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Social support, resilience, and self-esteem protect against common mental health problems in early adolescence

A nonrecursive analysis from a two-year longitudinal study

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Abstract

The aim of this study is to examine the mutual effects of self-esteem and common mental health problems (CMHPs) as well as the mutual effects of self-esteem and resilience in early adolescence. The recruited participants were 1015 adolescents aged 12.7 years (SD = 0.5 years) from two junior high schools. Data were repeatedly collected at five time points at 6-month intervals over 2-year years. The Social Support Rating Scale (SSRS), Block and Kremen's Ego-Resiliency Scale (ER89), Rosenberg Self-esteem Scale (RSES), and Mental Health Inventory of Middle School Students (MMHI-60) were used to measure social support, resilience, self-esteem, and CMHPs, respectively. Nonrecursive structural equation modeling (SEM) was performed to analyze the data.

There were bivariate partial correlations among the five-time measurements for the SSRS, ER89, RSES, and MMHI-60 scores. Self-esteem negatively predicted CMHPs with a standardized direct effect of −0.276 (95% CI: −0.425 to −0.097), and the opposite effect was −0.227 (95% CI: −0.383 to −0.072). Self-esteem positively predicted resilience with the standardized direct effect of 0.279 (95% CI: 0.093–0.425), and the opposite effect was 0.221 (95% CI: 0.063–0.376). Social support was a protective factor for mental health status.

The findings of mutual effects of self-esteem and CMHPs as well as self-esteem and resilience can provide researchers and practitioners with a conceptual framework that can help them build effective intervention methods to promote adolescent mental health status.

Abbreviations: AGFI = adjusted goodness of fit index, CFI = comparative fit index, CI = confidence interval, CMHPs = common mental health problems, ER = ego-resiliency scale, GFI = goodness-of-fit index, MMHI = mental health inventory of middle school students, NFI = normed fit index, RMSEA = root mean square error of approximation, RSES = Rosenberg self-esteem scale, SEM = structural equation model, SSRS = social support rating scale.

Keywords: common mental health problems, nonrecursive Structural equation modeling, resilience, self-esteem, social support

1. Introduction

Adolescence is an important stage in life. With unbalanced physiological and psychological development, adolescents often face many common mental health problems (CMHPs), including depression and anxiety. Adolescent CMHPs are public health issues that have received much attention. Self-esteem is fundamentally associated with CMHPs.[1,2] Self-esteem is the evaluative and affective dimension of the self-concept, and it reflects the sum of an individual's beliefs and knowledge about personal attributes and qualities.[3] According to the sociometer theory of self-esteem, self-esteem reflects the emotional state of an individual's degree of integration into interpersonal relationships. In other words, self-esteem is a subjective measure of the relationship between an individual and society and other important people. Previous studies have found that high self-esteem is a protective factor for physical and mental health. High self-esteem can lead to better mental health, while poor self-esteem is associated with a broad range of mental disorders.[3] In

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contrast, self-esteem is regarded as the core and the consequence of mental health. Self-esteem can be strengthened or eroded. Adolescents with high self-esteem can view themselves from a positive perspective and are more likely to be confident and optimistic. Some studies have reported that CMHPs such as depression and anxiety lead to reduced self-esteem.[5–7] These existing findings indicate that there might be a mutual relationship between CMHPs and self-esteem in the adolescent population.

Resilience can maintain well-being in the face of adversity. Because of a current lack of consensus on the operational definition, resilience has been accepted as a personality trait that can help individuals adapt to negative stressors and maintain psychological function.[8,9] Internal protective factors of resilience, such as self-esteem, have been widely studied in adolescent populations.[10,11] Moreover, some findings have shown that resilience can play a crucial role in promoting self-esteem. Resilience positively affects life satisfaction and psychological distress through the mediation effects of self-esteem.[12,13] High self-esteem has been regarded as a protective factor for resilience, at the same time, resilience is seen as a promoting factor for self-esteem.[14] It indicates that there might be a mutual relationship between resilience and self-esteem.

Social support as a protective factor for adolescent mental health is highly valued. Social support includes visible physical support, such as material assistance and social networks, as well as physical emotional support, such as the experience of being understood, accepted and respected. Social support has a generally beneficial effect on relieving individual psychological pressure, inhibiting negative emotions, providing positive emotional experience and promoting mental health.[15,16] As an important coping resource, social support can improve adolescents' self-evaluation, help them form a good self-image, and promote their self-esteem.[17,18] Social support can not only directly protect mental health but can also indirectly affect mental health by improving self-esteem.[19,20] Social support can also be considered one of the most important external resources to buffer the negative effects of stressors, and some studies have indicated the positive effect of social support on resilience.[21–23]

Most previous studies have assessed responses at a single survey. However, social support and CMHPs often change with the age of adolescents, and resilience and self-esteem also vary during adolescence. These relationships among social support, self-esteem, resilience and CMHPs may not be stable or maybe incomplete when based on only one measurement value. Moreover, in the same population, the mutual effects between self-esteem and CMHPs as well as between self-esteem and resilience are unclear. In the present study, we used five waves of repeated data that were obtained every 6 months over a 2-year longitudinal study among junior high school students to test the following hypotheses: First, correlations will occur between all five measurements of social support, self-esteem, resilience, and CMHPs. Second, there will be mutually influencing effects of self-esteem and CMHPs as well as self-esteem and resilience.

2. Materials and methods

2.1. Participants and procedures

The adolescents were recruited in this study from two junior high schools by using stratified cluster sampling. One school (school A) was the most seriously damaged and rebuilt after the 2008

Wenchuan earthquake, while the other was the school (school B) with the slightest damaged from that earthquake. The first baseline survey included 1256 participants whose age was 12.7 years (SD = 0.5 year; range = 10.9–15.4 years), and who were in the first semester of grade 7 in the junior high schools in October 2010. Then, the follow-up survey was performed among the same participants every half a year until October 2012, when the participants were in the first semester of grade 9. In total, five-time assessments were collected. In the present study, the 1015 individuals who participated in all five surveys were included. All participants gave both oral and written consent before the survey. The whole study process was supervised by the Quality Control Group and Medical Ethical Committee from Sichuan University. The detailed study design has been reported elsewhere.[24]

2.2. Measures

Data were collected from the students using self-reported questionnaires that included demographics, CMHPs, social support, self-esteem, resilience, and other factors.

2.2.1. Mental Health Inventory of Middle School Students (MMHI). CMHPs were measured using the 60-item Mental Health Inventory of Middle School Students (MMHI-60).[25] This scale consisted of 60 items, and each item was scored from 1 to 5. It included 10 subscales (each scale included 6 items) including depression, anxiety, study stress, maladjustment, hostility, psychological unbalance, interpersonal sensitivity and tension, emotional instability, obsessive–compulsive and paranoia. A higher score indicated poorer mental health. The total score for the 60 items was divided by 60 and classified into one of four groups: <2 no mental health problem; 2 to 2.99, mild; 3 to 3.99, moderate; and ≥4, severe. In this study, Cronbach's alpha coefficient across the five surveys was 0.96 to 0.97.

2.2.2. Rosenberg Self-esteem Scale (RSES). The Rosenberg Self-esteem Scale (RSES) was used to evaluate adolescents' self-esteem. The Chinese version of this scale has been widely used in the Chinese population, including adolescents.[26,27] The greater the score was, the higher the self-esteem. Cronbach's alpha coefficient for the RSES across the five surveys in this study was 0.81 to 0.85.

2.2.3. Social support rating scale. The Social Support Rating Scale (SSRS) developed by Shuiyuan Xiao was a 10-item questionnaire for measuring social support, including objective social support (3 items), subjective social support (4 items), and utilization of social support (3 items). A higher score indicated more social support. The SSRS has been widely used and shows acceptable reliability and validity in the Chinese adolescent population.[28–30] Cronbach's alpha coefficient for the SSRS across five surveys in this study was 0.75 to 0.78.

2.2.4. Ego-Resiliency Scale (ER89). Psychological resilience was measured using Block and Kremen's Ego-Resiliency Scale created in 1989 (ER89). This scale consisted of 14 items and measured the extent to which an individual was able to successfully adapt to their surroundings despite significant challenges or threats. All participants were asked to score each item on a 4-point scale ranging from 1 (does not apply) to 4 (applies very strongly). A higher score indicated greater ego resilience. This scale has been reported to be suitable for the Chinese adolescent population.[31,32] In our study, Cronbach's

alpha coefficient for the ER89 across five surveys was 0.85 to 0.87.

2.3. Statistical analysis

In the total sample, percentages, means and standard deviations (SD) were calculated for the descriptive data analysis. The partial correlations adjusted for covariates were analyzed among the five-time measurements of self-esteem, resilience, social support and CMHPs. The data were obtained from the same adolescent participants using the same questionnaire, although the order of some items in the questionnaire was changed in different surveys. Because artificial covariation, which is a kind of systematic error, could have occurred, confirmatory factor analysis was used for common method bias analysis.[33]

Moreover, we conducted a nonrecursive structural equation model (SEM), as shown in Figures 1 and 2. All the parameters in the nonrecursive SEM were freely estimated. The five-time measurements of the MMHI-60 built latent variable CMHPs. The other three latent variables, self-esteem, social support, and resilience, were created using the five-time measurements of RSES, SSRS, and ER89, respectively. SEM explicitly examined the direct effects and mediating effects among social support, self-esteem, resilience, and CMHPs and improved the quality of regression relationships based on controlling measurement errors. Nonrecursive SEM verified the mutual effects of these latent variables. We used six fitting indices to assess the nonrecursive SEM model: root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI), adjusted goodness of fit index (AGFI), and χ^2/df (chi-square statistic divided by degrees of freedom). If GFI, CFI, NFI, and AGFI were 0.90 or above, χ^2/df was <5, and RMSEA was <0.08, we considered the model appropriate. The 2000 iterations of the model by the bootstrap method were used to estimate the 95% confidence intervals (CIs) of the direct effects and indirect effects in all the models. We further compared the Nonrecursive effects in different genders and schools by using multigroup SEM. These analyses were conducted using SPSS21.0 (IBM; Armonk, New York, NY) and AMOS 21.0 (IBM; Armonk, New York, NY). The significance level was $P \leq .05$ based on two-sided tests.

3. Results

3.1. Study subjects

Of the 1015 participants included in this study with a mean age of 12.7 years (SD=0.5 years), 49.3% were boys. The rates of moderate-to-severe CMHPs were 8.4%, 12.0%, 18.6%, 18.8%, and 15.5% in the first through the fifth survey respectively. The male ratio of missing data of five-time was 45.3%, 48.6%, 51.1%, 49.2%, and 52.5%, respectively. There was no statistical significance compared with the data used in the present study. It indicated that missing data were random missing.

3.2. Comparison of MMHI-60, RSES, SSRS, and ER89 in different genders and schools

The participants in school A had higher resilience, social support, self-esteem, and lower CMHPs compared with school B. We just found boys had higher resilience compared with girls. There was no statistical significance of CMHPs, social support and self-esteem in different genders (Table 1).

3.3. Partial correlation coefficients of the five measurements and common method biases analysis

The five measurements (mean ± standard deviation) of self-esteem, social support, resilience, and CMHPs did not follow a linear or quadratic linear curve, while they presented an irregular fluctuation state. All the partial correlation coefficients adjusted for age, gender, and having a relative hurt or die in the earthquake had statistical significance. The partial correlation coefficients between CMHPs and resilience were the lowest among them (Table 2).

The results of confirmatory factor analysis showed that when we built the single factor with the MMHI-60, SSRS, RSES, and ER89 scores, the indices of the model were χ^2/df =28.946, GFI=0.5903 NFI=0.548, IFI=0.556, CFI=0.555 and RMSEA =0.166. The model fitted very poorly. There were no common method biases among these variables, and the data could be further analyzed using nonrecursive SEM.

3.4. Nonrecursive analyzing

Figure 1 and Table 3 show the relationships of four latent variables built from the five-time repeated measurements of the MMHI-60, SSRS, RSES, and ER89. After adding statistically significant correlations of measurement errors, there were negative mutual effects of CMHPs and self-esteem. Self-esteem and social support negatively predicted CMHPs. Social support also negatively indirectly predicted MMHI-60 only through self-esteem (CMHPs←self-esteem←social support) and both self-esteem and resilience (CMHPs←self-esteem ← resilience ←social support). The proportion of the mediating effect in total effects from social support to CMHPs was 27.9% (−0.137/−0.490). Of the total mediating effect from social support to CMHPs, the proportion of the mediating effect through both self-esteem and resilience was 40.4% (−0.055/−0.137).

Figure 2 and Table 4 show that there were positive mutual effects of resilience and self-esteem. Self-esteem and social support positively predicted resilience. Social support also indirectly predicted resilience only through self-esteem (resilience←self-esteem←social support) and both self-esteem and CMHPs (resilience←self-esteem←CMHPs←social support). The proportion of the mediating effect of the total effects of social support to resilience was 30% (0.138/0.460). Of the total mediating effect from social support to resilience, the proportion of the mediating effect through only self-esteem was 43.7% (0.060/0.138).

We further analyze all the relationships above between different genders and schools, we did not find the different relationships though the values of effects were some different. (The results were not shown.) It showed that the models as Figure 1 and Figure 2 were suitable for different genders and schools, and gender and school were not moderating factors.

As shown in Figure 1 and Figure 2, we adjusted for the correlation of measurement errors between e6 and e7, e9 and e10, e11 and e12, and e14 and e15. We also found relationships between e1 and e16, e2 and e17, e3 and e18, e4 and e19, and e5 and e20 (lines not shown in the figures because of too many lines) based on the modification indices in nonrecursive SEM. The six fitting indices for the two models were good because RMSEA = 0.067, GFI=0.915, NFI=0.921, IFI=0.934, CFI=0.934, and χ^2/df = 5.548.

Table 1

The difference of the five measurements from the scales of common mental health problems, self-esteem, resilience, and social support between genders and schools.

Variables[*]	N	Measure1 (Oct. 2010)	Measure 2 (Apr. 2011)	Measure 3 (Oct.2011)	Measure 4 (Apr. 2012)	Measure 5 (Oct. 2012)	$F^{\dagger}/P$
MMHI-60							
School A	427	2.16±0.62	2.25±0.64	2.38±0.68	2.38±0.65	2.37±0.64	3.83/.051
School B	588	2.05±0.58	2.12±0.67	2.23±0.75	2.34±0.76	2.25±0.67	
t/P		2.89/.004	3.18/.001	3.25/.001	0.94/.346	2.87/.004	
Boys	500	2.12±0.63	2.17±0.68	2.30±0.74	2.35±0.72	2.31±0.64	0.06/.815
Girls	515	2.07±0.58	2.18±0.65	2.28±0.71	2.37±0.71	2.30±0.68	
t/P		1.52/.129	0.20/.839	0.30/.762	0.24/.808	0.16/.877	
RSES							
School A	427	30.53±4.28	30.57±4.45	30.04±4.39	30.10±4.71	30.61±4.52	12.74/<.001
School B	588	32.04±4.41	32.36±4.71	31.32±4.98	30.85±5.10	31.45±4.62	
t/P		5.47/<.001	6.12/<.001	4.25/<.001	2.41/.016	1.86/.063	
Boys	500	31.18±4.49	31.41±4.81	30.87±4.83	30.73±4.89	31.08±4.65	0.06/.804
Girls	515	31.62±4.34	31.81±4.56	30.69±4.74	30.34±5.00	30.76±4.52	
t/P		1.60/.109	1.37/.172	0.62/.533	1.25/.212	1.28/.261	
ER89							
School A	427	40.63±6.18	41.51±6.05	40.62±6.08	40.46±6.12	40.82±5.78	34.67/<.001
School B	588	43.33±6.24	44.19±6.91	44.29±7.04	43.07±7.07	42.70±6.44	
t/P		6.838/<.001	6.432/<.001	8.689/<.001	6.148/<.001	4.808/<.001	
Boys	500	42.49±6.21	43.63±6.82	43.18±7.20	42.53±7.15	42.53±6.52	11.92/<.001
Girls	515	41.91±6.48	42.51±6.51	42.32±6.56	41.43±6.40	41.31±5.90	
t/P		1.44/.151	2.66/.008	1.97/.049	2.58/.010	3.13/.002	
SSRS							
School A	427	37.99±5.54	39.25±6.08	39.13±6.34	38.70±6.19	38.11±6.01	12.22/<.001
School B	588	37.35±5.84	38.41±5.93	38.54±6.43	37.50±6.31	36.66±5.99	
t/P		1.76/.078	2.19/.029	1.92/.055	3.01/.003	3.82/<.001	
Boys	500	37.16±5.79	38.74±6.03	38.59±6.41	38.13±6.28	37.34±6.15	0.15/.701
Girls	515	38.06±5.62	38.79±5.99	38.78±6.40	37.88±6.28	37.20±5.93	
t/P		2.54/.011	0.13/.898	0.48/.635	0.63/.529	0.31/.697	

[*] MMHI-60 refers to the 60-item Mental Health Inventory of Middle School Students; RSES refers to Rosenberg Self-esteem Scale; ER89 refers to Ego-Resiliency Scale, and SSRS refers to Social Support Rating Scale.
[†] Repeated Variance Analysis adjusted for age and having relative hurt or death in the 2008 Wenchuan earthquake at baseline survey.

Table 2

Bivariate partial correlations between the five-time measuring scores of scales from common mental health problems, self-esteem, social support and resilience[*].

Variables[†]	$\bar{x}\pm sd$	RSES1	RSES2	RSES3	RSES4	RSES5	SSRS1	SSRS2	SSRS3	SSRS4	SSRS5	MMHI1	MMHI2	MMHI3	MMHI4	MMHI5	ER1	ER2	ER3	ER4	ER5
RSES1	31.41±4.42	1	0.568	0.506	0.454	0.453	0.344	0.244	0.207	0.185	0.183	−0.346	−0.256	−0.236	−0.213	−0.197	0.467	0.312	0.277	0.239	0.239
RSES2	31.61±4.69		1	0.606	0.544	0.516	0.304	0.367	0.263	0.235	0.258	−0.366	−0.388	−0.315	−0.275	−0.219	0.347	0.468	0.324	0.328	0.285
RSES3	30.78±4.78			1	0.632	0.579	0.311	0.292	0.355	0.285	0.299	−0.320	−0.321	−0.410	−0.308	−0.266	0.275	0.334	0.438	0.322	0.297
RSES4	30.54±4.95				1	0.652	0.270	0.262	0.298	0.393	0.305	−0.330	−0.316	−0.402	−0.434	−0.337	0.291	0.337	0.329	0.453	0.358
RSES5	30.92±4.58					1	0.280	0.288	0.312	0.331	0.350	−0.300	−0.313	−0.378	−0.365	−0.379	0.282	0.321	0.302	0.344	0.429
SSRS1	37.62±5.72						1	0.615	0.526	0.525	0.500	−0.358	−0.2627	−0.219	−0.233	−0.170	0.358	0.260	0.234	0.236	0.214
SSRS2	38.76±6.01							1	0.633	0.580	0.614	−0.287	−0.348	−0.286	−0.233	−0.201	0.246	0.340	0.215	0.252	0.260
SSRS3	38.68±6.40								1	0.675	0.645	−0.261	−0.292	−0.369	−0.295	−0.242	0.203	0.220	0.315	0.284	0.287
SSRS4	38.00±6.28									1	0.696	−0.244	−0.283	−0.301	−0.357	−0.250	0.202	0.222	0.253	0.360	0.292
SSRS5	37.27±6.04										1	−0.231	−0.285	−0.293	−0.293	−0.282	0.210	0.216	0.223	0.302	0.339
MMHI1	2.09±0.60											1	0.589	0.497	0.493	0.462	−0.196	−0.132	−0.116	−0.153	−0.168
MMHI2	2.18±0.66												1	0.573	0.523	0.486	−0.168	−0.188	−0.173	−0.170	−0.180
MMHI3	2.29±0.72													1	0.613	0.567	−0.150	−0.151	−0.203	−0.201	−0.220
MMHI4	2.36±0.71														1	0.593	−0.155	−0.116	−0.127	−0.170	−0.179
MMHI5	2.30±0.66															1	−0.129	−0.095	−0.142	−0.180	−0.173
ER1	42.19±6.35																1	0.547	0.440	0.443	0.399
ER2	43.06±6.69																	1	0.541	0.529	0.461
ER3	42.74±6.89																		1	0.552	0.491
ER4	41.97±6.80																			1	0.537
ER5	41.91±6.24																				1

[*] The correlation analysis was adjusted for age, gender and having relative hurt or death in the 2008 Wenchuan earthquake.
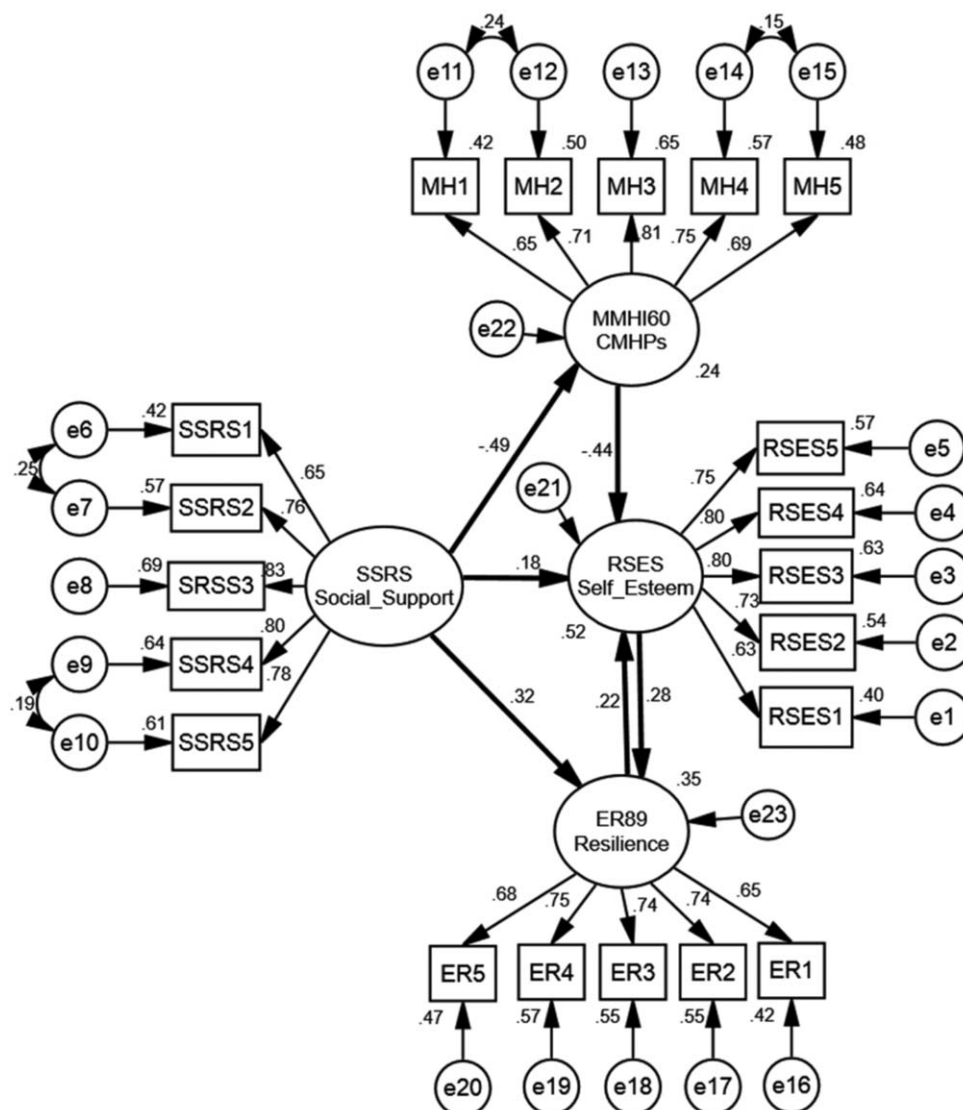[†] MMHI1–MMHI5 were the five-time measuring scores of 60-item Mental Health Inventory of Middle School Students. SSRS1–SSRS5 were the five-time measuring scores of Social Support Rating Scale; RSES1–RSES5 were the five-time measuring scores of the Rosenberg Self-esteem Scale, and ER1–ER5 were the five-time measuring scores of Ego-Resiliency Scale.
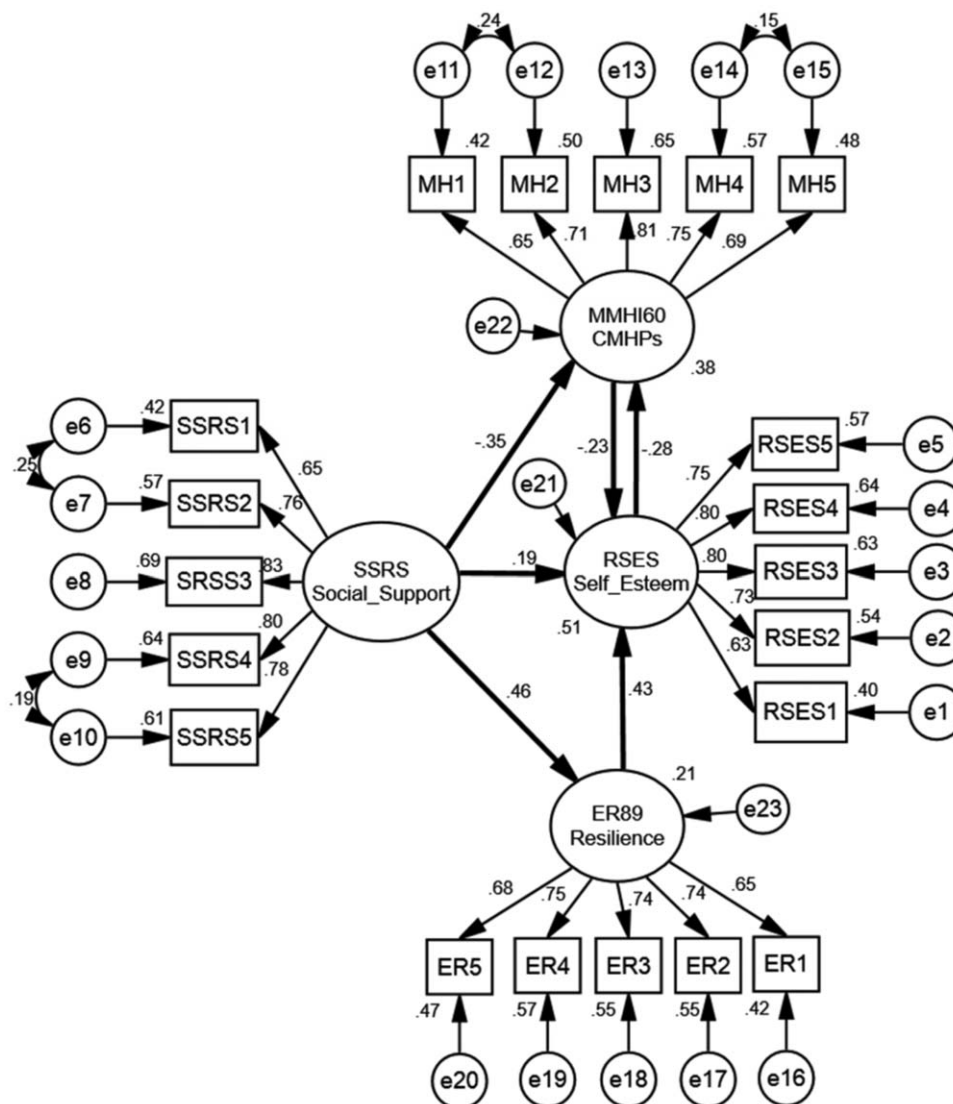
Figure 1. Mutual effects analysis between self-esteem and common mental health problems in early adolescence (n = 1015) in a nonrecursive structural equation model. MH1–MH5 refer to the five-time measurement scores of 60-item Mental Health Inventory of Middle School Students. SSRS1–SSRS5 refer to the five-time measurement scores of Social Support Rating Scale; RSES1–RSES5 refer to the five-time measurement scores of the Rosenberg Self-esteem Scale, and ER1–ER5 refer to the five-time measurement scores of Ego-Resiliency Scale.

Table 3

The mutual effects of self-esteem and common mental health problems and the direct and indirect relationships of resilience and social support.

Mutual and direct relationship[*]	Direct effect (standard error)	Standardized direct effect (95%CI)	Standardized total effect (95%CI)	P
CMHPs←self-esteem	−0.039 (0.012)	−0.276 (−0.425 to −0.097)		<.001
Self esteem←CMHPs	−1.600 (0.518)	−0.227 (−0.383 to −0.072)		.002
CMHPs←social support	−0.029 (0.005)	−0.353 (−0.467 to −0.257)	−0.490 (−0.547 to −0.425)	<.001
Self-esteem←social support	0.110 (0.027)	0.187 (0.091∼0.284)	0.496 (0.433∼0.558)	<.001
Self-esteem←resilience	0.279 (0.026)	0.430 (0.356∼0.491)		<.001
Resilence←social support	0.416 (0.035)	0.460 (0.392∼0.524)		<.001

Indirect relationship	Total mediating effect (95%CI)	Standardized total mediating effect (95%CI)	
CMHPs←self-esteem←social support	−0.011 (−0.018 to −0.004)	−0.137 (−0.216 to −0.050)	.005
CMHPs←self-esteem←resilience←social support			
Self-esteem←CMHPs←social support	0.181 (0.130–0.238)	0.309 (0.226–0.395)	.001
Self-esteem←resilience←social support			

[*] All arrows are independent variables at the sending end and dependent variables at the pointing end, and CMHPs refers to common mental health problems.

Figure 2. Mutual effects analysis between self-esteem and resilience in early adolescence (n = 1015) in a nonrecursive structural equation model. MH1–MH5 refer to the five-time measurement scores of 60-item Mental Health Inventory of Middle School Students. SSRS1–SSRS5 refer to the five-time measurement scores of Social Support Rating Scale; RSES1–RSES5 refer to the five-time measurement scores of the Rosenberg Self-esteem Scale, and ER1–ER5 refer to the five-time measurement scores of Ego-Resiliency Scale.

Table 4

The mutual effects of self-esteem and resilience and the direct and indirect relationships of common mental health problems and social support.

Mutual and direct relationship[*]	Direct effect (standard error)	Standardized direct effect (95%CI)	Standardized total effect (95%CI)	P
Self-esteem←resilience	0.143 (0.040–0.251)	0.221 (0.063–0.376)		.004
Resilience←self-esteem	0.291 (0.145–0.681)	0.279 (0.093–0.425)		.006
Self-esteem←social support	0.104 (0.053–0.161)	0.178 (0.092–0.273)	0.496 (0.433–0.558)	<.001
Resilience←social support	0.291 (0.197–0.403)	0.322 (0.217–0.441)	0.460 (0.392–0.524)	<.001
Self-esteem←CMHPs	−3.117 (−3.748 to −2.572)	−0.442 (−0.504 to 0.370)		<.001
CMHPs←social support	−0.041 (−0.048 to 0.034)	−0.490 (−0.547 to 0.425)		<.001

Indirect relationship	Total mediating effect (95%CI)	Standardized total mediating effect (95%CI)	
Resilience←self-esteem←Social support	0.125 (0.045–0.204)	0.138 (0.049 to −0.219)	.006
Resilience←self-esteem←CMHPs←social support			
Self-esteem←CMHPs←social support	0.186 (0.141–0.242)	0.318 (0.246–0.394)	.001
Self-esteem←resilience←social support			

[*] All arrows are independent variables at the sending end and dependent variables at the pointing end, and CMHPs refers to common mental health problems.

4. Discussion

Based on five repeated measurements over 2 years of longitudinal data, the results of nonrecursive SEM analysis in the same adolescent population showed that self-esteem and CMHPs had negative mutual effects on each other. Additionally, self-esteem and resilience had positive mutual effects on each other. The results of this study also identified that social support was a promoting factor for self-esteem and resilience, and it was a buffering factor against CMHPs. Self-esteem played a mediating role in the relationships between social support and CMHPs and a mediating role in the relationships between resilience and CMHPs.

The results of the present study demonstrated that self-esteem, resilience, social support and CMHPs all fluctuated in early adolescence. In grade 7, mental health status including self-esteem and resilience in adolescents was the best, while in grade 8, it became the worst. These results were consistent with previous studies in Chinese early adolescents.[34]

Self-esteem is thought to be an individual's feeling of their own positive attitude in social practice. It reflects whether an individual has good interpersonal relationships and thus has positive emotional experiences. It is the result of interactions between subjective and objective aspects and is fully reflected through self-acceptance and self-value. Good self-esteem is a protective factor for mental health and psychological functioning.[35] Individuals with an adequate level of self-esteem can see themselves from a positive perspective, which is manifested as more self-confidence, self-improvement, and an ability to change the situation and better cope with various problems and stressors.[35–37] Our results were consistent with previous prospective studies showing that lower self-esteem can lead to worse mental health status.[3,4] Our results were not in accordance with a few previous studies in which it was found that depression did not decrease self-esteem in adults based on longitudinal data.[38,39] However, a meta-analysis covering 77 studies on depression and 18 studies on anxiety evaluated vulnerability and scar models of low self-esteem and depression and low self-esteem and anxiety. After controlling for prior levels of the predicted variables and age, gender, or time lag between assessments, the findings showed that low self-esteem predicted depression and anxiety. The latter also caused low self-esteem. Self-esteem could be considered as an important indicator of mental health status, not just a protective factor for mental health status.[40] Our results supported these findings.

Resilience and self-esteem are attributes of positive psychology and are important indicators of positive mental health. Resilience enables individuals to cope with adverse situations and pressures, while self-esteem promotes self-acceptance, self-responsibility and self-maintenance. Our findings suggested that these two indicators promoted each other, which is of great significance for future psychological interventions and public health interventions in the adolescent population.[14,41] Self-esteem is relatively stable and it is difficult to improve it in practice. Resilience is affected by widely internal and external factors and it is relatively easy to improve. So practitioners can improve self-esteem by enhancing resilience. Self-esteem acts as a mediating factor, as has been proven in many previous studies, especially because it has a mediating effect on the relationships of social support promoting subjective well-being and buffering CMHPs.[42–45]

Our results were consistent with previous studies in which social support was verified as a positive factor to make individuals have higher self-esteem, and a sense of higher social value.[46] Among adolescents, the sources of vertical social support are parents, teachers and more senior others, and the sources of horizontal social support are friends and classmates. Low social support from friends, family and other resources in adolescents has been associated with depressive symptoms.[47] In contrast, when adolescents received active social support, including emotional support, instrumental support and informational support from their surroundings, they felt secure, confident and companionable in their lives. Objective social support and subjective social support could both protect against negative stressors and CMHPs, and thus, adolescents who perceived their social relations as supportive were very likely to experience good results that promote self-esteem, resilience and well-being.[8,48–50]

The noticeable strength of our study is the 2-year longitudinal design, in which we conducted repeated measurements of the RSES, SSRS, ER89, and MMHI-60 at five-time points. The associations of these variables were stable because the latent variables built using five measurements. Moreover, the mutual effects of self-esteem and CMHPs, as well as self-esteem and resilience, were verified by a nonrecursive SEM.

The limitations of our study should be mentioned.

1. The questionnaire in each survey was self-reported, which could have led to bias. Some confounding factors such as academic achievement and family economic status were not included in the nonrecursive SEM, the mutual effects of self-esteem and CMHPs as well as self-esteem and resilience might be unstable and needed more correction.
2. The participants recruited in this study were from the 2008 Wenchuan earthquake areas. Although the baseline survey was conducted 2 years after the earthquake and the last survey was conducted 4 years after the earthquake, mutual effects of self-esteem and CMHPs as well as self-esteem and resilience could have been affected by the earthquake

Therefore, further studies in other adolescent populations are required.

5. Conclusion

Self-esteem and CMHPs affect each other negatively, while self-esteem and resilience interact positively. Social support is a protective factor for all health indicators. The findings can provide practitioners with a good conceptual framework in which the mutual effects and the core factors that can be easily changed should be considered to promote adolescent mental health.

Author contributions

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References

[1] Henriksen IOS, Ran Yen I, Indredavik MSB, et al. The role of self-esteem in the development of psychiatric problems: a three-year prospective study in a clinical sample of adolescents[J]. Child Adolescent Psychiatr Mental Health 2017;11:1–9.

[2] Polce-Lynch M, Myers BJ, Kliewer W, et al. Adolescent self-esteem and gender: exploring relations to sexual harassment, body image, media influence, and emotional expression[J]. J Youth Adolescence 2001;30:225–44.

[3] Mann M. Self-esteem in a broad-spectrum approach for mental health promotion[J]. Health Educ Res 2004;19:357–72.

[4] Jia X, Liu X, Shi B. Perceived discrimination and subjective well-being in Chinese migrant adolescents: collective and personal self-esteem as mediators[J]. Front Psychol 2017;8:1213–23.

[5] Shervin A, Maryam ML. Depressive symptoms and self-esteem in white and black older adults in the United States[J]. Brain Sci 2018;8:105–17.

[6] Martinsen KD, Neumer S, Holen S, et al. Self-reported quality of life and self-esteem in sad and anxious school children[J]. BMC Psychol 2016;4:1–0.

[7] Ledrich J, Gana K. Relationship between attributional style, perceived control, self-esteem, and depressive mood in a nonclinical sample: a structural equation-modelling approach[J]. Psychol Psychother 2013;86:413–30.

[8] Olsson CA, Bond L, Burns JM, et al. Adolescent resilience: a concept analysis[J]. J Adolescence 2003;26:1–1.

[9] Ong AD, Bergeman CS, Bisconti TL, et al. Psychological resilience, positive emotions, and successful adaptation to stress in later life[J]. J Pers Soc Psychol 2006;91:730–49.

[10] Pargas RCM, Brennan PA, Hammen C, et al. Resilience to maternal depression in young adulthood[J]. Dev Psycho 2010;46:805–14.

[11] Dumont M, Provost MA. Resilience in adolescents: protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression[J]. J Youth Adolescence 1999;28:343–63.

[12] Liu Y, Wang Z, Zhou C, et al. Affect and self-esteem as mediators between trait resilience and psychological adjustment[J]. Pers Individual Dif 2014;66:92–7.

[13] Benetti C, Kambouropoulos N. Affect-regulated indirect effects of trait anxiety and trait resilience on self-esteem [J]. Pers Individual Diff 2006;41:341–52.

[14] Bin W, Wei L. The progress and comments of psychological resilience [J]. J Henan Univ (Soc Sci) 2007;47:127–30.

[15] Langford CPH, Bowsher J, Maloney JP, et al. Social support: a conceptual analysis [J]. J Adv Nurs 2008;25:95–100.

[16] He A, Hui Q, Liu H. Relationship between social support and loneliness in undergraduates: the mediating role of gratitude [J]. Chin J Clin Psychol 2015;23:150–3.

[17] Behnke AO, Plunkett SW, Sands T, et al. The Relationship between latino adolescents\Perceptions of Discrimination, Neighborhood Risk, and Parenting on Self-Esteem and Depressive Symptoms. J Cross-Cultural Psychol 2011;42:1179–97.

[18] Mcmahon SD, Felix ED, Nagarajan T. Social support and neighborhood stressors among African American Youth: networks and relations to self-worth. J Child Fam Stud 2011;20:255–62.

[19] Ibarra-Rovillard MS, Kuiper NA. Social support and social negativity findings in depression: perceived responsiveness to basic psychological needs. Clin Psychol Rev 2011;31:342–52.

[20] Reinherz HZ, Paradis AD, Giaconia RM, et al. Childhood and adolescent predictors of major depression in the transition to adulthood[J]. Am J Psychiatry 2003;160:2141–7.

[21] Fergus S, Zimmerman MA. ADOLESCENT RESILIENCE: a framework for understanding healthy development in the face of risk[J]. Annu Rev Public Health 2005;26:399–419.

[22] Wilks SE, Spivey CA. Resilience in undergraduate social work students: social support and adjustment to academic stress[J]. Soc Work Educ 2010;29:276–88.

[23] Zhang M, Jianmei Z, Feng Z, et al. Prevalence of psychological distress and the effects of resilience and perceived social support among Chinese college students: does gender make a difference?[J]. Psychiatry Res 2018;S2029914367.

[24] Qiaolan L, Min J, Yang Y, et al. Prevalence of Posttraumatic Stress Disorder (PTSD) and its correlates among junior high school students at 53 months after experiencing an earthquake[J]. Disaster Med Public Health Preparedness 2019;13:414–8.

[25] Jisheng W. The preparation and standardization for Mental Health Inventory of Middle School students (MMHI-60) in China[J]. Sci Soc Psychol 1997;4:15–20.

[26] Tian L. Shortcoming and merits of Chinese version of Rosenberg (1965) self-esteem scale[J]. Psychol Explore 2006;26:88–91.

[27] Zhao J, Kong F, Wang Y. The role of social support and self-esteem in the relationship between shyness and loneliness[J]. Pers Individual Diff 2013;54:577–81.

[28] Cao Y, Zhang Y, Chang D, et al. Correlations between self-reported symptoms and psychosocial factors of perpetrators with domestic violence in China: a population-based sample[J]. Chin Med J 2011;124:546–50.

[29] Xiao S. Social support rating scale: the theoretical basis and research applications[J]. J Clin Psychiatry 1994;4:98–100.

[30] Wu H, Shan W, Haibo W, et al. Living arrangements and health-related quality of life in Chinese adolescents who migrate from rural to urban schools: mediating effect of social support[J]. Int J Environ Res Public Health 2017;14:1249–52.

[31] Block J, Kremen AM. IQ and ego-resiliency: conceptual and empirical connections and separateness[J]. J Pers Soc Psychol 1996;70:349–61.

[32] Zeng XJ, Jiang H, Yong-Xin LI. Mental health, resilience and core self-evaluation in left-behind rural middle school students[J]. Chin Ment Health J 2014;28:947–9.

[33] Xiaoyan DWLX. Analysis on application of common methods bias test to psychological studies during recent five years in China[J]. J Jiangxi Normal Univ (Nat Sci) 2018;42:447–53.

[34] Wenxin Z. The self-esteem of Junior High School students[J]. Pschol Sci 1997;20:504–8.

[35] Baumeister RF, Campbell JD, Krueger JI, et al. Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles?[J]. Psychol Sci Public Interest 2003;4:1–44.

[36] Cong XB, Tian LM, Zhang XK. Self-esteem: the Core of Mental Health [J]. J Northeast Normal Univ 2005;213:144–8.

[37] Liu XC, Sang B, Dou DH. Pros and cons of self-enhancement: theory, empirical research, and application[J]. Adv Psychol Sci 2011;19:883–95.

[38] Boden JM, Fergusson DM, Horwood LJ. Does adolescent self-esteem predict later life outcomes? A test of the causal role of self-esteem[J]. Dev Psychopathol 2008;20:319–39.

[39] Orth U, Robins RW, Trzesniewski KH, et al. Low self-esteem is a risk factor for depressive symptoms from young adulthood to old age[J]. J Abnorm Psychol 2009;118:472–8.

[40] Sowislo JF, Orth U. Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies[J]. Psychol Bull 2013;139:213–40.

[41] Liu Y, Wang Z, Zhou C, et al. Affect and self-esteem as mediators between trait resilience and psychological adjustment[J]. Pers Individual Diff 2014;66:92–7.

[42] Prelow HM, Weaver SR, Swenson RR. Competence, self-esteem, and coping efficacy as mediators of ecological risk and depressive symptoms in urban African American and European American Youth[J]. J Youth Adolescence 2006;35:506–16.

[43] Symister P, Friend R. The influence of social support and problematic support on optimism and depression in chronic illness: a prospective study evaluating self-esteem as a mediator[J]. Health Psychol 2003;22:123–9.

[44] David M, Ceschi GJ, Van-Der-Linden M. Depressive symptoms after trauma: is self-esteem a mediating factor?[J]. J Nervous Ment Dis 2008;196:735–42.

[45] Tao L, Cheng S, University HN. The relationship between online social support and subjective well-being in college students: the mediating effect of self-esteem[J]. China J Health Psychol 2018;26:109–14.

[46] Marshall SL, Parker PD, Ciarrochi J, et al. Is self-esteem a cause or consequence of social support? A 4-year longitudinal study[J]. Child Dev 2014;85:1275–91.

[47] Klineberg E, Clark C, Bhui KS, et al. Social support, ethnicity and mental health in adolescents[J]. Soc Psychiatry Psychiatr Epidemiol 2006;41:755–60.

[48] Wight RG, Botticello AL, Aneshensel CS. Socioeconomic context, social support, and adolescent mental health: a multilevel investigation[J]. J Youth Adolescence 2006;35:109–20.

[49] Caserta TA, Pirttil Backman A, Punam Ki R. Stigma, marginalization and psychosocial well-being of orphans in Rwanda: exploring the mediation role of social support[J]. Aids Care 2016;28:1–9.

[50] Geckova A. Influence of social support on health among gender and socio-economic groups of adolescents[J]. Eur J Public Health 2003;13:44–50.