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The effect of interpersonal sensitivity on the interpersonal skills of undergraduate nursing students: The chain mediating effect of self-efficacy and subjective well-being

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Abstract

Background Undergraduate nursing students' interpersonal skills are closely related to their clinical nursing competence, yet research on the effects of interpersonal sensitivity on interpersonal skills and its mediating mechanisms is not found.

Objective To investigate the effects of interpersonal sensitivity on undergraduate nursing students' interpersonal skills and the mediating role of self-efficacy and subjective well-being.

Methods This study was a cross-sectional design conducted in Henan Province, China, from March to April 2024, using convenience sampling method, questionnaires using Interpersonal Competence Questionnaire, Interpersonal Sensitivity Scale, General Self-Efficacy Scale, and Index of Well-Being were administered to 745 undergraduate nursing students. The resulting data were analyzed using SPSS 25.0, and structural equation modeling was constructed using Amos 26.0 to explore the mediating role of self-efficacy and subjective well-being between interpersonal sensitivity and interpersonal skill.

Results The interpersonal skill of undergraduate nursing students was at a moderate level (M ± SD: 116.16 ± 29.383), and interpersonal sensitivity had a significant negative effect on interpersonal skill ($r = -0.373$, $p < 0.01$). Self-efficacy and subjective well-being acted as chain mediators between interpersonal sensitivity and interpersonal skill, accounting for 6.51% of the total effect.

Conclusion Nursing educators should emphasize the effect of interpersonal sensitivity on interpersonal skills and take feasible measures to improve the self-efficacy and subjective well-being of undergraduate nursing students to promote their interpersonal skills.

Keywords Interpersonal skills, Interpersonal sensitivity, Self-efficacy, Subjective well-being, Nursing students

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Introduction

Interpersonal skill is an individual psychological trait that influences and guarantees the smooth functioning of interpersonal activities during interactions with others and is one of the most important abilities for individuals to adapt to society [1]. Nurses' interpersonal skills are the ability of nurses to communicate and coordinate with coworkers, patients, patients' families, and others in the workplace [2]. Good interpersonal skills can help nurses build positive relationships with patients, coworkers, and management, which can lead to increased job satisfaction [3]. Conversely, if nurses experience difficulties in interpersonal interactions, this may lead to miscommunication and misunderstanding, which can increase frustration at work. This negative experience may prompt nurses to consider leaving their jobs [4, 5]. Due to the specificity of the population served, interpersonal skills are considered a necessary competency and attribute for nursing staff, and many schools have consequently included them in mandatory courses for undergraduate nursing students [6, 7]. Previous studies have also found that nursing students' interpersonal skills have a significant positive impact on their clinical work competence [5]. Therefore, in order to prevent the loss of nursing talents and further improve the quality of nursing services, it is necessary to explore the factors influencing the interpersonal skills of undergraduate nursing students. In fact, previous studies have found that personality traits such as interpersonal sensitivity [8] and self-esteem [9] are closely related to an individual's interpersonal skills. Among them, interpersonal sensitivity has received increasing attention from scholars [8, 10].

Interpersonal sensitivity is a stable personality trait of hyperawareness and sensitivity to the behaviors and emotions of others that affects how individuals think about, interpret, and evaluate events [11]. From the perspective of evolutionary psychology, appropriate interpersonal sensitivity will make individuals care more about the thoughts and feelings of others and can help individuals establish good social relationships, which will be beneficial to their interpersonal interactions [12]. However, Tajigharajeh's study showed that too much interpersonal sensitivity reduces an individual's efficiency in establishing interpersonal relationships [13]. Huang's study also showed that excessive interpersonal sensitivity negatively affects an individual's interpersonal skills [14]. Given the discrepancies between extant research findings, it is important to further explore the effects of interpersonal sensitivity on individuals' interpersonal skills. In addition, most of these studies have focused on specific groups, such as migrant children [15] and middle school students [16], with fewer studies examining nursing college student populations. Nevertheless, undergraduate nursing students frequently demonstrate high degrees of interpersonal sensitivity in their interactions with others because of the unique nature of the nursing profession [17]. In order to avoid being questioned or negatively evaluated by others, nursing undergraduates are more accustomed to complying with the expectations of others and are therefore more prone to interpersonal sensitive traits, such as self-doubt and interpersonal avoidance, which in the long run can negatively affect the interpersonal skills of undergraduate nursing students [18, 19]. In addition, previous studies have shown that interpersonal sensitivity is closely related to nursing students' loneliness [20] and irritability [21], and these negative emotions can further reduce nursing students' interpersonal skill [22]. Although we can speculate from these studies that interpersonal sensitivity has a negative impact on the interpersonal skills of undergraduate nursing students, there is no actual quantitative research evidence to support this inference. Therefore, we hypothesized that interpersonal sensitivity will have a negative effect on the interpersonal skill of undergraduate nursing students (Hypothesis 1).

In addition to interpersonal sensitivity, self-efficacy also has an impact on an individual's interpersonal skills. Previous studies have shown that self-efficacy not only has a significant positive correlation with interpersonal skill but also serves as a protective factor that buffers against some of the frustrations and failures that occur in interpersonal interactions and helps to improve an individual's interpersonal skill [23, 24]. In addition, nursing students with the personality trait of interpersonal sensitivity tend to have negative self-perceptions and are therefore more likely to perceive stress and develop negative emotions, which can lead to a "self-efficacy crisis" and a lack of self-efficacy in nursing students [25, 26]. Anghelache et al. also found that personality traits can influence college students' communication skills through their level of self-efficacy [27]. Therefore, we hypothesized that self-efficacy is a mediating variable between interpersonal sensitivity and interpersonal skills in undergraduate nursing students (Hypothesis 2).

Additionally, previous research has also shown that interpersonal sensitivity is not only a risk factor for life satisfaction among college students but also has a significant negative effect on an individual's subjective well-being [15, 28]. And there is a significant positive correlation between subjective well-being and interpersonal skills [29]. In addition, researchers have found a significant positive correlation between nursing students' subjective well-being and pro-social behavior [30]. Pro-social behavior is a category of behavior that conforms to society's desires and has no apparent benefit to the actor himself, while the actor consciously and voluntarily brings benefit to the recipient of the behavior [31]. Undergraduate nursing students who exhibit pro-social

behaviors are more likely to be treated with respect and kindness by others during interpersonal interactions, which results in a more positive interpersonal climate and contributes to the development of an individual's interpersonal skills [32, 33]. Therefore, we hypothesized that subjective well-being is a mediating variable between interpersonal sensitivity and interpersonal skills among undergraduate nursing students (Hypothesis 3).

The sustainable well-being model argues that intentional behavioral, cognitive, or volitional activities provide the best potential pathway to higher and sustainable levels of well-being [34]. As an intentional activity, self-efficacy is recognized as a suitable pathway for the vast majority of people to enhance their subjective well-being [35, 36]. Previous research has also shown that self-efficacy not only has a significant positive effect on nursing students' subjective well-being but also mediates the effects of other variables on subjective well-being [37]. Moreover, the higher an individual's subjective well-being, the more social rewards he or she receives, which is conducive to enhancing the individual's interpersonal skills [38]. Combined with the previous discussion on the relationship between variables, we hypothesize that interpersonal sensitivity has an impact on the interpersonal skills of undergraduate nursing students through the chain mediating effects of self-efficacy and subjective well-being (Hypothesis 4).

Based on the above literature review and analysis, this study will explore the effects of interpersonal sensitivity on interpersonal skills and test the mediating role of self-efficacy and subjective well-being from the perspective of nursing undergraduates. According to this research objective, we present the theoretical framework for this study, as shown in Fig. 1.

Methods

Study design

This study utilized a cross-sectional design to explore the relationship between interpersonal skills, interpersonal sensitivity, self-efficacy, and subjective well-being among undergraduate nursing students. Structural equation modeling was also constructed to test the mediating role of self-efficacy and subjective well-being. This study followed the guidelines of STROBE.

Setting, participants and sample

The convenience sampling method was used to select undergraduate nursing students from three comprehensive universities in Henan Province as the study population. These three schools are comparable in terms of the level of operation, faculty strength, and student population. Participants were required to fulfill the following criteria: (1) full-time undergraduate nursing students; (2) informed consent and voluntary participation in this study. Participants who did not complete the questionnaire were excluded. In addition, due to the curriculum related to undergraduate nursing students in China, fourth-year nursing students are usually practicing in hospitals; therefore, undergraduate nursing students in their senior year were not included in this study.

A presurvey of 60 undergraduate nursing students was conducted and the results showed that the mean score of the nursing students' interpersonal skills entries was 2.74 with a standard deviation of 0.61. Based on the sample size calculation formula $N = 4U\alpha^2\ S^2\ /\delta^2$ [39], $S = 0.61$, with the allowable error (δ) set to 0.1 and $\alpha = 0.05$, the sample size was initially calculated to be $N = 4 \times 1.96^2 \times 0.61^2/0.1^2 \approx 572$. Taking into account sampling error and invalid questionnaires, a total of 800 questionnaires were distributed and 782 questionnaires were returned, for a return rate of 97.75%. Questionnaires that were not completed in full or had the same options were considered invalid, and 745 valid questionnaires remained after 37

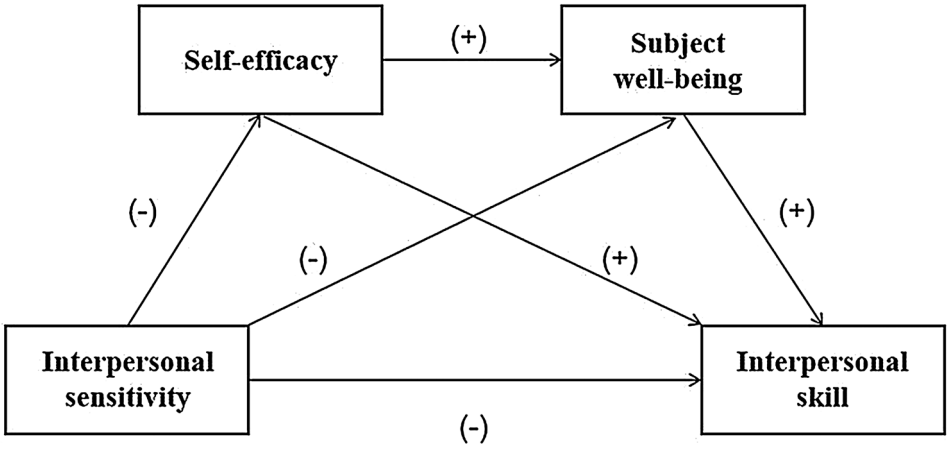

Fig. 1 Theoretical framework

invalid questionnaires were excluded, with an effective recovery rate of 93.13%.

Data collection

Between March and April 2024, after communicating with the heads of the nursing programs at the three schools, we began administering the questionnaire to undergraduate nursing students. A total of 300 people from School 1 participated in the survey, while School 2 and School 3 each had 250 participants. The study primarily used an anonymous self-administered questionnaire to collect data, and each participant received a sealed envelope containing the full contents of the questionnaire and an informed consent form. We distributed the questionnaires to the nursing students with the assistance of their class leaders and uniformly collected them after 30 min. Prior to the start of the survey, all participating nursing students were informed of the purpose, significance, and anonymity of this study and were assured that their studies would not be affected in any way. Throughout the survey, we ensured that there were no verbal cues or inducements given to the participating nursing students and that the participants had the option to withdraw at any time.

Instrument

Interpersonal skills

We used the Interpersonal Competence Assessment Questionnaire to assess the interpersonal skills of undergraduate nursing students. The questionnaire was developed by Buhrmester et al. psychologists at the University of California, USA [40], and was translated by Chinese scholar Yuan [55]. The questionnaire consists of five dimensions, namely, initiate contact, appropriate refusal, self-disclosure, conflict management, and emotional support, with a total of 40 entries. A five-point scale was used, with "1" meaning "cannot do it, feel extremely uneasy and unsure, so try to avoid it," and "5" meaning "very good at doing it, feels very relaxed, and can handle it very well." The total score of each dimension is summed up as the scale score, and the higher the scale score, the better the interpersonal skills. The Cronbach's coefficient of the Chinese version of the Interpersonal Competence Assessment Questionnaire (ICAQ) is 0.87 [41]. In this study, the Cronbach's coefficient of the scale was 0.978.

Interpersonal sensitivity

The Interpersonal Sensitivity Scale was used to assess the level of interpersonal sensitivity of undergraduate nursing students. The scale was developed by Byoce and Parker [42] and revised by Hua-Hua Zhong. It includes five dimensions of separation anxiety, skepticism, need for identity, timid, and vulnerability, with a total of 29 entries. The scale is scored on a four-point scale, with "1" indicating "very non-compliant," "4" indicating very compliant, and entries 3, 6, 12, 13, and 26 being reverse scored. The sum of the scores of all the entries is the interpersonal sensitivity score, and the higher the score, the higher the level of interpersonal sensitivity. The Cronbach's coefficient of the Chinese version of the Interpersonal Sensitivity Scale is 0.91 [43]. In this study, the Cronbach coefficient of the scale was 0.897.

Self-efficacy

The General Self-Efficacy Scale, developed by Schwarzer [44], was used to assess the level of self-efficacy of undergraduate nursing students. The scale is a unidimensional scale containing 10 items, such as "I am confident that I can cope effectively with anything that comes up unexpectedly." A four-point scale ranging from 1 (not at all true) to 4 (completely true) was used. The scale is rated from 10 to 40, with higher scores indicating higher levels of self-efficacy. The Chinese version of the General Self-Efficacy Scale has good internal consistency [37]. In this study, the Cronbach coefficient of the scale was 0.895.

Subjective well-being

We assessed the subjective well-being of undergraduate nursing students using the Index of Well-Being. The scale was developed by Campbell et al. [45] and translated and revised by Yao [45]. The scale consists of nine items in two dimensions: the overall affection index and life satisfaction. A 7-point scale ranging from 1 (more negative or less satisfied) to 7 (more positive or more satisfied) was used. The sum of the total score of the overall affection index (weighted 1.0) and the total score of life satisfaction (weighted 1.1) is the scale score, and a higher score indicates a higher level of subjective well-being. The Cronbach's coefficient for the Chinese version of the Index of Well-Being is 0.849 [46]. In this study, the Cronbach's coefficient for this scale was 0.944.

Data analysis

IBM SPSS 25.0 and AMOS 26.0 were used to analyze and process the data. First, Harman's single-factor test was used to test for common method bias (CMB). Second, frequency counts and percentages were used to describe the demographic characteristics of the participants. The continuous variables of interpersonal skills, interpersonal sensitivity, self-efficacy, and subjective well-being conformed to a normal distribution, and Pearson's correlation analysis was used to test the correlation between the variables. Then, structural equation modeling was constructed using AMOS 26.0 software. In the model, interpersonal sensitivity was the independent variable, interpersonal skill was the dependent variable, and self-efficacy and subjective well-being were the mediating variables. Finally, the bootstrapping method with 5000

replicated samples was used to calculate multiple mediating effects and bias-corrected confidence intervals (CI). A significant mediating effect was identified if the 95% CI did not include 0. A two-sided p-value of <0.05 was considered statistically significant.

Results

Common method bias test

Since all variables were obtained by self-report, we needed to test for common method bias. The results of Harman's single-factor test showed 11 factors with eigenvalues greater than 1, and the first component explained 30.849% (<40%) of the total variance [47]. Therefore, there is no serious common method bias in this study.

Demographic characteristics of participants

A total of 745 undergraduate nursing students participated in this study, with the majority of participants being under 23 years of age; 560 (75.2%) were female and 185 (24.8%) were male. 271 (36.4%) were from urban areas and 474 (63.6%) were from rural areas, and the majority of the participants (85.5%) were non-only children. At the time of data collection, 293 (39.3%) were in their first year of college, 271 (36.4%) were in their second year of college, and 181 (24.3%) were in their third year of college (Table 1).

Table 1 Characteristics of participants ($N = 745$)

Demographics	*N* (%)
Gender	
Male	185 (24.8)
Female	560 (75.2)
Age (Year)	
17–19	271 (36.38)
20–22	464 (62.28)
≥23	10 (1.34)
Year	
First year	293 (39.3)
Second year	271 (36.4)
Third year	181 (24.3)
Residence	
City	271 (36.4)
Country	474 (63.6)
Whether they are the only child	
Yes	108 (14.5)
No	637 (85.5)
Per capita monthly household income	
<3000	274 (36.8)
3000–6000	373 (50.1)
>6000	98 (13.1)

Correlation analysis and significance test

There was a significant correlation between the interpersonal skills of undergraduate nursing students, with interpersonal sensitivity ($r = -0.373$, $p < 0.01$), self-efficacy ($r = 0.418$, $p < 0.01$), and subjective well-being ($r = 0.432$, $p < 0.01$) being significantly correlated with each other. There was a significant negative correlation between interpersonal sensitivity and self-efficacy ($r = -0.403$, $p < 0.01$) and subjective well-being ($r = -0.364$, $p < 0.01$). In addition, there was a significant positive correlation between self-efficacy and subjective well-being ($r = 0.344$, $p < 0.01$) (Table 2).

Analysis of mediating effects

A one-way ANOVA showed a statistically significant difference in interpersonal skills among nursing students of different years ($F = 4.245$, $p = 0.015$, M ± S: first year, 119.47 ± 27.782; second year, 115.73 ± 28.360; third year, 111.45 ± 32.704), i.e., different years had an effect on the interpersonal skills of nursing students. In order to more accurately estimate the direct and indirect effects of interpersonal sensitivity on nursing students' interpersonal skill and to improve the reliability and stability of the model, we included "year" as a covariate in the Structural equation modeling (SEM). SEM was used to explore the mediating role of self-efficacy and subjective well-being between interpersonal sensitivity and interpersonal skills. The results of model fitting showed that the model fit well (Table 3).

As shown in Fig. 2, interpersonal sensitivity had a significant direct negative effect on interpersonal skills ($\beta = -0.15$, $p = 0.001$), self-efficacy ($\beta = -0.42$, $p < 0.001$), and subjective well-being ($\beta = -0.37$, $p < 0.001$). Self-efficacy had a significant direct positive effect on subjective well-being ($\beta = 0.20$, $p < 0.001$) and interpersonal skill ($\beta = 0.26$, $p < 0.001$). Also, subjective well-being had a significant positive effect on interpersonal skill ($\beta = 0.29$, $p < 0.001$).

Finally, we repeated the sampling 5000 times using the bootstrap test with percentile bias correction to determine 95% confidence intervals to further explore the mediating role of self-efficacy and subjective well-being between interpersonal sensitivity and interpersonal skills. The results showed that both self-efficacy and subjective well-being partially mediated the relationship between interpersonal sensitivity and interpersonal skills, with effect sizes of −0.106 and −0.107, respectively. Also, self-efficacy and the subjective well-being chain mediated the relationship between interpersonal sensitivity and interpersonal skills among nursing undergraduates, which accounted for 6.51% of the total effect (−0.025/−0.384) (Table 4).

Discussion

Our findings showed that undergraduate nursing students' interpersonal skills were at a moderate level, lower than the findings of Kang et al. on Korean nursing students [4]. This may be due to differences in education

Table 2 Descriptive statistics and correlations among the study variables ($N = 745$)

	Mean	Standard deviation	ISk	ISe	SE	SWB
ISk	116.16	29.383	1.000			
ISe	69.45	11.834	−0.373**	1.000		
SE	24.99	5.453	0.418**	−0.403**	1.000	
SWB	45.13	10.764	0.432**	−0.364**	0.344**	1.000

ISk, Interpersonal skill; ISe, Interpersonal sensitivity; SE, Self efficacy; SWB, subjective well being

**$p < 0.01$ (two-tailed)

Table 3 Structural equation model fitting index

Model	CMIN/DF	RMSEA	GFI	CFI	TLI	IFI
Recommended value	<5	<0.08	>0.90	>0.90	>0.90	>0.90
Mediation model	3.507	0.058	0.952	0.978	0.972	0.978

CMIN/DF, the Chi-square divided by degrees of freedom; RMSEA, root means square error of approximation; GFI, the goodness-of-fit index; CFI, the comparative fit index, TLI, Tucker-Lewis Index; IFI incremental fit index

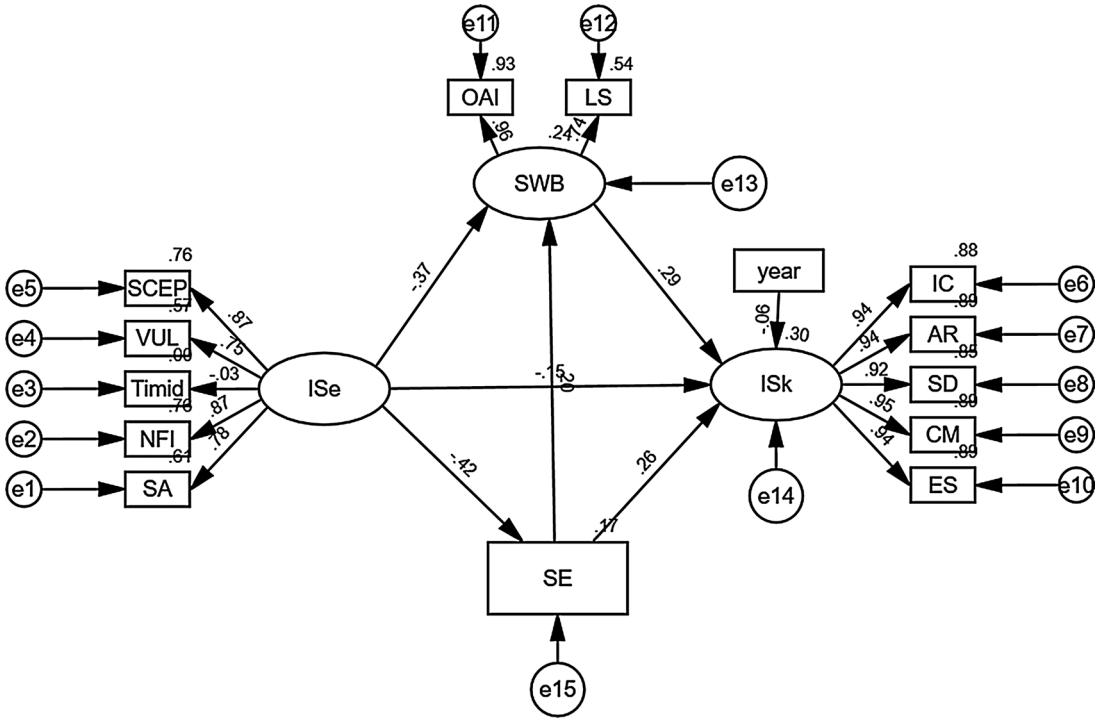

Fig. 2 Path analysis diagram of interpersonal sensitivity, interpersonal skill, self-efficacy, and subject well-being. ISk, Interpersonal skill; ISe, Interpersonal sensitivity; SE, Self efficacy; SWB, Subjective well-being. SCEP, Scepticism; VUL, Vulnerability; NFI, Need for identity; SA, Separation anxiety; OAI: Overall affection index; LS: Life satisfaction; IC: Initiate contact; AR: Appropriate refusal; SD: Self-disclosure; CM: Conflict management; ES: Emotional support

policies in different countries. Another possible reason could be the different grade levels of the nursing students. The nursing students in this study were predominantly freshmen and sophomores, while participants were all junior and senior nursing students in Kang's study. As the grade level increases, the nursing students receive more education in the curriculum and participate in clinical placements, thus possessing higher interpersonal skills. Compared with the results of Liu et al. [48], the participants' interpersonal sensitivity scores in this study were slightly higher, which may be due to the differences caused by the different study subjects. Our study population was undergraduate nursing students, and the nursing profession focuses more on the development of empathy and emphasizes teamwork; therefore, nursing students tend to be more able to detect the emotional changes of others more quickly and have higher interpersonal sensitivity. Consistent with previous research [38], the self-efficacy of nursing students in this study was at a moderate level, which indicated that nursing students possessed more stable positive psychological resources. However, subjective well-being scores in this study were higher than the findings of Ma [49]. This may be due to the fact that the subjects of Ma's study were graduate

Table 4 Bootstrap analysis of the mediating model

Effects	Paths	Effect	Bootstrap SE	Bootstrapping 95% CI
Total effect	ISe→ISk	−0.384	0.029	−0.440 to −0.328
Direct effect	ISe→ISk	−0.146	0.04	−0.227 to −0.068
Indirect effect	ISe→SE→ISk	−0.106	0.017	−0.141 to −0.074
	ISe→SWB→ISk	−0.107	0.019	−0.147 to −0.072
	ISe→SE→SWB→ISk	−0.025	0.007	−0.040 to −0.012
Total indirect effect	Total indirect effect	−0.238	0.026	−0.289 to −0.190

ISk, Interpersonal skill; ISe, Interpersonal sensitivity; SE, Self efficacy; SWB, subjective well being. SE, standard error; CI, confidence interval

nursing students. Graduate nursing students need to write master's theses, publish journal papers, etc., and usually have more academic pressure than undergraduate nursing students, resulting in lower levels of subjective well-being.

We found that interpersonal sensitivity would have a significant negative effect on undergraduate nursing students' interpersonal skills, and the higher the level of interpersonal sensitivity of undergraduate nursing students, the lower their level of interpersonal skills. Hypothesis 1 was verified. This result also further confirms the influence of personality traits on individuals' interpersonal skills and provides some theoretical support for relevant research on promoting interpersonal skills. Interpersonal sensitivity, as a stable and persistent personality trait, causes individuals to be more aggressive and is detrimental to their interpersonal interactions [50, 51]. The results of a survey of migrant children by Lai also showed that interpersonal sensitivity had a significant negative impact on interpersonal skills [52]. Therefore, in order to further enhance the interpersonal skills of undergraduate nursing students, educators should think about how to reduce the interpersonal sensitivity of undergraduate nursing students.

The results of this study showed that self-efficacy partially mediates the relationship between interpersonal sensitivity and interpersonal skills among undergraduate nursing students, and Hypothesis 2 was verified. The higher the interpersonal sensitivity of nursing undergraduates, the lower their self-efficacy. This can be explained by self-efficacy theory. The theory suggests that the experience of success or failure in an individual's own behavior is the most influential source of information on self-efficacy, with successful experiences increasing and repeated failures decreasing an individual's self-efficacy [53]. Nursing undergraduates with high interpersonal sensitivity experience more failures and frustrations during interpersonal interactions due to characteristics such as introversion and multi-anxiety, resulting in lower levels of self-efficacy [54, 55]. In addition, we found that self-efficacy had a significant positive effect on the interpersonal skills of undergraduate nursing students, and this result is consistent with a Korean study of nursing students [56]. This may be due to the fact that undergraduate nursing students with higher levels of self-efficacy are more inclined to adopt a proactive approach to interpersonal interactions as well as be more focused on maintaining relationships [57]. This result also suggests that nursing faculty can enhance undergraduate nursing students' interpersonal skills by increasing their successes (e.g., setting appropriate course learning goals) and developing positive attributions to enhance their self-efficacy.

We found that interpersonal sensitivity can have an impact on undergraduate nursing students' interpersonal skills through subjective well-being, validating Hypothesis 3. Consistent with the study by Wan et al. [15], our findings demonstrated that there is a significant negative correlation between interpersonal sensitivity and subjective well-being. In addition, the results of this study showed that subjective well-being had a significant positive effect on interpersonal skills, and the higher the level of subjective well-being of undergraduate nursing students, the stronger their interpersonal skills. This conclusion is also consistent with previous studies [58]. A high level of subjective well-being indicates that undergraduate nursing students have good mental health and more positive emotions, such as optimism and hope [59], which are precisely the positive factors that promote interpersonal interactions. In addition to this, the subjective well-being of undergraduate nursing students has also been shown to be strongly associated with high-quality care [60]. Therefore, colleges and universities should create a favorable campus climate for undergraduate nursing students and develop well-being education programs to increase their subjective well-being in order to promote the development of interpersonal skills among undergraduate nursing students.

Our findings also suggest that there is a significant positive correlation between self-efficacy and subjective well-being in a straight line and that interpersonal sensitivity can have an impact on interpersonal skills through the chain mediation of self-efficacy and subjective well-being. Hypothesis 4 was verified. This result suggests that undergraduate nursing students with high interpersonal sensitivity have more negative perceptions of themselves and lower levels of self-efficacy and subjective well-being, which negatively affects their interpersonal relationships and hinders the development of interpersonal skills among undergraduate nursing students. On the contrary, undergraduate nursing students with lower interpersonal sensitivity had high levels of self-efficacy and subjective well-being and showed more helpful behaviors and positive responses in interpersonal interactions

[30], which resulted in more positive feedback [32] and thus improved their interpersonal skills over time. This result suggests that the chain mediation of self-efficacy and subjective well-being is an important way in which interpersonal sensitivity affects the interpersonal skills of undergraduate nursing students and should be emphasized by nursing educators.

Implications for nurse education

This study found that interpersonal sensitivity has a negative impact on nursing undergraduates' interpersonal skills, in which self-efficacy and subjective well-being play a chain-mediated effect. Based on this, we propose some suggestions to further enhance their interpersonal skills. First, colleges can hold regular group cognitive-behavioral counseling to encourage self-expression in group settings and help nursing undergraduates identify and change negative thinking patterns at a deeper level, thus reducing the interpersonal sensitivity of them. Meanwhile, colleges also should offer communication skills training courses to teach students the skills of active listening, effective expression, and constructive feedback in order to enhance their social confidence and competence. Second, colleges and universities should strengthen the cultivation of nursing undergraduates' self-efficacy and the enhancement of subjective well-being. For example, teachers can set up challenging but achievable goals during lectures to guide nursing undergraduates to gradually complete tasks to enhance their self-efficacy; colleges can also organize regular mental health lectures, meditation and relaxation training, outdoor activities, etc., to help nursing undergraduates to establish a more positive emotional experience, which in turn enhances their subjective sense of well-being. Additionally, colleges can also establish mentor guidance and peer support systems to help nursing undergraduates increase self-confidence in the face of difficulties and gradually overcome interpersonal uneasiness and anxiety, so as to maximize the dual role of self-efficacy and subjective well-being and to reduce the negative impact of interpersonal sensitivity on nursing undergraduates' interpersonal skills.

Limitations

Although this study is important for promoting interpersonal skills among nursing undergraduates, there are some limitations. First, this study is a cross-sectional design that can only explore the interrelationships between variables at a certain point in time. In the future, longitudinal studies or other methods can be used to explore the dynamic development and related mechanisms among variables. Second, although the results of this study do not suffer from common methodological bias, the data in this study were obtained from the self-reporting of nursing undergraduates, which may have some bias between them and the actual situation. Therefore, in the future, a combination of questionnaire surveys and qualitative interviews can be used as a research method to be closer to the actual situation. Third, this study only investigated nursing undergraduates from three universities in Henan Province, and the present results may not be generalizable due to factors such as educational differences between regions. Future studies may consider surveying a larger group of nursing undergraduates to verify whether our findings hold true for other regional groups of nursing undergraduates. Finally, this study only examined the mediating role of self-efficacy and subjective well-being, and future research could incorporate negative variables such as loneliness and stress to further explain the mechanisms by which interpersonal sensitivity influences interpersonal skills.

Conclusions

This study found that interpersonal sensitivity had a significant negative effect on nursing undergraduates' interpersonal skills, confirming that self-efficacy and subjective well-being not only partially mediate the effect, respectively, but also chain-mediate the relationship between interpersonal sensitivity and interpersonal skills. The results of this study provide a foundation for further promoting the development of interpersonal skills in undergraduate nursing students and provide empirical guidance for nursing educators to develop strategies to improve nursing students' interpersonal sensitivity and enhance their self-efficacy and subjective well-being.

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Author contributions

JS and YS: Conceptualization, Investigation, Data collection, Data analysis, Writing original draft. ZJ and YZ: Conceptualization, Investigation, Writing original draft. JL and CC: Supervision, Writing review and editing. And all authors approved the final manuscript for submission.

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Data Availability

The datasets generated and analysed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study complies with the Declaration of Helsinki, does not involve unethical behavior or human clinical trials, and will not have any adverse effects on the physical or mental health of the participants. We also obtained informed consent from all participants and ethical approval from the Institutional Review Board of Henan Provincial Key Laboratory of Psychology and Behavior (ID Number: 20220107001).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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References

1. Bae M, Shin H. Multiple mediation effects of elementary school studentsself-disclosure and friendship quality on the relation between social skills and subjective well-being. Korean J Child Educ. 2016;25(3):193–209. https://doi.org/10.17643/KJCE.2016.25.3.11.
2. Hiçdurmaz D, Öz F. Interpersonal sensitivity, coping ways and automatic thoughts of nursing students before and after a cognitive-behavioral group counseling program. Nurse Educ Today. 2016;36:152–58.
3. Heinitz K, Lorenz T, Schulze D, Schorlemmer J. Positive organizational behavior: longitudinal effects on subjective well-being. Plos One. 2018;13(6). https://doi.org/10.1371/journal.pone.0198588.
4. Liu X, Wang Z, Zhang C, Xu J, Shen Z, Peng L, et al. Psychological capital and its factors as mediators between interpersonal sensitivity and depressive symptoms among Chinese undergraduates. Psychol Res Behav Manag. 2024;17:429–441. https://doi.org/10.2147/prbm.S452993.
5. Tajigharajeh S, Safari M, Abadi TSH, Abadi SSH, Kargar M, Panahi M, et al. Determining the relationship between emotional intelligence and interpersonal sensitivity with quality of work life in nurses. J Educ Health Promot. 2021;10(1). https://doi.org/10.4103/jehp.jehp_612_20.
6. Wan J, Liu YJ, Zhou WJ, Wu SY. Interpersonal sensitivity and subjective well-being of migrant workers' accompanying children: role of perception of exclusion and peer support. Psychol Res Behav Manag. 2024;17:2149–60. https://doi.org/10.2147/PRBM.S461318.
7. Baytemir K. The mediation of interpersonal competence in the relationship between parent and peer attachment and subjective well-being in adolescence. Egitim Ve Bilim-Educ. Sci.. 2016;41(186). https://doi.org/10.15390/eb.2016.6185.
8. Lyubomirsky S, Sheldon KM, Schkade D. Pursuing happiness: the architecture of sustainable change. Rev General Psychol. 2005;9(2):111–131.
9. Pfattheicher S, Nielsen YA, Thielmann I. Prosocial behavior and altruism: a review of concepts and definitions. Curr Opin Psychol. 2022;44:124–129. https://doi.org/10.1016/j.copsyc.2021.08.021.
10. Bulfone G, Iovino P, Mazzotta R, Sebastian M, Macale L, Sili A, et al. Self-efficacy, burnout and academic success in nursing students: a counterfactual mediation analysis. J Adv Nurs. 2022;78(10):3217–3224. https://doi.org/10.1111/jan.15231.
11. Huang H, Zhang L, Dong W, Tu L, Tang H, Liu S, et al. Stigma and loneliness among young and middle-aged stroke survivors: a moderated mediation model of interpersonal sensitivity and resilience. J Psychiatr Ment Health Nurs. 2024;31(4):596–606. https://doi.org/10.1111/jpm.13016.
12. Leal-Costa C, Tirado González S, Ramos-Morcillo AJ, Ruzafa-Martínez M, Díaz Agea JL, Van-der Hofstadt Román CJ. Communication skills and professional practice: does it increase self-efficacy in nurses? Front Psychol. 2020;11:1169. https://doi.org/10.3389/fpsyg.2020.01169.
13. Kang K, Lee M, Cho H. Interpersonal skills mediate the relationship between communicative and clinical competencies among nursing students: a descriptive study. Nurse Educ Today. 2021;99:104793. https://doi.org/10.1016/j.nedt.2021.104793.
14. Kim EJ, Lim JY, Kim GM, Kim SK. Nursing students' subjective happiness: a social network analysis. Int J Environ Res Public Health. 2021;18(21). https://doi.org/10.3390/ijerph182111612.
15. Locke EA. Self-efficacy: the exercise of control. Personnel Psychol. 1997;50(3):801.
16. Xu H, Peng L, Wang Z, Zeng P, Liu X. Interpersonal sensitivity on college freshmen's depression: a moderated moderation model of psychological capital and family support. Front Psychiatry. 2022;13(921045). https://doi.org/10.3389/fpsyt.2022.921045.
17. Dai W, Wei X, Li Q, Yang Z. Interpersonal sensitivity, smartphone addiction, connectedness to nature and life satisfaction among college students: a moderated mediation model. J Psychol Afr. 2023;33(6):548–55. https://doi.org/10.1080/14330237.2023.2279374.
18. Commodari E, Platania S, La Rosa VL, Commodari G, Carnemolla G, Parisi J, et al. Psychological well-being in adolescence: relationships between life skills, self-efficacy, and metacognitive skills. Mediterr J Clin Psychol. 2022;10(1). https://doi.org/10.13129/2282-1619/mjcp-3251.
19. Kyung KH. The mediating effect of interpersonal competence on the relationship between rejection sensitivity and social anxiety in undergraduate students. Korean J Youth Stud. 2018;25(12):305–26. https://doi.org/10.21509/kjys.2018.12.25.12.305.
20. Liu X, Peng L, Wang Z, Zeng P, Mi Y, Xu H. Effects of interpersonal sensitivity on depressive symptoms in postgraduate students during the COVID-19 pandemic: psychological capital and sleep quality as mediators. Front Psychiatry. 2023;14(1100355). https://doi.org/10.3389/fpsyt.2023.1100355.
21. 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. https://doi.org/10.1037/0021-9010.88.5.879.
22. Shi X, Wu Y, Cao F, Wang X, Du K, Zang S. The effect of loneliness on interpersonal sensitivity among nursing undergraduates: a chain mediation role of problematic internet use and bedtime procrastination. BMC Nurs. 2024;23(1):642. https://doi.org/10.1186/s12912-024-02321-0.
23. Bartolini S, Bilancini E, Sarracino F. Predicting the trend of well-being in Germany: how much do comparisons, adaptation and sociability matter? Soc Indic Res. 2013;114(2):169–191. https://doi.org/10.1007/s11205-012-0142-5.
24. Takase M, Teraoka S, Kousuke Y. Investigating the adequacy of the competence-turnover intention model: how does nursing competence affect nurses' turnover intention? J Clin Nurs. 2015;24(5–6):805–816.. https://doi.org/10.1111/jocn.12711.
25. Moudatsou M, Stavropoulou A, Philalithis A, Koukouli S. The role of empathy in health and social care professionals. Healthcare (Basel, Switzerland). 2020;8(1). https://doi.org/10.3390/healthcare8010026.
26. Marin TJ, Miller GE. The interpersonally sensitive disposition and health: an integrative review. Psychol Bull. 2013;139(5):941–84. https://doi.org/10.1037/a0030800.
27. Huang H, Tang H, Lu G, Chen C, Peng Q, Zhang Y, et al. Perceived parenting style and subjective well-being among Chinese nursing undergraduates: the role of self-efficacy and gender. Int J Environ Res Public Health. 2022;19(19):12654. https://doi.org/10.3390/ijerph191912654.
28. Li XM, Zhu Y, Shi XL. Interpersonal sensitivity as a mediator linking interpersonal stressors and social anxiety: longitudinal mediation analysis using parallel process latent growth curve modeling. J Affective Disorders. 2024;351:172–178. https://doi.org/10.1016/j.jad.2024.01.218.
29. Barakat N. Interpersonal skills. Libyan J Med. 2007;2(3):152–53. https://doi.org/10.4176/070620.
30. Lai P: Research on the Path of Social Work Intervention in Improving the Social Skills of Migrant Workers' Children. *Master's thesis*. Harbin: Heilongjiang University. (2022).
31. Cui X, Li B, He R, Zhang S, Lei L. The effects of prosocial spending on subjective well-being and its mechanism. Adv Psychol Sci. 2021;29(7):1279.
32. Mangan J, Rae J, Anderson J, Jones D. Undergraduate paramedic students and interpersonal communication development: a scoping review. Adv Health Sci Educ Theory Pract. 2022;27(4):1113–1138. https://doi.org/10.1007/s10459-022-10134-6.
33. Anghelache V. Interpersonal communication and selfefficacy. In: The 8th International Conference: Future Academy: 2018; 2018: 2357–1330.
34. Zahra ST, Saleem S, Subhan S, Mahmood Z. Role of social comparison and interpersonal skills in positive parenting and self-esteem in Pakistani adolescents: a serial mediation analysis. Family J. 2021:1066480720988095. https://doi.org/10.1177/1066480720988095.
35. Buhrmester D, Furman W, Wittenberg MT, Reis HT. Five domains of interpersonal competence in peer relationships. J Pers Soc Psychol. 1988;55(6):991. https://doi.org/10.1037//0022-3514.55.6.991.
36. Pickett CL, Gardner WL, Knowles M. Getting a cue: the need to belong and enhanced sensitivity to social cues. Pers Soc Psychol Bull. 2004;30(9):1095–1107. https://doi.org/10.1177/0146167203262085.
37. Ma C. The academic stress and subjective well-being of graduate nursing students: the mediating role of resilience. J Adv Nurs. 2023;79(7):2654–2663. https://doi.org/10.1111/jan.15619.
38. Kondo J, Tomizawa R, Jibu T, Kamide K. Developing an interpersonal communication skill scale targeting female nursing students. BMC Res Notes. 2020;13(1):43. https://doi.org/10.1186/s13104-020-4896-6.
39. Morimoto T, Matsuyama K, Ichihara-Takeda S, Murakami R, Ikeda N. Influence of self-efficacy on the interpersonal behavior of schizophrenia patients

undergoing rehabilitation in psychiatric day-care services. Psych Clin Neurosci. 2012;66(3):203–09. https://doi.org/10.1111/j.1440-1819.2012.02332.x.
40. Boyce P, Parker G. Development of a scale to measure interpersonal sensitivity. Aust N Z J Psychiatry. 1989;23(3):341–351.
41. Huahua Z. Relationship between Interpersonal Sensitivity, Perception of Social Support, and Loneliness Among College Students. *Master's thesis*. Fuzhou: Fujian Normal University; 2018.
42. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev. 1977;84(2):191–215. https://doi.org/10.1037/0033-295X.84.2.191.
43. Jun WH. Anger expression, self-efficacy and interpersonal competency of Korean nursing students. Int Nurs Rev. 2016;63(4):539–46. https://doi.org/10.1111/inr.12314.
44. Rojas Reyes J, Arias-Rojas M. From relational uncertainty to interpersonal sensitivity: a substantive grounded theory for nursing education. Nurs Educ Perspect. 2023;44(4):216–221. https://doi.org/10.1016/j.nedt.2015.09.006.
45. Campbell A. Subjective measures of well-being. Am Psychologist. 1976;31(2).
46. Ni P, Chen J, Liu N. The sample size estimation in quantitative nursing research. Chin J Nurs. 2010;45(4).
47. Brook J, Leanne A, MacLaren DJ, Salmon D. Co-production of an intervention to increase retention of early career nurses: acceptability and feasibility. Nurse Educ Pract. 2020;47:102861. doi:https://doi.org/10.1016/j.nepr.2020.102861.
48. Eren H, Turkmen AS. The relation between nursing students' levels of self-efficacy and caring nurse-patient interaction: a descriptive study. Contemp Nurse. 2020;56(2):185–198. https://doi.org/10.1080/10376178.2020.1782763.
49. Wan X, Huang H, Zhang Y, Peng Q, Guo X, Wu S, et al. The effect of prosocial behaviours on Chinese undergraduate nursing students' subjective well-being: the mediating role of psychological resilience and coping styles. Int J Ment Health Nurs. 2023;32(1):277–289. https://doi.org/10.1111/inm.13081.
50. Barrón-Martínez JB, Salvador-Cruz J. Social abilities in young Mexicans with down syndrome during the COVID-19 pandemic. Int J Dev Disabil. 2023;69(6):888–95. https://doi.org/10.1080/20473869.2022.2038527.
51. Zhou A, Yuan Y. Aggression and anxiety influence the relationship between interpersonal sensitivity and military morale among new recruits. Soc Behav Pers Int J. 2022;50(7):1–8. https://doi.org/10.1037/0021-9010.88.5.879.
52. Lijie R, Bibo M, Dan L, Junsheng L, Bullock A, Muzi Y. Relationship between interpersonal competences and loneliness among Chinese college students: a two-year follow-up study. Curr Psychol. 2023:1–10. https://doi.org/10.1007/s12144-021-02048-0.
53. Chen X, Tian L, Huebner ES. Bidirectional relations between subjective well-being in school and prosocial behavior among elementary school-aged children: a longitudinal study. In Child & youth care forum. Springer; 2020. p. 77–95. https://doi.org/10.1007/s10566-019-09518-4.
54. Schwarzer R, Mueller J, Greenglass E. Assessment of perceived general self-efficacy on the Internet: data collection in cyberspace. Anxiety, Stress, and Coping. 1999;12(2):145–161.
55. Yuan W. Evaluation of reliability and validity of interpersonal competence questionnaire applied among college students. Chin J Sch Health. 2005;26:1046–48.
56. Stavropoulos V, Barber E, de Sena Collier G, Snodgrass JG, Gomez R. Adolescent popularity: distinct profiles and associations with excessive internet usage and interpersonal sensitivity. Child Psychiatry Hum Dev. 2022;53(6):1097–1109. https://doi.org/10.1007/s10578-021-01194-7.
57. Marin TJ, Miller GE. The interpersonally sensitive disposition and health: an integrative review. Psychol Bull. 2013;139(5):941. https://doi.org/10.1037/A0030800.
58. Yao C, Nailing H, Qi S. Analysis on subjective well-being and related factors of elderly college students. Chin Ment Health J. 1995;6:256–57.
59. Hurtado MM, Villena A, Quemada C, Morales-Asencio JM. Personal relationships during and after an initial psychotic episode. First-person experiences. J Ment Health (Abingdon, England). 2024:1–7. https://doi.org/10.1080/09638237.2024.2408245.
60. Fujiwara R, Hasegawa A, Oura S-i, Matsuda Y. Personality traits characterizing a new type of depression lead to stress generation in Japanese University Students. J Psychopathol Behav Assess. 2024;46(1):116–25. https://doi.org/10.1007/s10862-023-10114-z.

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