Influence of Interpersonal Self-Supporting Personality on Social Problem-Solving Among Chinese College Students in Zhengzhou City

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Abstract: This study examines the impact of interpersonal self-supporting personality traits and cognitive biases influence social problem-solving abilities among Chinese college students. Using a comprehensive assessment battery including ISS, APNI, IAES, and SPSI-R-C measures, we examined data from 1,305 participants. Results revealed that interpersonal self-supporting personality traits positively predicted social problem-solving abilities, with this relationship mediated by cognitive biases. Specifically, positive attentional biases mediated the effects of interpersonal responsibility, initiative, and flexibility on problem-solving outcomes. Similarly, positive interpretative biases mediated the influence of interpersonal initiative and flexibility. While most interpersonal self-supporting traits were negatively associated with maladaptive cognitive biases, interpersonal flexibility and initiative showed unique patterns of influence. These findings bridge personality psychology and cognitive science perspectives, demonstrating that both stable personality traits and dynamic cognitive processes shape social problem-solving abilities. Our results suggest that interventions aimed at improving social functioning should target both interpersonal self-supporting personality traits and cognitive biases for optimal effectiveness.

Keywords: Attentional Bias, Interpretative Bias, Self-Supporting Personality, Social Problem-Solving.

1. Introduction

The modernization of Chinese education, as outlined in China Education Modernization 2035, emphasizes the "integration of knowledge and practice" for the first time, highlighting the crucial role of social practice in higher education. The ultimate goal of this social practice is to enhance students' social problem-solving abilities - critical skills for addressing real-world challenges in daily life. While social problem-solving represents an essential soft skill for higher education students, research indicates that students often acknowledge their weakness in soft skills, particularly in problem-solving (Yoke *et al.*, 2022). D'Zurilla et al. (2002) define social problem-solving as a general coping strategy through which individuals develop effective responses to specific problematic situations in everyday life.

The current state of social problem-solving abilities among Chinese college students remains unsatisfactory (Liu *et al.*, 2010), manifesting in various challenges including campus interpersonal conflicts, post-graduation employment delays, and workplace competency gaps. These issues are particularly pronounced among students from private universities (MyCOS, 2023). Research has established connections between personality traits and students' academic and social challenges. The Big Five personality traits have been shown to link with students' academic problems and social problems (D'Zurilla *et al.*, 2011). Specifically, extraversion and conscientiousness strongly correlate with students' motivation (Jung Ku *et al.*, 2021), while extraversion also shows positive correlations with behavioral issues such as smartphone addiction and cyberloafing activities (Adawiyah *et al.*, 2023). Moreover, for people with personality disorders, their problem-solving ability is worrying when faced with complex social problems (Kipman *et al.*, 2022).

However, personality traits manifest differently within Chinese cultural contexts. The self-supporting personality framework, comprising ten distinct positive personality traits rooted in Chinese traditional culture, emphasizes dialectical elements unique to Chinese cultural perspectives (Xia, Xu*, et al.*, 2014). Similar to the Big Five, these self-supporting personality traits positively predict social problem-solving abilities (Xia *et al.*, 2011). Research has also revealed that individuals with low levels of interpersonal self-supporting personality tend to exhibit attentional bias toward negative interpersonal information (Xia *et al.*, 2015; Xia, Shi*, et al.*, 2014). Such cognitive biases - systematic deviations from rational judgment that shape individuals' subjective reality - can impair social problem-solving capabilities. For example, Sternheim et al. (Sternheim *et al.*, 2020) found that individuals with affective disorders demonstrate reduced social problem-solving abilities due to their heightened attention to negative information.

Despite these established relationships, the precise mechanisms through which cognitive biases mediate the influence of personality traits on social problem-solving capabilities remain incompletely understood. This research gap is particularly significant given the substantial challenges Chinese college students face in applying social problem-solving skills to real-life situations. Therefore, this study aims to investigate the intricate relationships between interpersonal self-supporting personality traits, cognitive biases, and social problem-solving abilities among Chinese college students, with particular attention to the mediating role of cognitive biases in this dynamic.

2. Literature review

Understanding effective social problem-solving requires examining how personality traits influence cognitive processing patterns. While research has established direct relationships between personality and problem-solving outcomes, the mediating role of cognitive biases remains unclear. This review integrates social problem-solving theory with personality-cognition frameworks to propose a new model of how interpersonal traits shape problem-solving capabilities through cognitive mechanisms.

2.1 Social Problem-Solving, Interpersonal Self-Supporting Personality And Cognitive Processing

Social problem-solving encompasses real-life challenges rather than laboratory or theoretical problems, operating through two independent processes: problem orientation and problem-solving style. Problem orientations serve metacognitive, motivational functions through cognitive-emotional schemas that reflect individuals' problem-solving willingness. These orientations can be positive or negative, influencing how individuals appraise threats and challenges. Problem-solving styles represent how individuals understand and address everyday problems, manifesting as rational, impulsivity/carelessness, or avoidance approaches. Together, these components form a five-dimensional model for measuring social problem-solving effectiveness (D'Zurilla *et al.*, 2011).

Within this framework, self-supporting personality, grounded in Chinese traditional culture, emerges as a crucial influence on problem-solving capabilities. This integrated construct encompasses both personal and interpersonal aspects formed through individual problem-solving experiences (Xia & Huang, 2009). The interpersonal dimension particularly relates to social problem-solving capabilities (Zeng & Xia, 2015) through five key traits: interpersonal independence in basic activities, initiative in

social interactions, responsibility in maintaining trust, flexibility in communication approaches, and openness to accommodating others (Xia, Xu*, et al.*, 2014).

The link between personality and problem-solving operates through cognitive processing mechanisms. Research demonstrates that low interpersonal self-supporting personality can impair social problem-solving abilities, particularly through increased attention to negative emotional information (Zeng & Xia, 2015). This finding aligns with the personality-event congruence hypothesis (Iacoviello *et al.*, 2009), which suggests that personality traits regulate information sensitivity and stress response patterns.

These personality-cognition interactions can be understood through Kahneman's (2011) dual-system model: deliberate, analytical System 2 processing and automatic, rapid System 1 processing. System 1's emotional sensitivity often produces cognitive biases in attention and interpretation, potentially leading to misunderstanding or overlooking important information. Supporting evidence comes from studies of individuals with affective disorders, showing how negative emotional information creates attention and interpretation biases affecting social problem-solving (Xia *et al.*, 2013).

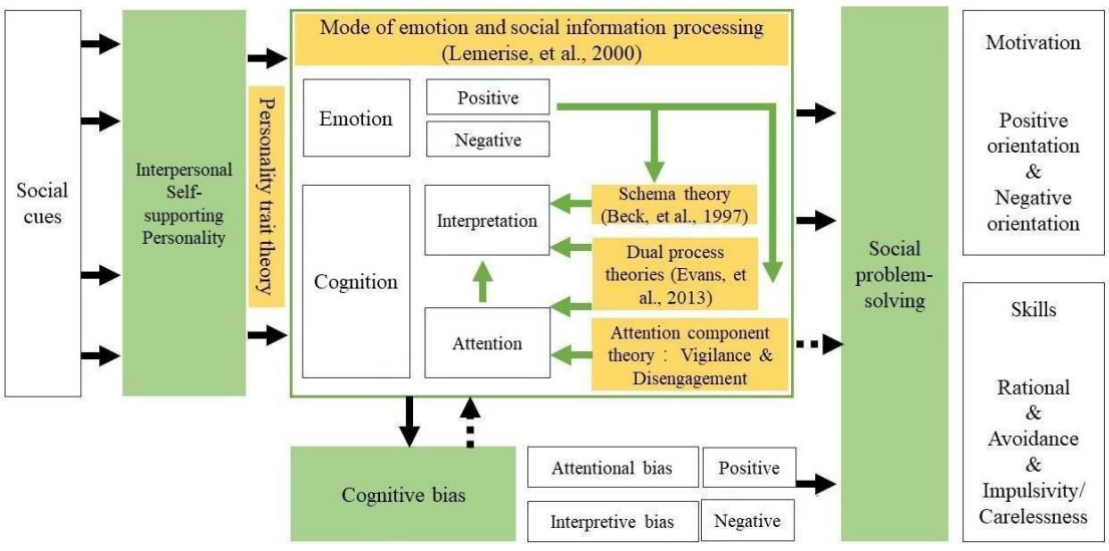
2.2 Information Processing and Personality-Cognition Interactions

Our theoretical framework synthesizes several complementary models to explain how personality shapes problem-solving through cognitive mechanisms. Crick and Dodge's (1994) information processing model provides the foundation, highlighting how cognitive biases affect social competence. Lemerise and Arsenio (2000) expanded this framework by incorporating emotional processes that influence each social information processing stage, recognizing emotion's crucial role in cognitive processing.

The component theory of attention (Posner & Petersen, 1990) explains the specific mechanisms through which personality traits affect information processing, demonstrating how traits influence both initial alertness to information and ability to disengage from it. Schema theory (Evans & Stanovich, 2013) complements this by showing how emotions activate interpretation frameworks influenced by personality traits, affecting how neutral situations may be interpreted positively or negatively. This integration explains how System 1 processing rapidly captures personality-consistent social cues, producing cognitive biases through emotion-cognition interaction within the personality context (Evans & Stanovich, 2013).

Figure 1

Theoretical Framework of Personality Influences on Social Problem-Solving Through Cognitive Bias



Building on this theoretical synthesis, we propose four hypotheses that reflect the interconnected nature of personality, cognitive bias, and problem-solving:

H1. Interpersonal self-supporting personality positively predicts social problem-solving.

H2. Interpersonal self-supporting personality positively predicts positive cognitive bias and negatively predicts negative cognitive bias.

H3. Positive cognitive biases enhance social problem-solving, while negative cognitive biases impair it.

H4. Cognitive bias mediates the relationship between interpersonal self-supporting personality and social problem-solving.

This theoretical integration advances our understanding in several ways. First, it explains the mechanisms through which personality traits influence problem-solving capabilities. Second, it highlights the critical mediating role of cognitive biases in this relationship. Finally, it provides a framework for developing targeted interventions that consider personality and cognitive factors to improve social problem-solving effectiveness.

3. Methodology

This study investigates the mediating role of cognitive biases in the relationship between interpersonal self-supporting personality and social problem-solving among Chinese college students. We employed a quantitative, cross-sectional design using standardized instruments to examine these relationships.

3.1 Research design and Participants

We conducted a cross-sectional correlational study to test our theoretical model. From a population of 29,840 registered students at Zhongyuan Institute Of Science And Technology (2023-2024), we recruited participants through the Students Affairs Office using WeChat class groups. Based on Cochran's formula, we determined a minimum sample size of 380 (95% confidence level, ±7% precision). From 1,412 initial responses, we removed 107 questionnaires due to duplicate responses, completion times under 600 seconds, or uniform response patterns (>95% same answers). The final sample comprised 1,305 students (400 males, 905 females).

3.2 Measurement Instruments

3.2.1 Interpersonal Self-Supporting Personality

Using the interpersonal domain of the Self-Supporting Personality Scale (SSPS-AS), we measured interpersonal self-supporting personality. This 20-item instrument uses a 5-point Likert scale (1="not at all" to 5="completely") to assess five personality traits: interpersonal independence, initiative, responsibility, flexibility, and openness. Each trait is measured through four items. The scale has demonstrated strong psychometric properties, with 10-week test-retest reliability ranging from .62 to .79, and construct validity supported through exploratory and confirmatory factor analyses (Xia & Huang, 2009). In our sample, Cronbach's α ranged from 0.711 to 0.789.

3.2.2 Social Problem-Solving

We assessed social problem-solving using the Chinese version (Liu *et al.*, 2010) of the Social Problem-Solving Inventory-Revised (SPSI-R) (D'Zurilla *et al.*, 2002). This 32-item instrument employs a 5-point Likert scale (0="not at all true for me" to 5="extremely true for me") to measure five dimensions: positive problem orientation, negative problem orientation, rational problem-solving, impulsivity/carelessness style, and avoidance style. Our sample showed Cronbach's α values between 0.615 and 0.888.

3.2.3 Cognitive bias measure

We measured cognitive bias using two standardized instruments.

The Attention to Positive and Negative Information Scale (APNI; Chinese version by Lv *et al.*, 2016) assesses attention bias through 26 items across four factors: positive others, negative others, positive self, and negative self. The scale demonstrated good reliability in our sample (Cronbach's α: 0.799-0.810).

The Interpretation of Ambiguous Events Scale (IAES; based on Beard & Amir, 2009) presents 22 ambiguous scenarios (11 interpersonal, 11 personal) with three possible interpretations (positive, negative, neutral) from Yang's research (2011). Participants first provide their own interpretation before rating the coherence of each provided interpretation on a 5-point scale. Our sample showed strong reliability (Cronbach's α: 0.794-0.902).

3.3 Procedure

The study received ethical approval from [relevant ethics board – Zhongyuan Institute Of Science And Technology, protocol approval ID:12-2023/GS62510UPM]. Data collection occurred through an online survey platform (WENJUANXING-Question Star). Educational faculty members, trained in research ethics protocols, distributed survey access through QR codes to student WeChat class groups. Participants received information about the study's purpose and voluntary nature before accessing the four instruments: ISS, SPSI-R-C, APNI, and IAES.

3.4 Data analysis

We conducted statistical analyses using IBM SPSS Statistics (version 25.0; IBM Corp., Armonk, NY) and AMOS (version 24). Our analysis plan consisted of three stages. First, we examined relationships among variables using Pearson's correlation coefficients. Second, we assessed the influence among variables through multiple linear regression analysis. Finally, we tested the hypothesized mediating effects using structural equation modelling in AMOS. This analytical approach allowed us to examine direct relationships between variables and the proposed mediating role of cognitive biases in the relationship between interpersonal self-supporting personality and social problem-solving.

4. Results

We systematically examined how interpersonal self-supporting personality traits influence social problem-solving abilities, both directly and through cognitive biases. Our analysis progressed from establishing baseline characteristics through increasingly complex relationships, using descriptive statistics, correlation analyses, regression models, and path analyses. This sequential approach allowed us to build a comprehensive picture of these relationships, from basic patterns to sophisticated mediational pathways.

4.1 Descriptive Statistics

To establish the foundation for our analyses, we first examined the distribution patterns of our key variables across the sample. Analysis of interpersonal self-supporting personality traits showed means above the questionnaire's midpoint of 12 (Table 1). Interpersonal responsibility demonstrated the highest mean ($M = 15.90, SD = 2.45$), followed by flexibility ($M = 14.51, SD = 2.41$), openness ($M = 14.05$, $SD = 2.98$), initiative ($M = 12.69, SD = 2.98$), and independence ($M = 12.11, SD = 3.71$). In social problem-solving dimensions, positive problem orientation and rational problem-solving scored higher than avoidance and impulsivity styles. These descriptive findings establish the baseline distribution of our variables, with most personality traits scoring above median levels and problem-solving styles showing distinct patterns.

Table 1

Means and Standard Deviations (M±SD) for Interpersonal Self-Supporting Personality Traits, Social Problem-Solving, and Cognitive Biases by Gender

	Male (n=400)	Female (n=905)	Total (n=1305)	Mean of setting
SSPIind	12.87±3.85	11.77±3.60	12.11±3.71	12
SSPIrep	16.03±2.58	15.85±2.39	15.90±2.45	12
SSPIini	12.94±3.09	12.57±2.93	12.69±2.98	12
SSPIopn	14.05±3.21	14.05±2.87	14.05±2.98	12
SSPIflx	14.69±2.66	14.44±2.28	14.51±2.41	12
RPS	49.10±7.43	48.86±6.19	48.93±6.59	39
AS	12.84±4.61	13.45±4.33	13.26±4.42	18
ICS	9.74±2.96	9.74±2.60	9.74±2.71	12
NPO	13.94±4.02	15.53±3.56	15.04±3.78	15
PPO	15.02±2.49	14.72±2.22	14.81±2.31	9
SPS	117.61±15.21	114.85±14.19	115.7±14.56	96
CBaP	58.50±7.94	58.84±6.90	58.74±7.24	33
CBaN	34.61±6.92	34.70±6.13	34.67±6.38	33
CBiPOS	75.70±12.70	76.41±11.19	76.19±11.67	33
CBiNEG	51.69±14.75	52.94±13.9	52.56±14.17	33

Note:
SSPIind, SSPIrep, SSPIini, SSPIopn, SSPIflx stand for Interpersonal Independence, Interpersonal Responsibility, Interpersonal Initiative, Interpersonal Openness, Interpersonal Flexibility.
RPS, AS, ICS, NPO, PPO, SSP stand for Rational Problem-Solving, Avoidance Style, Impulsivity/Carelessness Style, Negative Problem Orientation, Positive Problem Orientation, Social Problem-Solving total.
CBaP, CBaN stand for positive attentional bias, negative attentional bias.
CBiPOS, CBiNEG stand for Positive Interpretative Bias, Negative Interpretative Bias.
$^{***}p<.001$, $^{**}p<.01$, $^{*}p<.05$

4.2 Correlation Analysis

Building on these distributional patterns, we next examined how our variables interrelated to understand their associations. These correlational analyses provided insights into the relationships among personality traits, social problem-solving abilities, and cognitive biases. Our initial correlation analysis revealed significant relationships between personality traits and social problem-solving. Interpersonal responsibility demonstrated the strongest relationship with overall social problem-solving ($r = .535, p < .01$), followed by independence ($r = .424, p < .01$), flexibility ($r = .416, p < .01$), initiative ($r = .398, p < .01$), and openness ($r = .275, p < .01$). Further examination showed that all five personality traits positively correlated with the positive dimensions of social problem-solving and negatively correlated with its negative dimensions.

Extending our analysis to cognitive biases, we found that personality traits showed positive correlations with positive attentional and interpretative bias while negatively correlating with negative attentional and interpretative bias. Moreover, social problem-solving demonstrated significant correlations with cognitive biases, showing positive relationships with positive attentional bias ($r = .523, p < .01$) and positive interpretative bias ($r = .305, p < .01$), and negative relationships with negative attentional bias ($r = -.404, p < .01$) and negative interpretative bias ($r = -.433, p < .01$).These systematic patterns of correlation suggested the presence of more complex relationships among our variables, pointing to the need for more sophisticated regression analyses to understand their predictive relationships. Table 2 presents these findings.

Table 2

Pearson Correlations Among Interpersonal Self-Supporting Personality Traits, Social Problem-Solving Dimensions, and Cognitive Biases.

	SSPIind	SSPIrep	SSPIini	SSPI opn	SSPI flx	CBaP	CBaN	CBi POS	CBi NEG
RPS	.187**	.336**	.253**	.060*	.461**	.561**	-.082**	.333**	-.222**
AS	-.362**	-.516**	-.351**	-.323**	-.222**	-.322**	.442**	-.168**	.407**
ICS	-.257**	-.472**	-.210**	-.300**	-.197**	-.235**	.361**	-.103**	.325**
NPO	-.607**	-.339**	-.396**	-.312**	-.144**	-.166**	.569**	-.123**	.430**
PPO	.152**	.314**	.217**	.081**	.413**	.534**	-.109**	.329**	-.233**
SPS	.424**	.535**	.398**	.275**	.416**	.523**	-.404**	.305**	-.433**
CBaP	.188**	.227**	.321**	.089**	.439**	/	/	/	/
CBaN	-.408**	-.278**	-.278**	-.438**	-.091**	/	/	/	/
CBiPOS	.133**	.117**	.191**	.077**	.239**	/	/	/	/
CBiNEG	-.349**	-.292**	-.309**	-.255**	-.207**	/	/	/	/

4.3 Predictive Effects of Personality Traits on Social Problem-Solving

Given the strong correlational patterns, we next conducted hierarchical multiple regression analyses to examine how personality traits predict social problem-solving abilities while controlling for demographic variables. Before testing our main predictors, we verified the assumptions for multiple regression. The Durbin-Watson coefficients (≈ 2) confirmed the independence of observations, VIF values (all ≈ 1) indicated no multicollinearity and residual analyses showed normal distribution patterns.

As shown in Table 3, our initial model (Model 1), which examined demographic controls, revealed a significant but modest effect ($F = 3.037,\ p < .05$), with gender emerging as the only significant predictor ($B = -2.648,\ p < .01$), explaining 0.6% of the variance in social problem-solving. Building on this baseline, our main analysis (Model 2) incorporating the five personality traits showed substantial predictive power ($F = 133.294,\ p < .001$). All five traits significantly predicted social problem-solving abilities: Interpersonal Responsibility ($B = 2.301,\ p < .001$), Flexibility ($B = 1.582,\ p < .001$), Independence ($B = 0.835,\ p < .001$), Initiative ($B = 0.622,\ p < .001$), and Openness ($B = 0.375,\ p < .001$). This model demonstrated considerably stronger explanatory power, accounting for an additional 47.7% of the variance ($\Delta R^2 = 0.477$). These regression results quantify the substantial predictive relationship between personality traits and problem-solving abilities, with each trait making unique contributions beyond demographic factors.

Table 3

Hierarchical Multiple Regression Analysis Predicting Social Problem-Solving from Interpersonal Self-Supporting Personality Traits.

	Model 1		Model 2	
IV	B	sig	B	sig
(Constant)	118.634	0.000	33.002	0.000
gender	-2.648	0.004	-0.654	0.334
graduate level	1.913	0.160	1.184	0.231
grade	-0.425	0.276	-0.314	0.267
discipline category	0.019	0.891	0.029	0.780
SSPIind			0.835	0.000
SSPIrep			2.301	0.000
SSPIini			0.622	0.000
SSPIopn			0.375	0.000
SSPIflx			1.582	0.000
R^2	0.009		0.481	

IV	Model 1 B	sig	Model 2 B	sig
ΔR^2	0.006		0.477	
F	3.037	0.017	133.294	0.000

4.4 Predictive Effects of Personality Traits on Cognitive Biases

Following our analysis of social problem-solving, we examined how personality traits predict different types of cognitive biases through a series of hierarchical regression analyses. We conducted separate analyses for four dependent variables: positive and negative attentional bias and positive and negative interpretative bias. As with our previous analyses, we first verified regression assumptions. The Durbin-Watson coefficients (≈ 2) confirmed observation independence, VIF values (≈ 1) showed no multicollinearity, and residual analyses indicated normal distributions.

As shown in Table 4, our baseline models examining demographic controls (Models 1, 3, 5, and 7) revealed significant effects for negative attentional bias ($F = 3.576, p < .01$) and negative interpretative bias ($F = 3.447, p < .01$). Specifically, discipline category emerged as a significant predictor of negative attentional bias ($B = -0.157, p < .05$), explaining 0.8% of its variance.

Building on these baseline models, our primary analyses incorporating personality traits (Models 2, 4, 6, and 8 in Table 4) demonstrated substantial predictive power across all cognitive biases (F-values ranging from 13.042 to 65.412, all p < .001). For positive attentional bias, three traits showed significant influence: Interpersonal Responsibility ($B = 0.330, p < .001$), Initiative ($B = 0.470, p < .001$), and Flexibility ($B = 1.084, p < .001$), together explaining 24.7% of the variance. Negative attentional bias was predicted by Independence ($B = -0.477, p < .001$), Responsibility ($B = -0.312, p < .001$), Openness ($B = -0.689, p < .001$), and Initiative ($B = -0.129, p < .05$), accounting for 30.8% of the variance.

For interpretative biases, Initiative ($B = 0.415, p < .01$) and Flexibility ($B = 0.951, p < .001$) predicted positive bias, explaining 7.7% of the variance. Negative interpretative bias was predicted by Independence ($B = -0.784$), Initiative ($B = -0.575$), Openness ($B = -0.596$), and Flexibility ($B = -0.589$) (all $p < .001$), accounting for 21.5% of the variance. These analyses reveal that personality traits consistently predict cognitive biases, with different traits showing distinct influence patterns across positive and negative biases in both attentional and interpretative domains.

Table 4

Hierarchical Multiple Regression Analyses Predicting Cognitive Biases from Interpersonal Self-Supporting Personality Traits.

	Positive attentional bias		Negative attentional bias		Positive interpretative bias		Negative interpretative bias	
	Model 1	Model 2	Mode 3	Model 4	Model 5	Model 6	Model 7	Model 8
IV	B	B	B	B	B	B	B	B
Constant	58.972***	30.486***	35.918***	58.388***	73.574***	47.402***	50.647***	101.898***
Gender	0.156	0.713	-0.416	-0.961**	1.085	1.643	0.351	-0.993
Graduate level	0.249	0.293	-0.082	0.205	0.957	0.975	1.175	1.669
Grade	-0.078	-0.075	0.301	0.192	-0.470	-0.456	0.622	0.506
Discipline	-0.106	-0.096	-0.157*	-0.138**	0.082	0.085	-0.172	-0.154
SSPIind		0.033		-0.477***		0.121		-0.784***
SSPIrep		0.330***		-0.312***		0.203		-0.989
SSPIini		0.470***		-0.129*		0.415**		-0.575***
SSPIopn		0.005		-0.689***		0.099		-0.596***
SSPIflx		1.084***		0.018		0.951***		-0.589***
R^2	0.002	0.252	0.011	0.313	0.003	0.083	0.010	0.220
ΔR^2	-0.001	0.247	0.008	0.308	0.000	0.077	0.007	0.215
F	0.772	48.512***	3.576**	65.412***	1.089	13.042***	3.447**	40.568***

4.5 Predictive Effects of Cognitive Biases on Social Problem-Solving

Having established how personality traits predict cognitive biases, we next examined how these biases, in turn, influence social problem-solving abilities.

We conducted hierarchical regression analysis examining eight types of cognitive biases (positive and negative attentional biases about self and others, and positive and negative interpretative biases about self and others) as predictors of social problem-solving, while controlling for demographic variables. Initial assumption testing confirmed appropriate conditions for regression analysis, with Durbin-Watson coefficients near 2 indicating independence of observations, VIF values near 1 showing no multicollinearity, and normally distributed residuals.

As presented in Table 5, Model 2 revealed significant effects of cognitive biases on social problem-solving after controlling for demographic variables ($F = 100.382$, $p < .001$). Six cognitive biases emerged as significant predictors: positive attentional bias about self ($B = 1.453$, $p < .001$), positive attentional bias about others ($B = 0.364$, $p < .01$), negative attentional bias about self ($B = -0.620$, $p < .001$), negative attentional bias about others ($B = -0.782$, $p < .001$), negative interpretative bias about self ($B = -0.150$, $p < .01$), and positive interpretative bias about self ($B = 0.213$, $p < .01$). Together, these cognitive biases explained 47.8% of the variance in social problem-solving ($\Delta R^2 = 0.478$). These findings demonstrate that both attentional and interpretative biases substantially predict social problem-solving abilities, with distinct patterns for self-directed versus other-directed biases.

Table 5

Hierarchical Multiple Regression Analysis Predicting Social Problem-Solving from Attentional and Interpretative Cognitive Biases.

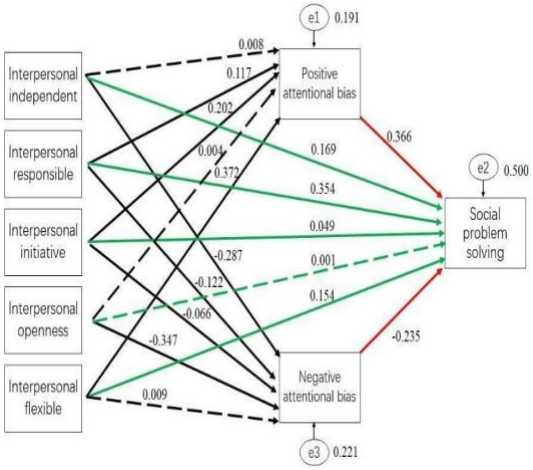
	Model 1		Model 2	
IV	B	sig	B	sig
Constant	118.634	0.000	91.195	0.000
Gender	-2.648	0.004	-3.027	0.000
Graduate Level	1.913	0.160	1.656	0.094
Grade	-0.425	0.276	0.116	0.684
Discipline Category	0.019	0.891	-0.041	0.689
CBaPS			1.453	0.000
CBaPO			0.364	0.001
CBaNS			-0.620	0.000
CBaNO			-0.782	0.000
CBiSps			-0.028	0.664
CBiSng			-0.150	0.016
CBiOps			0.213	0.004
CBiOng			-0.103	0.093
R^2	0.009		0.483	
ΔR^2	0.006		0.478	
F	3.037	0.017	100.382	0.000

4.6 Path model of the mediating effects between the variables

Building on our regression findings, we conducted path analyses to examine how attentional biases might mediate the relationship between personality traits and social problem-solving. We tested a structural equation model (shown in Figure 2) examining how positive and negative attentional biases mediate the relationships between the five interpersonal self-supporting personality traits and social problem-solving.

Figure 2

Path Model of Attentional Cognitive Biases Mediating Between Interpersonal Self-Supporting Personality Traits and Social Problem-Solving.



As detailed in Table 6, our path analysis revealed several non-significant pathways in the mediation model. Neither interpersonal independence nor interpersonal openness significantly predicted positive attentional bias ($\beta = 0.008$ and $\beta = 0.004$ respectively, both $p > .05$). Similarly, interpersonal flexibility showed no significant effect on negative attentional bias ($\beta = 0.009$, $p > .05$). The direct path from interpersonal openness to social problem-solving was also non-significant ($\beta = 0.001$, $p > .05$). All other pathways in the model demonstrated significant effects. These path analysis results indicate that attentional biases serve as mediators for some, but not all, personality traits' effects on social problem-solving.

Table 6

Standardized Path Coefficients for Attentional Bias Mediation Model.

Pathway	Unstandardized B	Standardized B	S.E.	C.R.	*p*
SSPIind→CBaP	0.015	0.008	0.047	0.316	0.752
SSPIrep→CBaP	0.333	0.117	0.071	4.69	***
SSPIini→CBaP	0.473	0.202	0.058	8.123	***
SSPIopn→CBaP	0.009	0.004	0.058	0.151	0.88
SSPIflx→CBaP	1.079	0.372	0.072	14.933	***
SSPIind→CBaN	-0.467	-0.287	0.04	-11.744	***
SSPIrep→CBaN	-0.302	-0.122	0.06	-5.008	***
SSPIini→CBaN	-0.134	-0.066	0.049	-2.705	0.007
SSPIopn→CBaN	-0.703	-0.347	0.049	-14.197	***
SSPIflx→CBaN	0.022	0.009	0.061	0.357	0.721
CBaP→SPS	0.694	0.366	0.041	16.792	***
CBaN→SPS	-0.516	-0.235	0.049	-10.59	***
SSPIind→SPS	0.603	0.169	0.074	8.19	***
SSPIrep→SPS	1.917	0.354	0.108	17.765	***
SSPIini→SPS	0.218	0.049	0.089	2.442	0.015
SSPIopn→SPS	0.004	0.001	0.094	0.041	0.967
SSPIflx→SPS	0.847	0.154	0.117	7.256	***

4.6.1 Mediation Analysis Through Attentional Bias

To quantify the mediating effects of attentional bias, we conducted bootstrap analyses examining both partial and full mediation pathways. Using bootstrap analysis (5000 samples, 95% confidence interval), we identified several significant mediating pathways through attentional bias. As shown in Table 7, negative attentional bias partially mediated the relationship between interpersonal independence and social problem-solving (4.20% mediation effect). For interpersonal responsibility, both positive and negative attentional bias served as partial mediators (4.0% and 2.7% respectively). We found full mediation through both positive and negative attentional bias for interpersonal initiative (5.7% and 1.2%), while negative attentional bias fully mediated the effect of interpersonal openness (6.3%). The strongest mediation effect emerged for interpersonal flexibility, where positive attentional bias partially mediated 13.1% of its effect on social problem-solving. These results reveal that attentional bias serves as both partial and full mediator, with varying strengths across different personality traits.

Table 7

Direct, Indirect, and Total Effects of Interpersonal Self-Supporting Personality Traits on Social Problem-Solving Through Attentional Bias Mediation.

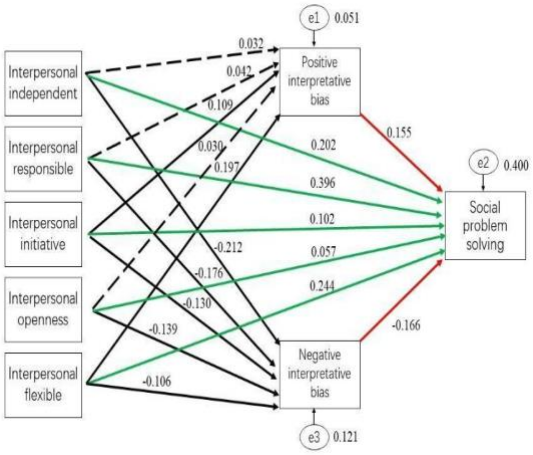
Pathway	Division	B	SE	Bias corrected 95% CI Lower	Upper	*p*	Effect sizes (%)
SSPIind→CBaP→SPS	indirect effect	0.010	0.047	-0.08	0.102	0.836	0.20%
SSPIind→CBaN→SPS	indirect effect	0.241	0.037	0.174	0.320	<.001	4.20%
	direct effect	0.603	0.108	0.392	0.817	<.001	/
SSPIrep→CBaP→SPS	indirect effect	0.231	0.060	0.121	0.358	<.001	4.00%
SSPIrep→CBaN→SPS	indirect effect	0.156	0.040	0.085	0.243	<.001	2.70%
	direct effect	1.917	0.129	1.671	2.179	<.001	/
SSPIini→CBaP→SPS	indirect effect	0.329	0.058	0.218	0.447	<.001	5.70%
SSPIini→CBaN→SPS	indirect effect	0.069	0.036	0.003	0.146	<.05	1.20%
	direct effect	0.218	0.134	-0.058	0.473	0.12	/
SSPIopn→CBaP→SPS	indirect effect	0.006	0.045	-0.084	0.095	0.899	0.10%
SSPIopn→CBaN→SPS	indirect effect	0.363	0.049	0.274	0.464	<.001	6.30%
	direct effect	0.004	0.111	-0.213	0.219	0.98	/
SSPIflx→CBaP→SPS	indirect effect	0.749	0.097	0.573	0.956	<.001	13.10%
SSPIflx→CBaN→SPS	indirect effect	-0.011	0.041	-0.093	0.067	0.757	-0.20%
	direct effect	0.847	0.145	0.565	1.133	<.001	/
	total effect	2.143	0.185	1.860	2.456	<.001	/

4.6.2 Mediation Analysis Through Interpretative Bias

Building on our attentional bias findings, we next examined the mediating role of interpretative bias using the same analytical approach.

Figure 3

Path Model Testing Interpretative Cognitive Bias as a Mediator Between Interpersonal Self-Supporting Personality Traits and Social Problem-Solving.



Our path analysis (Figure 3) revealed that interpersonal independence, responsibility, and openness did not significantly predict positive interpretative bias ($\beta = 0.032$, $\beta = 0.042$, $\beta = 0.030$, *respectively; all* $p > .05$), while all other pathways showed significance (Table 8).

Table 8

Standardised Path Coefficients for Interpretative Bias Mediation Between Interpersonal Self-Supporting Personality Traits and Social Problem-Solving.

Pathway	Unstandardized B	Standardized B	S.E.	C.R.	*p*
SSPIind→CBiPOS	0.099	0.032	0.084	1.186	0.236
SSPIrep→CBiPOS	0.196	0.042	0.127	1.55	0.121
SSPIini→CBiPOS	0.42	0.109	0.104	4.035	***
SSPIopn→CBiPOS	0.116	0.030	0.104	1.114	0.265
SSPIflx→CBiPOS	0.941	0.197	0.129	7.296	***
SSPIind→CBiNEG	-0.769	-0.212	0.094	-8.189	***
SSPIrep→CBiNEG	-0.964	-0.176	0.142	-6.773	***
SSPIini→CBiNEG	-0.587	-0.130	0.117	-5.025	***
SSPIopn→CBiNEG	-0.627	-0.139	0.117	-5.355	***
SSPIflx→CBiNEG	-0.591	-0.106	0.145	-4.084	***
CBiPOS→SPS	0.175	0.155	0.025	7.029	***
CBiNEG→SPS	-0.162	-0.166	0.022	-7.276	***
SSPIind→SPS	0.712	0.202	0.077	9.215	***
SSPIrep→SPS	2.114	0.396	0.116	18.187	***
SSPIini→SPS	0.448	0.102	0.095	4.705	***
SSPIopn→SPS	0.251	0.057	0.095	2.648	0.008
SSPIflx→SPS	1.324	0.244	0.119	11.11	***

As detailed in Table 9, bootstrap analyses revealed several significant mediating effects through interpretative bias. Negative interpretative bias fully mediated the relationship between interpersonal independence and social problem-solving (2.2% mediation effect) and partially mediated the effect of interpersonal responsibility (2.7%). Both positive and negative interpretative bias partially mediated the effects of interpersonal initiative (1.3% and 1.7%) and flexibility (2.9% and 1.7%). Negative

interpretative bias also partially mediated the effect of interpersonal openness (1.8%). These findings demonstrate that interpretative bias primarily serves as a partial mediator, with generally smaller effect sizes compared to attentional bias mediation.

Table 9

Analysis of indirect effect, direct effect and total effect of the mediating role of interpretative bias between interpersonal self-supporting personality and social problem-solving.

				Bias corrected 95% CI			
Pathway	Division	B	SE	Lower	Upper	*p*	Effect sizes (%)
SSPIind→CBiPOS→SPS	indirect effect	0.017	0.020	-0.022	0.060	0.372	0.30%
SSPIind→CBiNEG→SPS	indirect effect	0.124	0.026	0.078	0.182	<.001	2.20%
	direct effect	0.712	0.107	0.51	0.925	<.001	/
SSPIrep→CBiPOS→SPS	indirect effect	0.034	0.026	-0.014	0.09	0.143	0.60%
SSPIrep→CBiNEG→SPS	indirect effect	0.156	0.035	0.096	0.233	<.001	2.70%
	direct effect	2.114	0.141	1.845	2.404	<.001	/
SSPIini→CBiPOS→SPS	indirect effect	0.074	0.027	0.027	0.134	<.01	1.30%
SSPIini→CBiNEG→SPS	indirect effect	0.095	0.028	0.048	0.154	<.001	1.70%
	direct effect	0.448	0.140	0.165	0.722	<.01	/
SSPIopn→CBiPOS→SPS	indirect effect	0.020	0.022	-0.022	0.066	0.331	0.40%
SSPIopn→CBiNEG→SPS	indirect effect	0.101	0.027	0.055	0.163	<.001	1.80%
	direct effect	0.251	0.108	0.035	0.461	<.05	/
SSPIflx→CBiPOS→SPS	indirect effect	0.165	0.042	0.093	0.261	<.001	2.90%
SSPIflx→CBiNEG→SPS	indirect effect	0.096	0.03	0.043	0.163	<.01	1.70%
	direct effect	1.324	0.140	1.048	1.600	<.001	/
	total effect	5.732	0.185	5.364	6.087	<.001	/

Our analyses revealed a complex network of relationships among personality traits, cognitive biases, and social problem-solving abilities. We found that personality traits not only directly predict social problem-solving but also operate through both attentional and interpretative biases. The strength and nature of these relationships vary systematically across different personality traits, with some effects being fully mediated by cognitive biases while others show partial mediation. Notably, attentional bias demonstrated stronger mediating effects compared to interpretative bias, suggesting its more prominent role in the personality-problem solving relationship.

5. Discussion

Our study investigated the complex relationships between interpersonal self-supporting personality traits, cognitive biases, and social problem-solving abilities. Through systematic analysis, we found support for all four hypotheses, revealing both direct relationships and mediating mechanisms.

Our first finding revealed systematic relationships between interpersonal self-supporting personality traits and social problem-solving abilities. Consistent with hypothesis 1, individuals with stronger interpersonal self-supporting personality traits demonstrated enhanced social problem-solving abilities. This aligns with previous research indicating that traits such as empathy, assertiveness, and cooperation better equip individuals to navigate social challenges (Koruklu, 2015). The influence hierarchy we found - from interpersonal responsibility through flexibility, independence, initiative, to openness - partially contrasts with previous findings where flexibility and openness showed the strongest impact on practical interpersonal problems (Xia *et al.*, 2011). Our results particularly highlight the role of responsibility, supporting research showing that responsible individuals tend to be more

proactive and ethical in decision-making (Cam & Alkal, 2020). These findings extend our understanding of how specific personality traits contribute to social problem-solving capabilities.

Our second finding supported hypothesis 2, demonstrating that personality traits systematically influence cognitive biases. Individuals with stronger interpersonal self-supporting personality traits showed greater positive cognitive biases and reduced negative biases (Xia *et al.*, 2013). The influence was stronger on negative than positive biases, particularly for attentional bias compared to interpretative bias. This aligns with research showing negative experiences have stronger impacts on attention and cognition than positive ones (Baumeister *et al.*, 2001). As Norris et al. (Norris *et al.*, 2011) found, more independent individuals tend to show stronger responses to negative social stimuli, possibly due to their focus on maintaining personal control. These differential effects on attentional versus interpretative biases suggest that personality traits may have their strongest impact on early-stage information processing, where attentional mechanisms operate, rather than later-stage interpretative processes. This pattern indicates the fundamental role of personality in shaping initial cognitive responses to social stimuli.

Our third finding confirmed hypothesis 3, revealing differential impacts of cognitive biases on social problem-solving abilities. Both attentional and interpretative biases significantly influenced problem-solving, but with distinct patterns. The impact of attentional biases was more comprehensive, with both self-related and other-related positive and negative attention biases significantly affecting problem-solving (Acciarini *et al.*, 2021)This aligns with research showing that attentional focus on both positive and negative social cues enables more appropriate responses to social challenges (Richards *et al.*, 2014). For interpretative biases, we found a more selective influence. Only self-related positive and other-related negative interpretation biases significantly affected problem-solving. This selective impact aligns with self-concept theory (Mohebi & Bailey, 2020), suggesting that positive self-interpretation reinforces confidence in social problem-solving. The impact of negative other-related interpretative bias supports Hertel et al.'s (Hertel *et al.*, 2003) findings that such biases can lead to more careful social interactions. These findings highlight the distinct roles of attentional and interpretative biases in social problem-solving, with attentional biases showing broader influence compared to more selective interpretative effects.

Our fourth finding supported hypothesis 4, demonstrating that cognitive biases mediate the relationship between personality traits and problem-solving abilities. The mediational analyses revealed distinct patterns for attentional and interpretative biases. Positive attentional bias mediated the effects of responsibility, initiative, and flexibility on problem-solving, supporting research on adaptive problem-solving through positive focus (Suslow *et al.*, 2022). Negative attentional bias mediated effects of independence, responsibility, initiative, and openness, aligning with findings about how negative attention affects problem-solving motivation (Cole *et al.*, 2016). For interpretative bias, positive bias mediated only initiative and flexibility effects, while negative interpretative bias mediated all five personality traits' effects on problem-solving. This comprehensive mediation by negative interpretative bias aligns with the Combined Cognitive Bias Hypothesis regarding social anxiety and functioning (Lau *et al.*, 2021). These mediational patterns reveal the complex pathways through which personality traits influence problem-solving abilities via cognitive biases.

Collectively, our findings reveal a nuanced interplay between personality traits, cognitive biases, and social problem-solving abilities. The results demonstrate both direct effects of personality traits on problem-solving and indirect effects through cognitive biases, with distinct patterns for attentional versus interpretative biases.

6. Implications and limitations

Our findings offer significant theoretical and practical implications for education and psychology while also highlighting important limitations and future directions. Our study advances theoretical understanding of the relationships between personality, cognitive biases, and social problem-solving. The integration of these variables expands existing models by establishing cognitive biases not only as independent predictors but as crucial mediators between personality traits and problem-solving abilities. This theoretical framework provides a foundation for investigating how specific cognitive biases interact with personality dimensions to influence social behaviours. The mediational pathways we identified suggest new directions for understanding the mechanisms linking personality traits to

social outcomes. These theoretical advances create opportunities for developing more comprehensive models of social behaviour and personality functioning.

Our findings have direct implications for educational and psychological practice. For educators, our results highlight how educational experiences shape personality development and subsequent problem-solving abilities (Govindaraj & Pandiyaraj, 2022). This suggests the value of implementing training programs focused on modifying attention biases within educational curricula, particularly in contexts involving interpersonal conflicts and collaborative work.

For psychologists, our findings support the potential efficacy of cognitive-behavioral therapies (CBT) targeting both attentional and interpretative biases. The demonstrated relationship between cognitive biases and social problem-solving suggests that interventions combining personality assessment with cognitive bias modification could enhance therapeutic outcomes. These practical applications offer evidence-based approaches for enhancing social problem-solving abilities in both educational and clinical settings.

While our study provides valuable insights, important methodological limitations warrant consideration. A key limitation involves our use of offline measurement for cognitive biases, which may not fully capture real-time information processing. This distinction between offline and online cognitive processing raises questions about whether the mediating effects we observed would persist during immediate information processing. Future research should examine these relationships using online measurement approaches to validate our findings in real-time processing contexts.

Our study advances both theoretical understanding and practical applications while identifying important directions for future research. The findings provide a foundation for evidence-based interventions while acknowledging the need for additional investigation using alternative methodological approaches.

7. Conclusion

Our investigation examined the complex relationships among interpersonal self-supporting personality traits, cognitive biases, and social problem-solving abilities, revealing systematic patterns of direct and indirect effects. First, interpersonal self-supporting personality traits demonstrated significant direct effects on social problem-solving abilities. Interpersonal responsibility emerged as the strongest predictor, followed by flexibility and initiative. These relationships held consistent across analyses while controlling for demographic variables. Second, cognitive biases played a substantial role in social problem-solving. Positive attentional and interpretative biases enhanced problem-solving abilities through increased self-efficacy and adaptive responses. Conversely, negative biases impaired problem-solving capabilities, particularly in motivational dimensions, by amplifying perceived threats and reducing proactive engagement. Third, cognitive biases mediated the relationship between personality traits and social problem-solving abilities. Notably, attentional biases showed stronger mediating effects than interpretative biases, with positive biases facilitating and negative biases impeding the influence of personality traits on problem-solving outcomes.

However, one key limitation of the current studies lies in the sampling, particularly within the context of Zhongyuan Institute, where the participants were drawn predominantly from a specific educational and cultural background. This limits the generalizability of the findings to broader populations, as the sample may not fully represent the diversity of cognitive biases and social problem-solving abilities found in different age groups, cultural contexts, or educational settings. Given that interpersonal self-supporting personality traits and cognitive biases may vary across different groups, caution is needed when generalizing the results beyond this specific cohort. Future research should aim to include more diverse and representative samples, spanning different educational institutions, cultural backgrounds, and age ranges, to increase the external validity of the findings. Additionally, longitudinal studies across various contexts (e.g., workplace, community) could provide more comprehensive insights into how cognitive biases influence social problem-solving over time and in different life domains.

In conclusion, these findings advance our understanding of the mechanisms through which personality traits influence social problem-solving abilities. The demonstrated mediating role of cognitive biases, particularly the differential effects of attentional versus interpretative biases, establishes a more nuanced framework for understanding social problem-solving development.

8. Co-Author Contribution

The authors declare no conflicts of interest. This study was conceptualized by WW and AMM. WW developed the research materials, conducted data collection and analysis as part of their doctoral research. AMM provided statistical guidance and supervised the manuscript development. WW prepared the initial draft, with AMM providing substantial revisions and editorial oversight. NANB contributed to the supervision of this research. All authors reviewed and approved the final manuscript.

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10. References

Acciarini, C., Brunetta, F., & Boccardelli, P. (2021). Cognitive biases and decision-making strategies in times of change: a systematic literature review. *Management Decision*, *59*(3), 638-652.

Adawiyah, R., Azizan, A., Sahar, A., & Herawati, I. (2023). Relationship between Smartphone Addiction, Personality Traits and Cyberloafing Behaviour among Malaysian Youths. *Asian Journal of University Education*, *19*(2), 395-403. https://doi.org/10.24191/ajue.v19i2.22228

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of general psychology*, *5*(4), 323-370. https://doi.org/10.1037/1089-2680.5.4.323

Beard, C., & Amir, N. (2009). Interpretation in social anxiety: When meaning precedes ambiguity. *Cognitive therapy and research*, *33*, 406-415. https://doi.org/10.1007/s10608-009-9235-0

Cam, S., & Alkal, A. (2020). An Investigation of Interpersonal Problem Solving in University Students in Terms of Personality Traits, Resilience and Hope. *European Journal of Educational Sciences*, *7*(1), 15-31. https://doi.org/10.19044/ejes.v7no1a2

Cole, C. E., Zapp, D. J., Fettig, N. B., & Pérez-Edgar, K. (2016). Impact of attention biases to threat and effortful control on individual variations in negative affect and social withdrawal in very young children. *Journal of Experimental Child Psychology*, *141*, 210-221. https://doi.org/10.1016/j.cpr.2009.11.003

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological bulletin*, *115*(1), 74. https://doi.org/10.1037/0033-2909.115.1.74

D'Zurilla, T. J., Maydeu-Olivares, A., & Gallardo-Pujol, D. (2011). Predicting social problem solving using personality traits. *Personality and individual Differences*, *50*(2), 142-147. https://doi.org/10.1016/j.paid.2010.09.015

D'Zurilla, T. J., Nezu, A. M., & Maydeu-Olivares, A. (2002). Social problem-solving inventory-revised. https://doi.org/10.1037/t05068-000

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on psychological science*, *8*(3), 223-241. https://doi.org/10.1177/1745691612460685

Govindaraj, Y., & Pandiyaraj, G. (2022). Social responsibility and leadership behaviour among higher educational students in the 21st century. *Asian Journal of University Education*, *18*(4), 1119-1129. https://doi.org/10.24191/ajue.v18i4.20043

Hertel, P. T., Mathews, A., Peterson, S., & Kintner, K. (2003). Transfer of training emotionally biased interpretations. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, *17*(7), 775-784. https://doi.org/10.1002/acp.905

Iacoviello, B. M., Grant, D. A., Alloy, L. B., & Abramson, L. Y. (2009). Cognitive personality characteristics impact the course of depression: A prospective test of sociotropy, autonomy and

domain-specific life events. *Cognitive therapy and research*, *33*, 187-198. https://doi.org/10.1007/s10608-008-9197-7

Jung Ku, C., Yoke Lian, L., Rizal, H., Rau Krishnan, A., Amin, H., Samsulbahri, M. N., & Ghazali, M. F. (2021). Big Five Personality Traits and Motivation in Learning Mandarin as Foreign Language. *Asian Journal of University Education*, *17*(4), 106-116. https://doi.org/10.24191/ajue.v17i4.16180

Kahneman, D. (2011). Thinking, fast and slow. *Farrar, Straus and Giroux*.

Kipman, U., Bartholdy, S., Weiss, M., Aichhorn, W., & Schiepek, G. (2022). Personality traits and complex problem solving: Personality disorders and their effects on complex problem-solving ability. *Frontiers in Psychology*, *13*, 788402. https://doi.org/10.3389/fpsyg.2022.788402

Koruklu, N. (2015). Personality and Social Problem-Solving: The Mediating Role of Self-Esteem. *Educational Sciences: Theory and Practice*, *15*(2), 481-487.

Lau, J. F., Shariff, R., & Meehan, A. (2021). Are biased interpretations of ambiguous social and non-social situations a precursor, consequence or maintenance factor of youth loneliness? *Behaviour research and therapy*, *140*, 103829. https://doi.org/10.1016/j.brat.2021.103829

Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child development*, *71*(1), 107-118. https://doi.org/10.1111/1467-8624.00124

Liu, Y., Gu, C., & Wang, F. (2010). The relationship between social problem solving and internet addiction tendency among college students: the mediating effects of social avoidance and distress. *Special Education in China*(6), 6. https://doi.org/10.3969/j.issn.1007-3728.2010.06.016.

Lv, Y., Guo, J., & Zhang, Y. (2016). A Revision of the Attention to Positive and Negative Information Scale(APNI) in Chinese Children. Chinese. *Journal of Clinical Psychology*, *24*(5), 4. https://doi.org/10.16128/j.cnki.1005-3611.2016.05.021

Mohebi, L., & Bailey, F. (2020). Exploring Bem's Self perception theory in educational context. *Encyclopaideia*, *24*(58), 1. https://doi.org/10.6092/issn.1825-8670/9891

MyCOS, T., I. S. U. o. S. a., Center, H. E. R., WANG, Q., & Wang, M. . (2023). *Employment report for Chinese undergraduates.* . Social Science Academic Press.

Norris, C. J., Larsen, J. T., Crawford, L. E., & Cacioppo, J. T. (2011). Better (or worse) for some than others: Individual differences in the positivity offset and negativity bias. *Journal of Research in Personality*, *45*(1), 100-111. https://doi.org/10.1016/j.jrp.2010.12.001

Posner, M. I., & Petersen, S. E. (1990). The attention system of the human brain. *Annual review of neuroscience*, *13*(1), 25-42. https://doi.org/0147-006X/90/0301-0025S02.00

Richards, H. J., Benson, V., Donnelly, N., & Hadwin, J. A. (2014). Exploring the function of selective attention and hypervigilance for threat in anxiety. *Clinical psychology review*, *34*(1), 1-13. https://doi.org/10.1016/j.cpr.2013.10.006

Sternheim, L., Danner, U., van Elburg, A., & Harrison, A. (2020). Do anxiety, depression, and intolerance of uncertainty contribute to social problem solving in adult women with anorexia nervosa? *Brain and behavior*, *10*(6), e01588. https://doi.org/10.1002/brb3.1588

Suslow, T., Hoepfel, D., Günther, V., Kersting, A., & Bodenschatz, C. M. (2022). Positive attentional bias mediates the relationship between trait emotional intelligence and trait affect. *Scientific Reports*, *12*(1), 20733. https://doi.org/10.1038/s41598-022-25317-9

Xia, L.-X., Shi, X.-L., Zhang, R.-R., & Hollon, S. D. (2014). Interpersonal self-support and attentional disengagement from emotional faces. *The Spanish Journal of Psychology*, *17*, E106. https://doi.org/10.1017/sjp.2014.111

Xia, L.-X., Shi, X.-L., Zhang, Y., & Hollon, S. D. (2013). Interpersonal self-support and attentional bias on negative and positive interpersonal information. *International Journal of Psychology*, *48*(6), 1246-1259. https://doi.org/10.1080/00207594.2012.738299

Xia, L.-X., Xu, X.-Y., Hollon, S. D., & Zhang, J.-F. (2014). The relation of self-supporting personality, big five personality and depression. *Current Psychology*, *33*, 630-643. https://doi.org/10.1007/s12144-014-9233-6

Xia, L., & Huang, X. (2009). The reliability and validity of adolescent students' self-Supporting personality scale. *Psychol. Sci*, *32*, 952-954. https://doi.org/10.16719/j.cnki.1671-6981.2009.04.009

Xia, L., Huang, X., Wan, L., & Yang, H. (2011). Self-supporting personality and practical problem solving. *Psychological Development and Education*, *27*(1), 52-58. https://doi.org/10.16187/j.cnki.issn1001-4918.2011.01.008

Xia, L., Zhang, R., & Gao, S. (2015). Attentional bias of low interpersonal flexibility and negative emotional information. . *Psychology : Techniques and Applications*(11), 18-23. . https://doi.org/CNKI:SUN:XNND.0.2013-02-024

Yang, J. (2011). *Interpretation bias in adolescents with social anxiety* Master, Southwest University].

Yoke, T. C., Ali, A. J., & Abdullah, A. G. K. (2022). Soft skill levels of diploma business students in private higher educational institutions Malaysia: A review and approach during COVID-19 pandemic. *International Journal of Education and Training*

Zeng, Y., & Xia, L.-X. (2015). The relationship between interpersonal self-reliance traits and psychological symptoms among high school students: The mediating role of social problem-solving attitudes. *Journal of Southwest University (Natural Science Edition)*, *37*(12). https://doi.org/10.13718/j.cnki.xdzk.2015.12.021