notably intercorrelated and that social support mediated the association between interpersonal relationship quality and school adaptation within our sample. The mechanism behind this association is not hard to explain. Engaging in leisure activities could be a valuable means to develop social interactions, companionships, and friendships (Coleman and Iso--Ahola, 1993; Iwasaki, 2007), with higher quality of interpersonal relationships in turn promoting more leisure activities. In the context of epidemic control, leisure activities are particularly important for mental health (Ettekal and Agans, 2020; Hammami et al., 2020). Similarly, studies have found that social support from friends can predict school adaptation, and acted as a mediator between engagement in leisure activities and school adaptation (Lee et al., 2018). The current study found that social support mediated the influence of interpersonal relationships on school adaptation among the participants in our study, which suggests that, during the period of COVID-19 control, those college students reporting higher quality of interpersonal relationships experience more social support (from close friends and family) also participate in more leisure activities in school, which, in turn, may have promoted their school adaptation.

Resilience was also found to mediate the association between interpersonal relationships and school adaptation among university students in the present study, thus supporting our third hypothesis. Consistent with the findings of previous studies (Lee et al., 2020; Masten, 2013), we found that interpersonal relationships, resilience, and school adaptation are three closely related variables. Rutter (1985) suggested that psychological resilience protects people against adversities mainly through four processes: (a) reducing risk impact; (b) reducing negative chain reactions; (c) establishing self-esteem and self-efficacy; and (d) creating opportunities for adaptive responses. Our results provide empirical evidence for the protective effects of resilience on facing adversity (e.g., low quality of interpersonal relationships) and on reducing the impact of that adversity (e.g., school adaptation problems). In line with this perspective, during the period of COVID-19 control, the college student participants in the present study who reported higher quality interpersonal relationships also tended to show more resilience and to endorse more positive and resilient attitudes towards life, which collectively may have enhanced their adaptation to school life.

Lastly, we found support for our fourth and final hypothesis that interpersonal relationships would exert an influence on school adaptation among university students through the serial mediation impacts of social support and resilience during COVID-19 control period. Theoretically, the organism-environment interaction model suggests that the dynamic interactions between internal factors and external environmental factors facilitate individual's adaptation (Lerner et al., 2006). Consistent with this model, our findings affirming the presence of serial mediation underscore the important role of both external (i.e., social support) and internal (i.e., resilience) factors in facilitating student adaptation to the unique demands of the epidemic situation. Furthermore, according to the resilience activation framework, social support likely contributes to the activation of resilience (Abramson et al., 2015),

suggesting that social support from family and others influences the development of resilience (Pinkerton and Dolan, 2007). In sum, our study findings are both aligned with those of previous investigations, and more specifically indicate that interpersonal relationships influence college students' school adaptation through the chain effect of social support and resilience in the context of epidemic control. An important practical implication of our findings is that programmatic efforts by university administrators and teachers to create an institutional atmosphere which supports interpersonal interactions and encourages students to build higher quality of interpersonal relationships are likely to have positive implications for students' mental health during the post-epidemic period.

5. Limitations

Although the current study's research process and statistical analysis were relatively rigorous, and its findings may have some implications for students' mental health in the post-epidemic period, some study limitations also require special attention. First, as this study focused on college students' school adaptation, its findings may not be applicable to the adaptive problems of other student populations. Second, online self-assessments and non-random sampling may have affected the representativeness and reliability of the results.

6. Conclusion

The present study found that, during COVID-19 control period, college student participants reporting a higher quality of interpersonal relationships had better school adaptation than their counterparts. Furthermore, social support and resilience acted as partial mediators of the relationship between interpersonal relationships and school adaptation independently. More interestingly, interpersonal relationships can also exert an influence on school adaptation among university students through the serial mediational influences of social support and resilience. The results suggest that, providing training that strengthens students' interpersonal interaction skills can advance the support and opportunities they need to build resilience, and thus serve as an effective way of reducing their school adaptation problems in the post-epidemic period. The results of this study are thus instructive for mental health education during this difficult era.

Author contributions

Xing Zhang,Biqin Li and Wenjian Xu conceived and designed the study; Wen Li and Bin Zhou collected data; Xing Zhang and Pengfei Huang analyzed the data; Xing Zhang wrote the manuscript.

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Declaration of Competing Interest

No authors of this paper have any conflicts of interest.

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