BMC Psychology

Open Access

The relationship between perceived social support and social anxiety in Chongqing rural secondary school students: the chain mediating effect of core self-evaluation and shyness

Weigang Pan[1†], Bangyan Li[1†], Yihong Long[2,3] and Congcong Cao[4*]

Abstract

Background Adolescents in less economically developed areas are susceptible to social anxiety, so finding ways to effectively prevent and intervene in social anxiety could be a major step forward for poverty alleviation. However, little is known about the inner workings of social anxiety in this group. Exploring the risk and protective factors of social anxiety among adolescents in less developed rural areas is crucial for maintaining their mental health and improving their social adaptability. The purpose of this study is to explore the relationships among perceived social support, core self-evaluation, shyness and social anxiety among rural secondary school students and analyze the risk and protective factors of social anxiety.

Methods A total of 626 rural secondary school students are investigated with the Perceived Social Support Scale (PSSS), Core Self-Evaluation Scale (CSES), Shyness Scale (SS) and Social Avoidance and Distress Scale (SADS). Structural equation modeling is used to analyze the mediating effects of core self-evaluation and shyness.

Results The results reveal that (1) the perceived social support and core self-evaluation of rural secondary school students are significantly negatively correlated with social anxiety, whereas their shyness is significantly positively correlated with social anxiety. There are significant gender differences in perceived social support, core self-evaluation, shyness and social anxiety. (2) There is a significant chain mediating effect of core self-evaluation and shyness between perceived social support and social anxiety, and the mediation model is cross-gender consistent.

Conclusions These results confirm that perceived social support and core self-evaluation are protective factors against social anxiety in rural secondary school students and that shyness is a risk factor for social anxiety. Moreover, perceived social support can indirectly affect social anxiety through core self-evaluation and shyness. Prevention

†Weigang Pan and Bangyan Li contributed equally to this work.

*Correspondence:
Congcong Cao
510700573@qq.com

Full list of author information is available at the end of the article

and intervention of social anxiety can be carried out in three ways: improving the perceived ability of social support, enhancing positive self-evaluation, and reducing shyness and avoidance behaviors.

Keywords Perceived social support, Core self-evaluation, Shyness, Social anxiety, Rural areas, Secondary school students

Introduction

Social anxiety is one of the most common forms of anxiety [1] and usually begins in childhood or adolescence at an average age between 14 and 16 years [2, 3]. Social anxiety refers to psychological phenomena such as tension, fear and embarrassment in the process of interacting with others and is characterized by a strong and persistent fear in social interaction activities or behavioral performance situations [4]. A study on the level of social anxiety among young people in seven countries revealed that more than one-third of respondents met the criteria for social anxiety disorder (SAD) [5]. Social anxiety has negative influences on individuals' academic development [6, 7], quality of life [8], and subjective well-being [9], and severe social anxiety can easily lead to alcohol abuse and suicide risk [10].

Susceptibility of adolescents in less economically developed areas to social anxiety

Factors such as the regional environment and economic level in which an individual lives can lead to social anxiety. The burden of extreme poverty can have a great impact on social functions, especially the development of individuals' social skills [11]. Living in rural areas [12] and having a low education level [13] are significantly associated with social anxiety. Liu et al. investigated 50,361 students' mental health in the rural areas of five provinces in China and reported that 7% of them were at risk for overall anxiety [14].

Young people are the backbone of the revitalization of the rural economy, and physical and mental health is an important guarantee of the revitalization of rural talent. How to effectively prevent and intervene in social anxiety is a major problem in rural poverty alleviation work. Research has shown that poverty alleviation conditional cash transfers and asset promotion programs can be beneficial to mental health, whereas mental health interventions can further improve the economic outcomes for the poor [15]. This suggests that the prevention and intervention of social anxiety in adolescents in economically underdeveloped areas is a new way to alleviate poverty. However, little is known about the inner workings of social anxiety in this group. Compared with those in other urban areas, the material resources and living standards in rural areas are relatively backward, and the psychological development of adolescents in these areas is faced with many disadvantageous factors. This brings great challenges to adolescents' interpersonal

communication, so it is particularly important to cultivate their interpersonal communication ability and enhance their social adaptability. China is a vast country, the development between East China and West China is unbalanced. Compared with the eastern rural areas, the western rural areas have been more more difficult to develop economically. This study explored the protective factors and risk factors for social anxiety among rural secondary school students in Chongqing, western China, with the aim of providing empirical evidence for cultivating their social ability and developing targeted mental health services.

Protective roles of perceived social support and core self-evaluation

The family economic stress model shows that families with low socioeconomic status are more likely to have negative emotions and attitudes toward their children because of their parents' high economic and psychological stress [16]. In most rural families, parents work year round and lack adequate parent−child communication. These factors lead to adolescents in rural areas perceiving limited material and emotional support from outside. Perceived social support is an important influencing factor for the intervention and treatment of social anxiety. It is defined as an individual's perception of general support, or specific support behaviors, of people in their social network, which enhances an individual's functioning and serves as a buffer for adverse outcomes [17]. Wen et al. confirmed that cognitive−behavioral intervention with social support had a better effect on individuals with low perceived social support [18].

Regarding the relationship between social support and social anxiety, the social causation model holds that social support leads to social anxiety, whereas the social selection model holds that social anxiety leads to social support [19]. Some cross-sectional studies have reported a significant negative association between perceived social support and social anxiety [20, 21]. A longitudinal study confirmed that perceived social support negatively predicts social anxiety [22]. The main effect model of social support suggests that social support itself has a beneficial effect on mental health; the buffer model suggests that social support has a beneficial buffering effect on stress in stressed individuals [23]. However, the theoretical model of social support is influenced by people's socioeconomic status. Under the condition of low socioeconomic status, the results support the main effect model [24].

Pan *et al. BMC Psychology*   (2024) 12:708

Page 3 of 10

Previous studies have shown that individuals with social anxiety generally have negative self-evaluation and feelings [25]. Improving self-evaluation is an important goal of cognitive behavioral therapy for social anxiety [26]. Core self-evaluation is the most basic evaluation of an individual's own ability and value and usually includes four core traits: self-esteem, generalized self-efficacy, locus of control and neuroticism [27]. When individuals have very low self-evaluations, they will be full of doubt and lack confidence in themselves, resulting in negative outcome expectations in social interactions [28]. The cognitive model of social anxiety suggests that negative self-cognition and self-evaluation are risk factors for the generation and development of social anxiety [29]. The self-presentation theory of social anxiety states that people usually want to make an ideal impression on others before or during social interaction but feel social anxiety when they doubt whether they will succeed in making an ideal impression [30]. Therefore, positive core self-evaluation may be a protective factor against social anxiety.

Perceived social support is closely related to self-evaluation. Individuals with low perceived social support tend to judge others' support as useless, enhance their recall of past useless support, and inhibit their recall of past useful support [31], indicating that individuals with low perceived social support have a negative cognitive model and a negative evaluation attitude toward the outside world. Some researchers have also investigated the relationship between individuals' perception of social support and their cognition of themselves and others and reported that the more positive their perception of social support is, the more positive their cognition of themselves and others [32]. These findings indicate that there is a positive relationship between perceived social support and individuals' self-evaluation.

Risky role of shyness

Low socioeconomic status is a disadvantageous factor. Studies have shown that the lower the socioeconomic status is, the greater the degree of shyness [33, 34]. Shyness occurs in social situations where an individual faces social attention or evaluation and usually displays inhibited and fearful behaviors in the presence of unfamiliar people [35]. Compared with non-shy people, shy people are more likely to experience social anxiety and embarrassment in social situations and experience stronger autonomic reactions in social or performance situations [36]. Various hypotheses have been proposed regarding the relationship between shyness and social anxiety [37, 38]. One hypothesis suggests that these two are essentially the same experience because they ostensibly fall under the same characteristics of social fear and avoidance behaviors [39]. Another hypothesis is that shyness and social anxiety overlap because they share many

characteristics but shyness is a broader, more heterogeneous structure [37]. A third hypothesis holds that shyness and social anxiety exist on a continuum [40], from "no fear or anxiety" at one end to "extreme fear or anxiety" at the other. A growing body of research suggests that shyness increases the risk of social anxiety disorders [41] and that a shyness personality reduces an individual's motivation to establish and maintain social relationships [42]. Shy people display inhibited and fearful behavior around unfamiliar people [35].

Culture can affect the production and expression of shyness. China is a collectivist country and has an introverted and implicit cultural background, which is comparable to that of an individualistic country. Cross-cultural studies have shown that collectivist countries more readily accept socially reticent and unsociable behaviors than do individualistic countries but that collectivist countries have higher levels of social anxiety and are more afraid of blushing [43, 44]. A study on shy attitudes revealed that Chinese students automatically associate shyness with negative words and believe that shyness is not good; however, their own level of shyness is very high [45].

The shy people have a unique cognitive pattern. They are not confident in their own abilities and are very worried about making a bad impression in front of others by acting unsatisfactorily. Shy people present more negative self-evaluations of their everyday communication, vocal symptoms, and public speaking ability than non-shy people do [46]. A study of shyness in Turkish college students revealed that fear of negative evaluation, their self-esteem, and the potential for interpersonal rejection are predictors of shyness, the self-esteem factor was particularly important [47]. Self-esteem is a characteristic of core self-evaluations, and individuals' self-evaluations can affect their shyness levels [47]. Once they have a negative evaluation of themselves, they will be ashamed to express themselves, and they will exhibit more shy and inhibited behaviors in interpersonal communication. Shyness is essentially the proximity avoidance of conflict in social situations [48] and manifests as excessive attention given to oneself in real or imagined social situations [49]. While interacting with others, shy individuals distribute cognitive resources to monitor self-performance and regulate nervous emotions. This makes them feel very exhausted and pained during the social process, which can easily cause social anxiety. These studies suggest that shyness may be a risk factor for social anxiety in rural adolescents and that negative self-evaluation may increase this risk. Perceived social support affects people's self-evaluation; the more positive the perception of social support is, the more positive the self-perception of others.

Current study

Through the above literature analysis, we can see that perceived social support affects people's self-evaluations and that the more positive the perceived social support is, the more positive the self-perception of others is [32]. Self-evaluations affect individuals' shyness and inhibitory behaviors, and shyness further exacerbates individuals' levels of social anxiety. On the basis of these findings, this study proposes the following hypotheses: (1) Among rural secondary school students in western China, perceived social support and core self-evaluation are negatively correlated with social anxiety and are protective factors against social anxiety, whereas shyness is positively correlated with social anxiety and is a risk factor for social anxiety. (2) Secondary school students' core self-evaluation and shyness have a chain mediating effect on the relationship between perceived social support and social anxiety (see Fig. 1).

Method

Participants

Convenience sampling was used to investigate 626 secondary school students from 3 rural secondary schools in Chongqing, western China. The internal validity of this sampling method was good, but its generalizability was relatively poor [50]. In scientific development, convenience sampling is the norm. Bornstein et al. analyzed the sampling methods of five scientific development journals from 2007 to 2011 and reported that 92.5% used convenience sampling and that only 5.5% used probability sampling [51]. This research takes rural middle school students in Chongqing as the research object. The overall GDP of this area is below the middle level in Chongqing, and it is a relatively backward area for economic development. All the students were registered in rural areas and were included in the homogeneous convenience sampling, which has higher external validity than heterogeneous convenience sampling [52]. Nine questionnaires were incomplete and were not included in
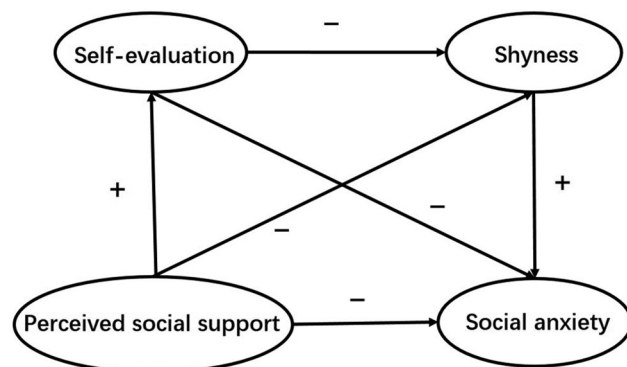

Fig. 1 The hypothetical model among variables. Note: +: Positive correlation; −: Negative correlation

the formal analysis. Ultimately, 617 valid questionnaires were obtained. The demographic variables collected in the questionnaires included age, sex, grade, single-child status, and type of family (original family, reconstituted family, single-parent family or orphan). The age range of the students was from 11 to 18 years ($M = 14.7$, $SD = 1.34$). Among them, 348 male students and 268 female students were included, and one student did not report any information. There were 333 middle school students and 248 high school students, but 3 students did not report. Ninety-two participants were from one-child families, 524 were from non-one-child families, and one did not report. There were 478 students from their original families, 56 students from reconstituted families, 66 students from single-parent families, and 4 orphans, but 13 students did not report.

Measures

Perceived Social Support Scale (PSSS)

This study used the Perceived Social Support Scale (PSSS) developed by Zimet et al. [53] to measure the perceived social support of secondary school students. The Chinese version [54] contains 12 items. Perceived social support emphasizes individuals' own perceptions and feelings of social support, including their perceptions and feelings about three aspects: family, friends, and other support. This scale was scored on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). Higher scores indicate higher levels of perceived social support. This scale has been shown to be suitable for measuring the perceived social support of Chinese adolescents [55]. The Cronbach's α coefficient of the total scale in this study was 0.904, and the Cronbach's α coefficients of family support, friends support and others support were 0.876, 0.862 and 0.798, respectively.

Core self-evaluation scale (CSES)

This study adopted the core self-evaluation scale (CSES) developed by Judge et al. [27] to measure the core self-evaluation of secondary school students. The Chinese version has 8 items and can be used to effectively measure adolescents' core self-evaluation [56]. The items were scored on a 5-point Likert scale ranging from complete disagreement (1) to complete agreement (5). Higher scores indicate that individuals' core self-evaluations are more positive. The CSES has been shown to be suitable for measuring the core self-evaluation of Chinese adolescents [57]. The Cronbach's α coefficient of this scale in the present study was 0.801.

Shyness scale (SS)

This study used the shyness scale developed by Cheek and Buss [58] to measure shyness in secondary school students. This scale is a unidimensional scale with 13

questions on a 5-point scale. Higher scores indicate higher levels of shyness. It has been proven to be suitable for measuring the shyness level of Chinese adolescents [59]. The Cronbach's α coefficient of this study was 0.838.

Social Avoidance and Distress Scale (SADS)

This study used the Social Avoidance and Distress Scale [60] to measure the social anxiety level of secondary school students. It consists of 28 items, including two dimensions: social avoidance and social distress. The items were scored on a 2-point scale (1=yes, 0=no), with scores ranging from 0 to 28. Higher scores indicate higher levels of social anxiety in individuals. It has been shown to be useful in measuring social anxiety among Chinese adolescents [61]. The Cronbach's α coefficient of the total scale in this study was 0.895, and the Cronbach's α coefficients of social avoidance and social distress were 0.791 and 0.838, respectively.

Data processing and analysis

SPSS 18.0 and Amos 26.0 were used for the data analysis. First, the data were standardized (e.g [61]). Pearson correlation analysis was performed to explore the relationships among perceived social support, core self-evaluation, shyness and social anxiety. The latent variable mediating effect analysis of the structural equation model (SEM) was used to investigate the mediating role of core self-evaluation and shyness in the relationship between perceived social support and social anxiety.

Results

Common method bias

Since the data were all from self-reports of the participants, there may be a common method bias. In accordance with Harman's single-factor test [62], all the questions in the scale were tested for common method bias. The variance explained by the first factor was 20.732%, which was less than the critical criterion of 40%, indicating that there was no significant common method bias in this study [63].

Descriptive statistics and the Pearson correlation analysis

The results of the descriptive statistics and Pearson correlation analysis are shown in Table 1. Perceived social support was significantly positively correlated with core self-evaluation ($r=0.389$, $p<0.001$) and significantly

negatively correlated with shyness ($r = -0.118$, $p=0.032$) and social anxiety ($r = -0.318$, $p<0.001$). Core self-evaluation was significantly negatively correlated with shyness ($r = -0.311$, $p<0.001$) and social anxiety ($r = -0.338$, $p<0.001$). Shyness was significantly positively correlated with social anxiety ($r=0.721$, $p<0.001$). In addition, significant gender differences were found in terms of perceived social support, core self-evaluation, shyness and social anxiety. Boys scored higher than girls did in terms of perceived social support (t=3.239, $p=0.001$) and core self-evaluation (t=4.472, $p<0.001$) and lower in terms of shyness (t = -3.696, $p<0.001$) and social anxiety (t = -4.712, $p<0.001$).

The chain mediating model test

Because the core self-evaluation scale and the shyness scale are both single-dimensional scales, this study adopted the packaging method to address them [64, 65]. That is, two or more items of the same scale were randomly packaged into a new index, and the composite score (mean) was used as the score of the new index for analysis. The perceived social support scale and the social anxiety scale have many subdimensions. If the SEM is built on the basis of items, the model will be too complex. The packaging technique is a method often used to simplify SEM, but the precondition is that the scale is one-dimensional and that the subjects are homogeneous [66]. For the multidimensional scale, the subdimension of the scale is regarded as the observation variable (calculated by dividing the total score of all the items of the subscale by the number of items), and the total score of the scale is regarded as the latent variable to simplify the model (e.g., [67]).

SEM analysis was conducted via Amos 26.0 to examine the mediating effects of core self-evaluation and shyness on the relationship between perceived social support and social anxiety. Sex and age were controlled as covariates. The results showed that the model had a good fit: $\chi^2=142.770$, df=48, χ^2/df=2.974, RMSEA (root mean square error of approximation)=0.058, CFI (comparative fit index)=0.973, GFI (goodness-of-fit index)=0.959, AGFI (adjusted goodness-of-fit index)=0.934. The standardization coefficients are shown in Fig. 2. Specifically, perceived social support was positively correlated with core self-evaluation ($\beta=0.46$, $p<0.001$) and negatively correlated with social anxiety ($\beta = -0.17$, $p<0.001$);

Table 1 Descriptive statistics and Pearson correlation analysis results

	M	SD	1	2	3	4
1. Perceived social support	4.94	1.296	-			
2. Core self-evaluation	2.92	0.809	0.389***	-		
3. Shyness	3.19	0.761	-0.118*	-0.311***	-	
4. Social anxiety	0.55	0.257	-0.318***	-0.338***	0.721***	-

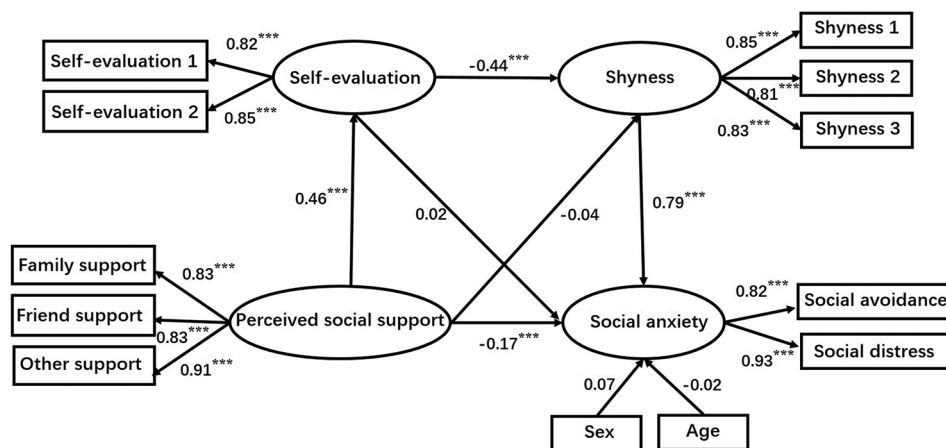Note: * $p<0.05$, *** $p<0.001$

Fig. 2 Chain mediation effect model

Table 2 Bootstrap analysis results of the chain mediating effects test

Paths	Effect value	Boot SD	Boot CI LL	Boot CI UL
perceived social support → core self-evaluation → social anxiety	-0.015	0.021	-0.056	0.028
perceived social support → shyness → social anxiety	0.014	0.044	-0.076	0.097
perceived social support → core self-evaluation → shyness → social anxiety	-0.141	0.034	-0.216	-0.082
Direct effect	-0.152	0.050	-0.227	-0.088
Total mediating effect	-0.142	0.036	-0.242	-0.047
Total effect	-0.294	0.050	-0.398	-0.203

however, it was not significantly correlated with shyness ($\beta=0.02$, $p=0.695$). Core self-evaluation was negatively related to shyness ($\beta = -0.44$, $p<0.001$) but not to social anxiety ($\beta = -0.04$, $p=0.370$). Shyness was positively correlated with social anxiety ($\beta=0.80$, $p<0.001$).

The significance of the mediating effect was further tested via the bias-corrected bootstrap method (sampling 5000 times). The results are shown in Table 2. The upper and lower limits of the bootstrap 95% confidence interval for the path of perceived social support → core self-evaluation → social anxiety contained 0, indicating that there was no significant mediating effect of core self-evaluation on the relationship between perceived social support and social anxiety ($\beta = -0.015$, $p=0.443$, 95% CI [-0.056 to 0.028]). Moreover, there was no mediating effect of shyness on the relationship between perceived social support and social anxiety ($\beta=0.014$, $p=0.803$, 95% CI [-0.076 to 0.097]). The upper and lower limits of the bootstrap 95% confidence interval for the path of perceived social support → core self-evaluation → shyness → social anxiety did not contain 0, indicating that core self-evaluation and shyness had a chain mediating effect on perceived social

support and social anxiety ($\beta = -0.141$, $p<0.001$, 95% CI [-0.216 to -0.082]). There was a significant correlation between perceived social support and social anxiety after the addition of the two mediating variables ($\beta = -0.142$, $p=0.004$, 95% CI [-0.242 to -0.047]), indicating that the model was partially mediating.

Multigroup analysis of the mediation effect model for gender
Because there were significant gender differences in perceived social support, core self-evaluation, shyness and social anxiety, this study used multigroup analysis to test whether the chain mediation effect model was affected by gender. The results (See supplementary Table 1 for more details) showed that the parameters of the unrestricted model (Model 1) estimated by both male and female students were $\chi^2=100.895$, df=64, χ^2/df=1.576, RMSEA=0.032, CFI=0.989, GFI=0.967, AGFI=0.943, TLI=0.985. When all parameters were restricted to be equal (model 5), the fitted indices were $\chi^2=223.033$, df=84, χ^2/df=2.655, RMSEA=0.054 CFI=0.960, GFI=0.937, AGFI=0.917, TLI=0.957. The comparison of different models revealed that both ΔNFI and ΔIFI were less than 0.05, indicating that there was no significant difference between the models [68]. These results showed that the mediation effect model had cross-gender consistency.

Discussion
This study examined the relationships among perceived social support, core self-evaluation, shyness and social anxiety among secondary school students in rural areas of Chongqing, western China. Correlation analysis revealed that rural secondary school students' perceived social support and core self-evaluation were significantly negatively correlated with social anxiety, whereas shyness and social anxiety were significantly positively correlated.

In addition, significant gender differences were found in terms of perceived social support, core self-evaluation, shyness and social anxiety. The mediating effect analysis revealed that core self-evaluation and shyness had a chain mediating effect on the relationship between perceived social support and social anxiety. Multigroup comparative analysis revealed that the chain mediation model had no gender difference, and that the model had cross-gender consistency. These findings suggest that social support and core self-evaluation are protective factors against social anxiety and that shyness is a risk factor for social anxiety. Prevention and intervention for social anxiety can be approached in three ways: improving perceived social support, enhancing positive self-evaluation and reducing shyness and avoidance behaviors.

Perceived social support was negatively correlated with social anxiety, and the greater the students' perceived social support was, the lower their social anxiety was. This finding is consistent with previous findings that perceived social support is a significant predictor of anxiety symptoms [69] and has a positive role in the treatment of social anxiety [18]. Social anxiety is a component of a biology-based avoidance system designed to alert and protect people from social exclusion [70]. In contrast, social support comes from the support and care of social networks and conveys that individuals are not excluded but rather are liked and cared for, which can effectively reduce individuals' social anxiety. China is a collectivist Confucian culture, and the Chinese self is other-oriented [71]. Interpersonal relationships play a crucial role in enhancing mental health [72]. Students in underdeveloped rural areas of Chongqing face many disadvantages. Most of their parents go out to work and there is a lack of adequate parent–child communication. Compared with students in the developed eastern regions, they actually receive less material and emotional support. Social support has been found not only to have a generalized beneficial effect on an individual's physical and mental health but also to act as a buffer against the negative effects of stressful events on physical and mental health [73]. To help these secondary school students improve their social adaptability, on the one hand, we need to increase their social support; on the other hand, they need to enhance their perception of social support and gain a sense of power from the relatively limited support, which is also very important for alleviating social anxiety.

In this study, perceived social support was positively correlated with core self-evaluation, which is consistent with the findings of previous studies [74]. Perceiving external support and care enhances individuals' internal strength and improves their levels of self-esteem and self-evaluation [75]. According to the sociometer theory of self-esteem, when an individual is supported by others, it is a manifestation of being accepted and loved by others, and the corresponding level of self-esteem of the individual will improve [76]. The self-esteem outcome model also suggests that positive social support increases an individual's level of self-esteem and sense of social worth [77]. In this study, core self-evaluation was significantly negatively related to shyness. A study of Turkish students also revealed that negative evaluations of oneself affect the level of shyness [47]. Individuals with low self-evaluation have low evaluation of their own ability and self-worth and are afraid of showing their bad selves, so they choose to restrain and avoid interpersonal communication.

The present study revealed that there is a significant positive correlation between shyness and social anxiety. This finding is consistent with the results of previous studies. A longitudinal study spanning five years revealed that shyness predicted a relative increase in social anxiety over time [78]. Specifically, the way in which shyness is expressed affects social anxiety. Colonnesi et al. [79] conducted a study on the process of generating social anxiety in young children and revealed that children who showed shyness only in a negative way were more likely to be socially anxious than were those who expressed shyness only in a positive way and those who did not display any shyness. Blöte et al. revealed that improving the social self-perception of shy adolescents could help prevent social anxiety [78]. The results of a gender difference analysis revealed that the scores of perceived social support and core self-evaluations were significantly higher for boys than for girls and that the scores of shyness and social anxiety were significantly lower for boys than for girls. Many Chinese families prefer sons over daughters, placing sons at the center of the family and giving them more material resources and attention, whereas daughters are not valued, especially in rural areas [80]. This cultural background and the family of origin can affect an individual's self-perception. A large number of survey data have shown that adolescent girls are more sensitive than boys are and that their shyness and social anxiety levels are also greater [81].

The results of the mediation effect analysis revealed that there was a chain mediating effect of self-evaluation and shyness on the relationship between perceived social support and social anxiety. Perceived social support can influence social anxiety both directly and indirectly through an individual's self-evaluation and shyness. Research has shown that enhancing social support and reducing shyness can alleviate adolescents' loneliness and increase their connectedness to the outside world [82] and that perceived social support and self-evaluative bias can affect individuals' social anxiety and social avoidance [83]. These studies showed that social support, self-evaluation and shyness are important influencing factors in interpersonal communication. This study confirmed the

internal mechanism of the influence of these three variables on social anxiety. Individuals with social anxiety have negative cognitive patterns and negative interpretation biases, and such negative cognitive patterns can affect interpersonal communication. Hezel and McNally [84] reported that people with social anxiety disorders were prone to interpreting neutral and ambiguous stimuli as threatening. Another longitudinal study revealed that students who performed better on theory-of-mind tasks had better environmental adjustments and interpersonal interactions [85]. This finding indicates that individuals' inability to effectively understand others' mental states, or misunderstanding the states, is a risk factor for social anxiety. Current interventions for social anxiety have focused on the use of the cognitive behavioral therapy model [86], and an important feature of this approach is the emphasis on maladaptive cognitions and negative avoidance behaviors [87]. When individuals have negative cognitive patterns, they often focus on negative and useless support when they perceive external support and evaluate themselves negatively, which is considered maladaptive cognition. Moreover, shy individuals often exhibit inhibited and fearful behaviors and actively choose to avoid socializing and presenting themselves, reducing the opportunity to make connections with others, which are negative avoidance behaviors. These findings align with the mediation model results of the present study, which deepens our understanding of cognitive–behavioral therapy for the treatment of social anxiety.

This study investigated the protective factors and risk factors for social anxiety among secondary school students in rural areas of Chongqing. The results support the main effect and buffering effect models of social support. The findings highlighted both the cognitive and behavioral dimensions of interventions for social anxiety. The cognition dimension includes understanding the care and help given by others and self-evaluation. On the behavioral side, shy and socially avoidant students should be encouraged to try to acquire social skills in the process of socializing and gradually reduce their shyness and inhibitory behaviors. These findings deepen our understanding of the psychological development of adolescents in rural areas, and provide a useful reference for poverty alleviation.

This study has several limitations. First, it is a cross-sectional correlation study, and no causal relationships between variables can be obtained. In the future, the experimental design can be used to manipulate the perceived social support level of the experimental group and the control group to investigate the change rule of social anxiety. The influence of variables can also be analyzed via longitudinal follow-up studies and cross-lagged tests. Second, the representativeness of the sample needs to be improved. The subjects of this study were rural secondary school students in the Chongqing area. Future research can expand the scope of related studies in the western rural areas and increase the sample size to verify the model. Finally, cultural characteristics have a certain impact on the psychological development of rural secondary school students. In the future, cross-cultural studies can explore whether there are differences in the occurrence and development mechanisms of adolescent social anxiety between Chinese and Western cultures.

Conclusions

For the rural secondary school students in Chongqing, perceived social support and core self-evaluation were negatively correlated with social anxiety, whereas shyness was positively correlated with social anxiety. Core self-evaluation and shyness had chain mediating effects on perceived social support and social anxiety. These results provide a theoretical basis for the prevention and treatment of social anxiety. In areas with relatively difficult social environments and economic statuses, interventions for adolescents' social anxiety can start by reducing their negative cognition of themselves, others and the outside world; increasing their core self-evaluations; and reducing their shyness and withdrawal behavior.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40359-024-02229-z.

Supplementary Material 1

Data availability
The datasets used during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The present study was conducted with the permission of the Academic Ethics Committee of Chongqing University of Arts and Sciences and participants' guardians. Written informed consent was obtained from all the participants and their parents.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Laboratory of Emotion and Mental Health, Chongqing University of Arts and Sciences, Chongqing, China
[2]College of National Culture and Cognitive Science, Guizhou Minzu University, Guiyang, China
[3]School of Public Administration, South China University of Technology, Guangzhou, China
[4]School of Economics and Management, Chongqing University of Arts and Sciences, Chongqing, China

References
1. Jarcho JM, Romer AL, Shechner T, Galvan A, Guyer AE, Leibenluft E, Pine DS, Nelson EE. Forgetting the best when predicting the worst: preliminary observations on neural circuit function in adolescent social anxiety. Dev Cogn Neuros. 2015;13:21–31.
2. Iverach L, Rapee RM. Social anxiety disorder and stuttering: current status and future directions. J Fluen Disord. 2014;40:69–82.
3. Ran G, Zhang Q, Huang H. Behavioral inhibition system and self-esteem as mediators between shyness and social anxiety. Psychiat Res. 2018;270:568–73.
4. Boehme S, Miltner WH, Straube T. Neural correlates of self-focused attention in social anxiety. Soc Cogn Affect Neur. 2015;10(6):856–62.
5. Jefferies P, Ungar M. Social anxiety in young people. A prevalence study in seven countries. PLoS ONE. 2020;15(9):e0239133.
6. Brook CA, Willoughby T. The social ties that bind: Social anxiety and academic achievement across the university years. J Youth Adolescence. 2015;44:1139–52.
7. Crone EA, Dahl RE. Understanding adolescence as a period of social–affective engagement and goal flexibility. Nat Rev Neurosci. 2012;13(9):636–50.
8. Safren SA, Heimberg RG, Brown EJ, Holle C. Quality of life in social phobia. Depress Anxiety. 1996;4(3):126–33.
9. Camacho A, Ortega-Ruiz R, Romera EM. Adolescents' social anxiety dynamics in a latent transition analysis and its psychosocial effects. Int J Clin Hlth Psyc. 2022;22(3):100311.
10. Fehm L, Pelissolo A, Furmark T, Wittchen H-U. Size and burden of social phobia in Europe. Eur Neuropsychopharm. 2005;15(4):453–62.
11. Linder A, Gerdtham U-G, Trygg N, Fritzell S, Saha S. Inequalities in the economic consequences of depression and anxiety in Europe: a systematic scoping review. Eur J Public Health. 2020;30(4):767–77.
12. DiBartolo PM, Hofmann SG. Social anxiety. Clinical, developmental, and social perspectives. 2014.
13. Kupper N, Denollet J. Social anxiety in the general population: introducing abbreviated versions of SIAS and SPS. J Affect Disorders. 2012;136(1–2):90–8.
14. Liu H, Shi Y, Auden E, Rozelle S. Anxiety in rural Chinese children and adolescents: comparisons across provinces and among subgroups. Int J Env Res Pub He. 2018;15(10):2087.
15. Lund C, De Silva M, Plagerson S, Cooper S, Chisholm D, Das J, Knapp M, Patel V. Poverty and mental disorders: breaking the cycle in low-income and middle-income countries. Lancet. 2011;378(9801):1502–14.
16. Neppl TK, Jeon S, Schofield TJ, Donnellan MB. The impact of economic pressure on parent positivity, parenting, and adolescent positivity into emerging adulthood. Fam Relat. 2015;64(1):80–92.
17. Kerres Malecki C, Kilpatrick Demary M. Measuring perceived social support: development of the child and adolescent social support scale (CASSS). Psychol Schools. 2002;39(1):1–18.
18. Wen X, Zhao C, Kishimoto T, Qian M. Effect of perceived social support on the efficacy of online cognitive behavioral therapy for social anxiety disorder. Beijing Da Xue Xue Bao. 2020;56(3):571–8.
19. Johnson TP. Mental health, social relations, and social selection: a longitudinal analysis. J Health Soc Behav. 1991;32(4):408–23.
20. Leeves S, Banerjee R. Childhood social anxiety and social support-seeking: distinctive links with perceived support from teachers. Eur J Psychol Educ. 2014;29:43–62.
21. Ren Y, Li M. Influence of physical exercise on social anxiety of left-behind children in rural areas in China: the mediator and moderator role of perceived social support. J Affect Disorders. 2020;266:223–9.
22. Calsyn RJ, Winter JP, Burger GK. The relationship between social anxiety and social support in adolescents: a test of competing causal models. Adolescence. 2005;40(157):103.
23. Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. Psychol Bull. 1985;98(2):310.
24. Turner RJ, Grindstaff CF, Phillips N. Social support and outcome in teenage pregnancy. J Health Soc Behav. 1990;31(1):43–57.
25. Heimberg RG, Brozovich FA, Rapee RM. A cognitive behavioral model of social anxiety disorder: Update and extension. In: Hofmann SG, DiBartolo PM, eds. Social anxiety : clinical, developmental, and social perspectives. Amsterdam: Elsevier; 2010. p. 395–422.
26. Gregory B, Peters L. Changes in the self during cognitive behavioural therapy for social anxiety disorder: a systematic review. Clin Psychol Rev. 2017;52:1–18.
27. Judge TA, Erez A, Bono JE, Thoresen CJ. The core self-evaluations scale: development of a measure. Pers Psychol. 2003;56(2):303–31.
28. Burke RS, Stephens RS. Social anxiety and drinking in college students: a social cognitive theory analysis. Clin Psychol Rev. 1999;19(5):513–30.
29. Hofmann SG. Cognitive factors that maintain social anxiety disorder: a comprehensive model and its treatment implications. Cogn Behav Therapy. 2007;36(4):193–209.
30. Leary MR, Jongman-Sereno KP. Social anxiety as an early warning system: A refinement and extension of the self-presentation theory of social anxiety. In: Hofmann SG, DiBartolo PM, editors. Social anxiety: clinical, developmental, and social perspectives. Amsterdam: Elsevier; 2010. p. 579–97.
31. Mankowski ES, Wyer RS Jr. Cognitive processes in perceptions of social support. Pers Soc Psychol B. 1996;22(9):894–905.
32. Sarason BR, Pierce GR, Shearin EN, Sarason IG, Waltz JA, Poppe L. Perceived social support and working models of self and actual others. J Pers Soc Psychol. 1991;60(2):273.
33. Lawrence B, Bennett S. Shyness and education. The relationship between shyness, social class and personality variables in adolescents. Brit J Educ Psychol. 1992;2(2):257–63.
34. Asi KY. The level of shyness among talented students in light of Socio-Economic Level of the family in Riyadh. J Educ Pract. 2016;7(15):48–53.
35. Crozier R. Shyness as anxious self-preoccupation. Psychol Rep. 1979;44(3):959–62.
36. Hofmann SG, Moscovitch DA, Kim H-J. Autonomic correlates of social anxiety and embarrassment in shy and non-shy individuals. Int J Psychophysiol. 2006;61(2):134–42.
37. Heiser NA, Turner SM, Beidel DC, Roberson-Nay R. Differentiating social phobia from shyness. J Anxiety Disord. 2009;23(4):469–76.
38. Rapee RM, Coplan RJ. Conceptual relations between anxiety disorder and fearful temperament. New Dir Child Adoles. 2010;127:17–31.
39. Heiser NA, Turner SM, Beidel DC. Shyness. Relationship to social phobia and other psychiatric disorders. Behav Res Ther. 2003;41(2):209–21.
40. Chavira DA, Stein MB, Malcarne VL. Scrutinizing the relationship between shyness and social phobia. J Anxiety Disord. 2002;16(6):585–98.
41. Poole KL, Van Lieshout RJ, Schmidt LA. Exploring relations between shyness and social anxiety disorder: the role of sociability. Pers Indiv Differ. 2017;110:55–9.
42. Levin I, Stokes JP. An examination of the relation of individual difference variables to loneliness. J Pers. 1986;54(4):717–33.
43. Hong JJ, Woody SR. Cultural mediators of self-reported social anxiety. Behav Res Ther. 2007;45(8):1779–89.
44. Ingles C, Xinyue Z, La Greca A, Hidalgo MD. Comparing social anxiety in Chinese, Spanish and North American adolescents. In: INTERNATIONAL JOURNAL OF PSYCHOLOGY: 2008: PSYCHOLOGY PRESS 27 CHURCH RD, HOVE BN3 2FA, EAST SUSSEX, ENGLAND; 2008: 496–496.
45. Xiao B, Coplan RJ. A cross-cultural examination of implicit attitudes toward shyness in Canada and China. J Res Pers. 2021;93:104119.
46. Dos Santos KP, Ribeiro VV, Siqueira LTD, Brugnara LC, Rosa ICB, Dassie-Leite AP. Does shyness influence the self-perception of vocal symptoms, public speaking, and daily communication? J Voice. 2022;36(1):54–8.
47. Koydemir S, Demir A. Shyness and cognitions: an examination of Turkish university students. J Psychol. 2008;142(6):633–44.
48. Asendorpf JB, Banse R, Mücke D. Double dissociation between implicit and explicit personality self-concept: the case of shy behavior. J Pers Soc Psychol. 2002;83(2):380.
49. Beaton EA, Schmidt LA, Schulkin J, Hall GB. Repeated measurement of salivary cortisol within and across days among shy young adults. Pers Indiv Differ. 2013;55(6):705–10.

50. Emerson RW. Convenience sampling revisited: embracing its limitations through thoughtful study design. J Visual Impairment Blindness. 2021;115(1):76–7.

51. Bornstein MH, Jager J, Putnick DL. Sampling in developmental science: situations, shortcomings, solutions, and standards. Dev Rev. 2013;33(4):357–70.

52. Jager J, Putnick DL, Bornstein MH. II. More than just convenient: the scientific merits of homogeneous convenience samples. Monogr Soc Res Child Dev. 2017;82(2):13–30.

53. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. Pers Assess. 1988;52(1):30–41.

54. Jiang Q. Perceived social support scale. Chin J Behav Med Sci. 2001;10(10):41–3.

55. Xin Y, Li Q, Liu C. Adolescent self-esteem and social adaptation: Chain mediation of peer trust and perceived social support. Social Behav Personality. 2019;47(4):1–9.

56. Ren Z, Ye Y. The Chinese version of core self-evaluation scale. J Fujian Normal Univ. 2009;4:157–63.

57. Li Y, Shen X, Wang JL. Association between negative life events and suicidal behavior in adolescents: roles of core self-evaluation, depression and gender. Soc Psychiatry Psychiatr Epidemiol. 2024. https://doi.org/10.1007/s00127-024-02725-y

58. Cheek JM, Buss AH. Shyness and sociability. J Pers Soc Psychol. 1981;41(2):330.

59. Li S, Chen X, Ran G, Zhang Q, Li R. Shyness and internalizing problems among Chinese adolescents: the roles of independent interpersonal stress and rumination. Child Youth Serv Rev. 2021;128:106151.

60. Wang X, Wang X, Ma H. Manual of the Mental Health Rating Scale. Chin Mental Health J. 1999;13(1):31–5.

61. Pan Z, Zhang D, Hu T, Pan Y. The relationship between psychological Suzhi and social anxiety among Chinese adolescents: the mediating role of self-esteem and sense of security. Child Adol Psych Men. 2018;12:1–9.

62. Fuller CM, Simmering MJ, Atinc G, Atinc Y, Babin BJ. Common methods variance detection in business research. J Bus Res. 2016;69(8):3192–8.

63. Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J Appl Psychol. 2003;88(5):879.

64. Kishton JM, Widaman KF. Unidimensional versus domain representative parceling of questionnaire items: an empirical example. Educ Psychol Meas. 1994;54(3):757–65.

65. Yang C, Nay S, Hoyle RH. Three approaches to using lengthy ordinal scales in structural equation models: parceling, latent scoring, and shortening scales. Appl Psych Meas. 2010;34(2):122–42.

66. Bandalos DL. Is parceling really necessary? A comparison of results from item parceling and categorical variable methodology. Struct Equ Model. 2008;15(2):211–40.

67. Qiu H, Chai J. Chinese primary school students' peer relationship and Chinese language scores: the chain mediation effect of parental involvement and sense of autonomy. Front Psychol. 2022;13:738982.

68. Li Y, Zhang J, Li J, Chen Y, Zhang J, Zuo M. The influence of parents on children's consciousness of gender equality: a multi-group structural equation modeling approach. Front Psychol. 2024;15:1361281.

69. Shelton AJ, Wang CD, Zhu W. Perceived social support and mental health: Cultural orientations as moderators. J Coll Couns. 2017;20(3):194–207.

70. Kashdan TB. Social anxiety spectrum and diminished positive experiences: theoretical synthesis and meta-analysis. Clin Psychol Rev. 2007;27(3):348–65.

71. Markus HR, Kitayama S. Culture and the self: implications for cognition, emotion, and motivation. Psychol Rev. 1991;98(2):224.

72. Li J, Li J, Jia R, Wang Y, Qian S, Xu Y. Mental health problems and associated school interpersonal relationships among adolescents in China: a cross-sectional study. Child Adol Psych Men. 2020;14:1–10.

73. Chen R. Social support as a protective factor against the effect of grief reactions on depression for bereaved single older adults. Death Stud. 2022;46(3):756–63.

74. Zhang R, Gao Y, Xie P. The role of perceived social support for loneliness in the Chinese elderly: Hope and core self-evaluations as mediators. Curr Psychol. 2023;42(33):29172–8.

75. Liu G, Pan Y, Ma Y, Zhang D. Mediating effect of psychological suzhi on the relationship between perceived social support and self-esteem. J Health Psychol. 2021;26(3):378–89.

76. Anthony DB, Holmes JG, Wood JV. Social acceptance and self-esteem: tuning the sociometer to interpersonal value. J Pers Soc Psychol. 2007;92(6):1024.

77. Marshall SL, Parker PD, Ciarrochi J, Heaven PC. Is self-esteem a cause or consequence of social support? A 4-year longitudinal study. Child Dev. 2014;85(3):1275–91.

78. Blöte AW, Miers AC, Van den Bos E, Westenberg PM. Negative social self-cognitions: how shyness may lead to social anxiety. J Appl Dev Psychol. 2019;63:9–15.

79. Colonnesi C, Nikolić M, de Vente W, Bögels SM. Social anxiety symptoms in young children: investigating the interplay of theory of mind and expressions of shyness. Abnorm Child Psych. 2017;45:997–1011.

80. Zhao X, Chen J, Chen MC, Lv XL, Jiang YH, Sun YH. Left-behind children in rural C hina experience higher levels of anxiety and poorer living conditions. Acta Paediatr. 2014;103(6):665–70.

81. Kessler RC, Petukhova M, Sampson NA, Zaslavsky AM, Wittchen HU. Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. Int J Meth Psych Res. 2012;21(3):169–84.

82. Tan J, Ai Y, Wen X, Wu Y, Wang W. Relationship between shyness and loneliness among Chinese adolescents: social support as mediator. Soc Behav Personal. 2016;44(2):201–8.

83. Bédard K, Bouffard T, Pansu P. The risks for adolescents of negatively biased self-evaluations of social competence: the mediating role of social support. J Adolescence. 2014;37(6):787–98.

84. Hezel DM, McNally RJ. Theory of mind impairments in social anxiety disorder. Behav Ther. 2014;45(4):530–40.

85. Ronchi L, Banerjee R, Lecce S. Theory of mind and peer relationships: the role of social anxiety. Soc Dev. 2020;29(2):478–93.

86. Neufeld CB, Palma PC, Caetano KA, Brust-Renck PG, Curtiss J, Hofmann SG. A randomized clinical trial of group and individual cognitive-behavioral therapy approaches for social anxiety disorder. Int J Clin Hlth Psyc. 2020;20(1):29–37.

87. Morrison AS, Heimberg RG. Social anxiety and social anxiety disorder. Annu Rev Clin Psycho. 2013;9(1):249–74.

Publisher's note