

The Relationship between Social Capital and Innovation Potential: The Mediating and Moderating Effects of Psychological Capital

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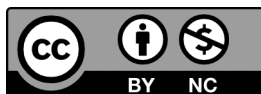
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Abstract: This study investigated the influence and mechanism of social capital on innovation potential through the 2018 sample data of the China Family Panel Studies (CFPS). 12,318 Chinese people were identified as research subjects, and a model was constructed and validated to explore the relationship between social capital and innovation potential. The results showed that: (1) Both social capital and psychological capital were significantly and positively related to innovation potential; (2) Psychological capital played a partial mediating effect in the relationship between social capital and innovation potential; (3) Psychological capital played a moderating effect in the relationship between social capital and innovation potential — when individuals had a higher level of psychological capital, social capital showed a more substantial facilitation effect on innovation potential. These findings enrich the theory of innovation and provide cross-cultural evidence to better exploit the role of innovation in economic development and social progress.

Keywords: Psychological capital; Social capital; Innovation potential; Mediating effect; Moderating effect



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1 Introduction

Innovation is the driving force of social and economic development. With the increasing global competition, the rapid growth of information technology, and the challenges posed by the post-epidemic era, the importance of innovation has become increasingly prominent. Researchers and policymakers have emphasized the importance of innovation for achieving competitive advantage and sustainable economic development (Brem et al., 2016; Tian et al., 2018). Edmund Phelps, a Nobel laureate in economics, suggested that the prosperity of a nation depends on the breadth and depth of innovative activities and that for society to prosper, innovation does not depend on scientists and

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researchers alone but on stimulating the creativity and innovation of the masses. Vigorous economic growth can be maintained only by relying on the creative talents of each ordinary person (Phelps, 2014). Therefore, research into the innovation potential of ordinary people is of significant theoretical and practical value.

Social capital is an important influencing factor of innovation potential. The growing trend of research papers on social capital and innovation published in recent years shows that their relationship has received attention (Gu et al., 2022). Social capital is the sum of actual and potential resources embedded in the relationships held by individuals or social units (Nahapiet & Ghoshal, 1998). Mass innovation is permanently embedded in specific social contexts, so the structure of networks among individuals, the quality of relationships, and shared social perceptions play a significant role in stimulating the potential of citizen innovation. Social capital plays a role in enabling individuals to access influential networks and resources that help design innovative solutions. Social capital also helps build trust among individuals and stakeholders, making it easier for individuals to engage in collaborative innovation. In addition, social capital can help create a sense of shared responsibility among community members, which is necessary to ensure the effective implementation of innovative solutions. Scholars argue that social capital helps people to acquire, allocate, and use resources to develop individual capabilities (Krishna & Itoh, 1988). Social capital has a positive impact on the development of creativity (Liu et al., 2020; Nahapiet & Ghoshal, 1998; Yeşil, 2019). Social capital has a more noticeable impact on individuals in China, a country with a humanistic society. Based on the above literature, it is reasonable to infer that social capital has a positive predictive effect on the innovation potential of the general public, which was also confirmed in this study.

Psychological capital has an indirect effect on social capital and innovation potential. As mentioned earlier, social capital has a positive predictive effect on innovation potential. Social capital, as a link connecting individuals to their environment, will undoubtedly be influenced by individual psychological characteristics in influencing innovation potential. Innovation itself can be a high-risk activity, as generating novel and valuable ideas often fails (Carmeli & Schaubroeck, 2007), and psychological capital, as an element of positive human psychological characteristics, is an essential contributor to the realization of innovation (Zhou, 2003). The recognized core components of psychological capital include positive, self-confidence, optimism, resilience, etc. The formation of these positive qualities is also inseparable from people in social life situations; people with high social capital have easy access to resources and thus success, and the positive emotional experience brought by success naturally nurtures and enhances people's positive psychological capital; at the same time, external factors work through internal factors, and different levels of social capital in influencing people's At the same time, exogenous factors work through endogenous factors. Different levels of social capital may be moderated by psychological qualities in the process of influencing people's creative potential. Therefore, the hypothesis of an indirect effect of psychological capital between social capital and innovation potential is proposed and tested in this study.

There are not many research results about social capital and innovation potential, and the existing studies have the following shortcomings: firstly, the relationship and internal operation mechanism between social capital and innovation potential are not clear; secondly, the existing studies mainly focus on a specific group of people, such as the influence of social capital on the creativity of graduate students and researchers, Etc., and there is a lack of research on the innovation potential of the general public; again, social capital is affected by Many factors influence social capital, and social capital under the influence of different regional cultures may have different performance. Further research is needed to explore the dynamics and influence of social capital in different organizational contexts and cultures, and

cross-cultural research is necessary. The deficiencies in existing research justify the selection of the current research topic.

This study drew upon the literature review to develop a theoretical model, postulate hypotheses, and analyze data from The China Family Panel Studies (CFPS) 2018 of a population sample from 25 Chinese provinces to explore the relationship between social capital, psychological capital, and innovation potential.

This study contributes to the existing literature in three ways: first, it examines the influence of social capital and psychological capital on the innovation potential of the general population, thereby addressing the need for more research on the population innovation potential of existing studies. Secondly, it reveals that psychological capital mediates and moderates the relationship between social capital and innovation potential, thus deepening our understanding of social capital's internal mechanism and boundary conditions in impacting innovation potential. Finally, the selection of a sample from China - an economy that has held the record for the highest GDP growth in the world in recent years - provides cross-cultural evidence that can be leveraged to further exploit the role of innovation in economic progress and social development.

This study contributes to the following aspects: (1) It examines the influence of social capital and psychological capital on the innovation potential of the general population. It makes up for the lack of research on the innovation potential of the population in existing studies. (2) The study found that psychological capital plays both a mediating and moderating role between social capital and innovation potential, and clarifies the internal mechanism and boundary conditions of social capital on innovation potential, which expands the scope of application of psychological capital theory.³ The study selects a sample from China (which has the highest GDP growth in the world in recent years). The findings of the study enrich the innovation theory and provide cross-cultural evidence to better exploit the role of innovation in economic development and social progress.

2 Literature Review and Research Hypotheses

2.1 The Relationship between Social Capital and Innovation Potential

There is no clear definition of innovation potential in the academic community, which is closely related to creativity. In past studies, creativity is a source of innovation within organizations (Amabile et al., 1996), something needed for almost all jobs (Shalley et al., 2009), and a key to organizational competitiveness (Oldham & Cummings, 1996). Creativity can be considered as the generation of unusual ideas and the feasibility of these ideas. This study defines creative potential as the ability and characteristics of individuals to generate innovative ideas, focusing on the early stages that lead to the occurrence of innovative ideas, as the ability to have multiple problem-solving ideas may be more important in the early stages of problem-solving than determining the feasibility and viability of each option. Some scholars view creativity as the ability to develop novel and potentially valuable ideas (Shalley et al., 2004; Zhou & George, 2001), an understanding that fits well with our definition of innovation potential. A review of the literature reveals that innovation, creativity, and innovativeness, all of which are closely related to innovation potential, have been linked to social capital.

Social capital theory is interdisciplinary in nature, and so far, there is no single definition of social capital in academia. Among the many definitions of social capital, the most authoritative is Bourdieu's, who considers social

capital as “a collection of actual or potential resources that are linked to the possession of a durable network of institutionalized relationships that are commonly known or recognized” (Bourdieu & Nice, 1980). Later, Bourdieu (1985) further distinguished social capital into two essential elements: one is the relationship itself, which enables individuals to become members of a group; the other is the quality and quantity of resources obtained after establishing the relationship. Later, Krishna & Itoh (1988) divided social capital into “interpersonal networks”. Nahapiet & Ghoshal (1998) divided social capital into three dimensions: structural, relational and cognitive. It can be seen that social capital covers interrelated concepts such as social structure, social networks, culture, values, trust, informal organizations, and social resources (Lin, 2017), reflecting a range of socio-cultural resources inherent in social networks (Purohit et al., 2015). As a result, social capital has been widely used in studies of performance, career satisfaction, knowledge sharing, and value creation (Basuil & Datta, 2017; Pil & Leana, 2009; Qiu et al., 2015).

The available research results show a close relationship between social capital and innovation potential. Existing studies suggest that social capital can influence innovation directly (Akçomak & ter Weel, 2009; Al-Omouh et al., 2022; Lyu et al., 2022) or indirectly through mediating variables (Yan & Guan, 2018), such as through knowledge management (Salehi et al., 2022), innovation capacity (Yeşil, 2019), Etc. Furthermore, individual innovation behavior is the external manifestation of innovation potential (Yu et al., 2021), which indicates that there must be a close relationship between social capital and innovation potential. The relationship between social capital and individual innovation potential has been further demonstrated in the literature. It was found that social capital reflects the essential socio-cultural resources of an individual's community and is a fundamental socio-cultural factor for creativity (Reagans & McEvily, 2003), which is necessary and fundamental for the development of creativity (Glăveanu, 2010; Glăveanu et al., 2020). Social capital provides individuals with access to new knowledge and information through social interactions (Tsai & Ghoshal, 1998), access to resources and opportunities through activating their social networks (Mazzoni & Iannone, 2014), and greater stimulation of innovation potential. Through the above literature, we propose the following research hypotheses:

H1: Social capital has a positive association with people's innovation potential.

In addition, it is worth mentioning that this study is concerned with relative social capital. Social capital usually refers to the quantity and quality of social network relationships within and outside the organization objectively (Arthur et al., 1995) and is usually measured by realistic indicators in empirical studies, such as family members' occupational prestige (Li & Guo, 2022), but individuals may be influenced by their subjective perceived relative social capital (Hsu et al., 2021; Terrion & Lagacé, 2008). Social comparison theory suggests that relative social capital status after comparison with others may be more influential on human development than actual social capital status. Empirical studies have also found that subjective social status can additionally explain variation in people's behavior based on objective social status (Greitemeyer & Sagioglou, 2016; Manuck et al., 2010). Overall, there still needs to be more research on relative social capital in the academic community. This study is not intended to compare the strength of the effects of absolute and relative social capital. However, it is interesting in the relative social capital's role in developing innovation potential. To avoid confusion, the term “relative social capital” will be abbreviated as “social capital” in the following.

2.2 The Influence of Psychological Capital

As mentioned earlier, social capital may positively contribute to innovation potential. Social capital, as a condition that people possess externally, is often inseparable from their internal psychological characteristics in influencing innovation potential. Therefore, examining how social capital and psychological characteristics jointly affect people's

innovation potential is essential. Based on the literature review, this study suggests that psychological capital may be important in the relationship between social capital and innovation potential.

Luthans et al. (2005) defined psychological capital as a “positive psychological state of individual development” consisting of four dimensions: hope, optimism, confidence (self-efficacy), and resilience, and this concept is widely recognized and applied. Psychological capital is based on existing theories and research on human capital (what you know) and social capital (whom you know) and answers the question “who are you”, which can be invested and developed in specific ways to gain a competitive advantage (Luthans, 2002). According to the characteristics of psychological capital, individuals with high levels of psychological capital have the confidence to undertake and invest the necessary effort to succeed in challenging tasks; the ability to adhere to goals and be flexible about them; optimism about success; and the resilience to persist in achieving success when plagued by problems and adversity (Luthans et al., 2007).

Studies have shown that psychological capital as an influencing factor directly impacts innovation performance, behavior, etc. (Alshebami, 2021; Yuan, 2020). Moreover, it can also act as a mediator to influence the relationship between other elements and innovation (Abdullah et al., 2020; Fang & Jia, 2015). Baek & Kim (2014) explored the relationship between adult-specific positive psychological capital and creativity and found that psychological capital and its components were positively associated with creativity. Ghafoor & Haar (2022) found that psychological capital positively impacts creativity and that individuals with high levels of psychological capital make better use of stress and behave more creatively. It is evident that the psychological capital of an individual has an influential role in the realization of creative potential, whereby we propose the hypothesis that:

H2: Psychological capital has a positive effect on innovation potential.

Psychological capital is a positive psychological state likely to be an important mediating variable between social capital and innovation potential. This inference is supported by existing research. On the one hand, social capital and psychological capital are closely linked, with social capital influencing psychological capital, such as self-efficacy and hope (Hongyu et al., 2020). A high-quality social network enables individuals to receive work-related psychological and social support from those around them (Nahapiet & Ghoshal, 1998), resulting in more positive affective experiences, while motivational research literature has found that positive affective processes underlie the relationship between psychological resources and creative performance (Ambrose & Kulik, 1999). On the other hand, as mentioned earlier, psychological capital can promote innovative behavior, and the realization of innovation requires the subjective and active participation of individuals and the support of positive psychological energy. Psychological capital can act directly on innovation or act as a mediating factor to influence the relationship between other elements and innovation (Abdullah et al., 2020; Fang & Jia, 2015). Based on these empirical studies, we propose a path in which social capital influences innovation potential: social capital-psychological capital-innovation potential; that is, social capital both acts directly on innovation potential and indirectly influences innovation potential through psychological capital. Accordingly, the following hypothesis is formulated:

H3: Psychological capital mediates the relationship between social capital and innovation potential.

In addition, the impact of social capital on innovation is inconsistent (Alguezau & Filieri, 2010), which suggests the need to examine the moderating variables between social capital and innovation potential and figure out when social capital comes into play. This study focuses on the moderating role of psychological capital to explore whether the direction and strength of the relationship between social capital and innovation potential are moderated by psychological

capital. Liu et al. (2020) found that social capital can increase the level of innovation within organizations and that psychological capital has a moderating role in this process. Ran and Yuan (2016), in a study on psychology, assessed the relationship between capital and innovation, showing that psychological capital can act as a moderator of social capital, thereby improving the ability of individuals and teams to innovate. Slåtten et al. (2019) also examined the relationship between psychological capital, social capital, and job performance. They found that psychological capital can improve employee performance in the work environment, thereby helping to improve team innovation. Whether the effect of social capital on innovation potential varies according to the level of psychological capital, this moderating effect deserves an in-depth analysis. Accordingly, it is proposed that the following:

H4: Psychological capital has a moderating effect on the relationship between social capital and innovation potential.

2.3 Model Construction

Given the above literature review and hypotheses, we suggest that there are direct, mediating, and moderating effects of social and psychological capital on innovation potential. In the direct effect, the roles of social capital and psychological capital are independent of each other. The mediating effect model assumes that social capital affects an individual's innovation potential by influencing his or her psychological capital; the moderating effect model distinguishes between different effects of social capital on innovation potential in different contexts, i.e., the effect of social capital on innovation potential is realized differently in individuals with different levels of psychological capital.

Moderating effects on innovation potential and the theoretical model are shown in Figure 1. First, social capital and psychological capital have direct effects on innovation potential (H1 and H2); second, psychological capital plays a partially mediating role in the relationship between social capital and innovation potential (H3). Finally, the interaction between psychological capital and social capital impacts innovation potential (H4).

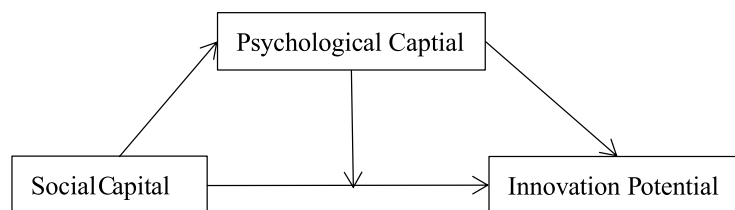


Figure 1 Theoretical Model

2.4 Data and Variables

The data for this study were obtained from the China Family Panel Studies (CFPS) of 2018. This survey, which had been subjected to ethical review by the Biomedical Ethics Committee of Peking University, was a comprehensive multidisciplinary social research endeavor executed every two years using a random sample of the total population of China, sans Hong Kong, Macao, and Taiwan region, to form a representative sample. In 2018, with strict selection criteria and random sampling, participants from 144 districts, 32 streets, 640 neighborhood committees, and 19,986 households were interviewed across 25 provinces, which contained 95% of the population of China. After discarding missing or invalid values, the final analysis utilized 12,318 participants aged 16-93,

with 6538 males and 5780 females.

2.5 Innovation Potential

Based on previous literature (McCrae, 1987), we measured innovation potential using the “openness dimension” of the simplified Big Five personality questionnaire from the 2018 Adult Questionnaire, with the following questions: to what extent do you fit these descriptions: Originality, generates new To what extent do you fit these descriptions: “Original, generate new ideas” “imaginative” “value artistic and aesthetic experiences”, on a scale of 1 to 5, with one being not at all and five being full, with higher scores indicating higher creative potential. The Cronbach’s alpha coefficient of the questions was 0.596, a part of the large-scale questionnaire. The Cronbach’s alpha coefficient was more significant than 0.5, indicating that the selected questions can reflect the variables more stably.

2.6 Social Capital

In this study, Krishna & Itoh’s (1988) definition of social capital was used to classify social capital into two dimensions: “Interpersonal network” and “trust”. Based on this definition of social capital, the self-reported scores of economic status, social status, interpersonal relationships, and interpersonal trust were selected to measure social capital in the 2018 CFPS adult questionnaire. One question on economic status, social status, and interpersonal relationships responds to the interpersonal network dimension. It has been documented that people with higher socioeconomic status have more robust social networks (Blumenstock, 2016). High social status and income indicate a high-quality network structure; high interpersonal scores respond to tight ties with people. A six-question trust scale asked respondents to rate their trust in several categories of people (parents, neighbors, Americans, strangers, government officials, doctors, etc.) from 0-very distrustful to 10-very trustful. Representative questions include “How would you rate your income in your local area?” “How would you rate your social status in your local area?”, and “How well connected are you?” “How much do you trust your neighbors?” etc.

The questions we selected for the human relations and interpersonal trust scales are rated on a scale of 0-10, and economic status and social status are rated on a scale of 1-5. To standardize the scales, we converted the 0-10 scale into a 1-5 scale according to the different levels of Likert scale processing published by IBM (Statistics, 2020) and then took the average of these questions to measure social capital, with higher scores representing higher social capital. The internal consistency of Cronbach’s alpha coefficient for these questions was 0.683.

2.7 Psychological Capital

Because psychological factors are challenging to observe directly, questionnaires have become the most commonly used measure. Luthans et al. (2007) developed a 24-question psychological capital questionnaire for the workplace, which was widely adopted by scholars (Newman et al., 2014). On this basis, Avey et al. developed a 12-item scale, PCQ-12 (Avey et al., 2011), on which the scale obtained better cooperation and less participant fatigue with shorter length (Luthans & Youssef-Morgan, 2017), while avoiding the structural instability associated with reverse integration (Peterson & Chang, 2003). However, these scales have been used mainly in companies and have yet to be included in sizeable social survey questionnaires.

Some items in the survey are very similar to (Avey et al., 2011) PCQ-12 psychological capital scale, and we

selected these items and took the average score to measure psychological capital. For example: “Satisfied with life” “Confident in my future” “Can cope well with stress” “Have a sense of accomplishment” etc. These topics are rated on a scale of 1-5, with one representing not very agreeable and five representing very agreeable, and the higher the score, the higher the psychological capital score. The Cronbach’s alpha coefficient for the internal consistency test of the topic items was 0.573.

2.8 Control Variables

In addition, age, gender, and other variables that may affect the measurement of the variables were used as control variables in this paper. The meanings of the main variables and descriptive statistics are listed in Table 1.

Table 1 The Meaning of Main Variables and Descriptive Statistics

Variable Category	Variable Name	Variable Meaning and Assignment	Mean Value	Standard Deviation
Dependent Variable	Creative Potential	-	3.154	0.860
	Originality	Originality that generates new ideas (not at all to fully 1 - 5)	3.070	1.177
	Artistic	Emphasis on artistic and aesthetic experiences (not at all to fully 1 - 5)	3.000	1.191
	Imaginative	Imaginative (not at all to fully 1 - 5)	3.380	1.100
	Social Capital	-	3.205	0.497
	Social Network	-	0.000	1.000
	Relationships	How well connected do you think you are (lowest to highest 0 - 10)	3.849	0.776
	Social Status	How much would you rate your local social status (very low to very high 1 - 5)	3.110	1.087
Independent Variables	Economic Status	How much would you rate your local position in terms of income (very low to very high 1 - 5)	2.880	1.063
	Trust Dimension	-	0.000	1.000
	Parental Trust	How much you trust your parents (very distrustful to very trustful 0 - 10)	4.730	0.569
	Neighborhood Trust	Trust in neighbors (very distrustful to very trusting 0 - 10)	3.701	0.837
	Trust in Americans	Trust in Americans (very distrustful to very trusting 0 - 10)	1.986	1.024
	Trust in Strangers	Trust in strangers (very distrustful to very trusting 0 - 10)	1.890	0.891
	Trust in Doctors	Trust in doctors (very distrustful to very trustful 0 - 10)	3.033	1.083
	Trust in Government Official	Trust in government official (very distrustful to very trusting 0 - 10)	3.664	0.961
	Psychological Capital	-	3.853	0.599
	Confidence Level	Your confidence in your future (very little confidence to very much confidence 1 - 5)	4.100	0.974
Intermediate variables	Life Satisfaction	Your satisfaction with your life (very dissatisfied to very satisfied 1 - 5)	3.960	0.981
	Sense of Accomplishment	How important your sense of accomplishment is to you (very unimportant to very important 1 - 5)	3.880	1.082
	Sense of Hope People	like me have a good chance of improving their lives (strongly disagree to strongly agree 1 - 5)	3.680	0.907
	Resilience Usually	You are relaxed and can cope well with stress (not at all to fully 1 - 5)	3.660	0.973
Control variable	Age	Your date of birth (year surveyed - date of birth)	49.730	14.887
	Gender	Male is assigned 1, female is assigned 0	0.530	0.499
	Region	According to the convention, subjects are divided into East 1, Central 2, and West 3 according to their provinces.	0.530	0.499

2.9 Data Analysis

In this study, a large dataset ($N = 12318$) was analyzed using SPSS 25.0. Descriptive statistics and bivariate correlation analysis were conducted to identify relevant variables, while general linear regression analysis was used to test for mediating and moderating effects. Data with missing values were removed from the sample before analysis.

3 Results

3.1 Common Method Bias Test

Our data for the study were derived from participants' self-reports, so potential standard method bias must be tested to ascertain the accuracy of the results. We conducted a Harman one-way test to determine if any of the factors had an eigenvalue greater than 1, and the maximum factor explained variance was 21.40%. This was found to be less than the critical criterion threshold of 40%, and thus, it can be concluded that there is no serious issue of standard method bias present in the study.

3.2 Correlation Analysis

Before conducting regression, mediating effect, and moderating effect analysis, Pearson analysis was utilized to estimate the correlation coefficients between the variables to ascertain the correlation direction and level of correlation. Descriptive statistics and correlations are summarized in Table 2. The output suggests that gender and age were positively correlated with all significant variables; Social capital scores were positively associated with total psychological capital scores. Additionally, innovation potential scores demonstrated a positive correlation with both social capital and psychological capital, providing tentative support for hypotheses 1 and 2.

Table 2 Means, Standard Deviations, and Correlations of all Variables

Variables	<i>M</i>	<i>SD</i>	Gender	Age	Social Capital	Psychological Capital	Innovation Potential
Gender	0.530	0.499	–				
Age	49.750	14.884	0.081**	–			
Social Capital	3.232	0.612	0.020*	0.158**	–		
Psychological Capital	3.854	0.599	0.062**	0.049**	0.509**	–	
Innovation Potential	3.227	0.935	0.101**	-0.057**	0.192**	0.278**	–

Note: *N* = 12318; Gender was dummy coded such that 1 = male and 0 = female; **p* < 0.05, ***p* < 0.01.

3.3 Direct Effect Test

This study conducted a multiple regression analysis (Enter method) to explore the direct effect of psychological and social capital on innovation potential, using psychological and social capital as predictor variables, innovation potential as the outcome variable, and gender and age as control variables. The results, presented in Table 3, indicated that social capital (*B* = 0.206, *p* < 0.001) had a positive predictive effect on innovation potential, thus confirming H1.

Table 3 The Direct Influence of Social Capital and Psychological Capital on the Innovation Potential

Predictors	Model 1				Model 2			
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>B</i>	<i>SE</i>	β	<i>t</i>
Gender	0.211	0.018	0.105	11.965***	0.185	0.017	0.092	10.718***
Age	-0.007	0.001	-0.098	10.987***	-0.006	0.001	-0.089	10.235***
Social Capital	0.206	0.009	0.206	23.205***	0.086	0.01	0.086	8.574***
Psychological Capital					0.232	0.01	0.232	23.235***
<i>R</i> ²	0.056				0.095			
ΔR^2	0.056				0.039			
<i>F</i>	<i>F</i> (1, 3) = 242.549, <i>p</i> < 0.001				<i>F</i> (1, 4) = 324.844, <i>p</i> < 0.001			

Note: *N* = 12318; ****p* < 0.001.

After considering the influence of social capital ($B = 0.086, p < 0.001$), psychological capital can significantly and positively predict innovation potential ($\beta = 0.232, p < 0.001$). The R^2 of the joint explanatory variable of social capital and psychological capital on innovation potential was 0.095, which means that social capital and psychological capital jointly predicted 9.5% of the variance in innovation potential, controlling for gender and age, and by including the psychological capital variable, the explanatory power of the equation was increased by 3.9%, thus supporting H2.

3.4 The Test of the Mediating Effect of Psychological Capital

According to the test procedure proposed by Baron & Kenny (1986), the possible mediating effect of psychological capital between social capital and innovation potential was examined. For this study, the test needs to satisfy four requirements: first, the predictor variables should be significantly correlated with the outcome variables. Second, the predictor variables should be significantly correlated with the mediating variables. Third, the mediating variable should be significantly correlated with the outcome variable. Fourth, the relationship between the predictor variable and the outcome variable is weakened (partially mediated) or insignificant (fully mediated) after controlling for the effect of mediating variables. Table 1 shows that the first three requirements are satisfied, so only the fourth requirement is examined here using regression analysis.

Controlling for the effects of gender and age as potential factors, social capital as the independent variable, innovation potential as the dependent variable, and psychological capital as the mediating variable, the results of the analysis are shown in Table 4 and summarized in Figure 2.

Table 4 Testing the Mediation Effect of Psychological Capital on the Relationship between Social Capital and Innovation Potential

Predictors	Criterion: Innovation Potential			Criterion: Psychological Capital			Criterion: Innovation Potential		
	B	SE	t	B	SE	t	B	SE	t
Gender	0.211	0.018	11.965***	0.110	0.016	7.092***	0.185	0.017	10.718***
Age	-0.007	0.001	-10.987***	-0.003	0.001	-4.683***	-0.006	0.001	-10.235***
Social capital	0.206	0.009	23.205***	0.514	0.008	65.648***	0.087	0.010	8.574***
Psychological capital							0.232	0.010	23.235***
R^2	0.056			0.264			0.095		
F	242.549			1468.765			324.844		

Note: $N = 12318$; *** $p < 0.001$.

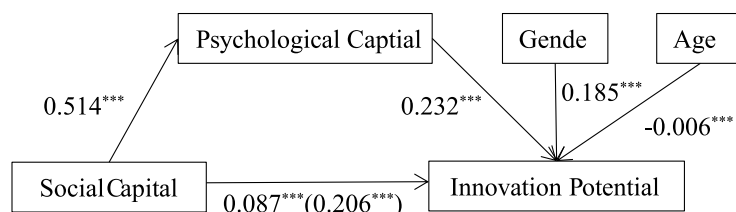


Figure 2 The Mediation Effect of Psychological Capital between Social Capital and Innovation Potential

As shown in Table 4, after controlling for the effects of gender and age, social capital had a significant positive effect on innovation potential ($B = 0.206, p < 0.001$), and social capital had a significant positive effect on psychological capital as a mediating variable ($B = 0.514, p < 0.001$); when psychological capital was added to the regression, social capital ($B = 0.087, p < 0.001$) and psychological capital ($B = 0.232, p < 0.01$) had a significant positive effect on innovation potential.

Specifically, as Figure 2 shows, after adding psychological capital to the regression equation, the regression

coefficient of social capital on innovation potential decreases but remains significant (Before adding: $B = 0.206, p < 0.001$; After adding: $B = 0.087, p < 0.001$), indicating that psychological capital has a partial mediating effect between social capital and innovation potential, with the mediating effect accounting for a total effect of 35.7%. The effect of social capital on innovation potential is partially realized through the main effect path and partially realized indirectly through psychological capital.

3.5 Test of the Moderating Effect of Psychological Capital

Hierarchical regression was used to investigate the potential moderating impact of psychological capital on the relationship between social capital and innovation potential. The first step included the independent variable (social capital) in the regression equation. In the second step, the moderating variable (psychological capital) was included in the regression equation based on the first step. In the third step, the interaction term (social capital $\times$ psychological capital) is included in the regression equation based on the second step. If the moderating term has a significant predictive effect on innovation potential, the moderating effect of psychological capital is considered significant. To minimize the effects of multicollinearity, the predictor variables utilized in the regression were standardized, except the moderating term (Whisman & McClelland, 2005).

Table 5 Testing the Moderating Effect of Psychological Capital on the Relationship between Social Capital and Innovation Potential

Predictors	Model 1			Model 2			Model 3		
	B	SE	t	B	SE	t	B	SE	t
Gender	0.211	0.018	11.965***	0.185	0.017	10.718***	0.184	0.017	10.670***
Age	-0.007	0.001	-10.987***	-0.006	0.001	-10.235***	-0.006	0.001	-10.531***
Social Capital	0.206	0.009	23.205***	0.087	0.01	8.574***	0.081	0.010	7.985***
Psychological Capital				0.232	0.01	23.235***	0.244	0.010	23.699***
Psychological Capital $\times$ Social Capital							0.035	0.008	4.696***
R^2	0.056			0.095			0.097		
F	242.549			324.844			264.731		

Note: $N = 12318$; *** $p < 0.001$.

As shown in Table 5, social capital ($B = 0.086, p < 0.001$) and psychological capital ($B = 0.232, p < 0.001$) had a significant positive predictive effect on innovation potential, and the interaction term between social capital and psychological capital also showed statistical significance ($B = 0.035, p < 0.001$), indicating that the effect of social capital on innovation potential at the psychological capital different levels are significantly different.

To further clarify the effect of social capital-psychological capital interaction on innovation potential, this study conducted a simple slope test and plotted the simple slope analysis (see Figure 3). The relationship between social capital and innovation potential was found to be inconsistent between low psychological capital ($B = 0.046, SE = 0.013, t = 3.503, p < 0.001$) and high psychological capital ($B = 0.116, SE = 0.012, t = 9.769, p < 0.001$), and the association was more robust at high psychological capital. In other words, the “social capital $\rightarrow$ innovation potential” pathway is moderated by psychological capital, and the magnitude of the contribution of social capital to innovation potential varies with different levels of psychological capital. Specifically, when individuals have a higher level of psychological capital, social capital has a stronger effect on innovation potential.

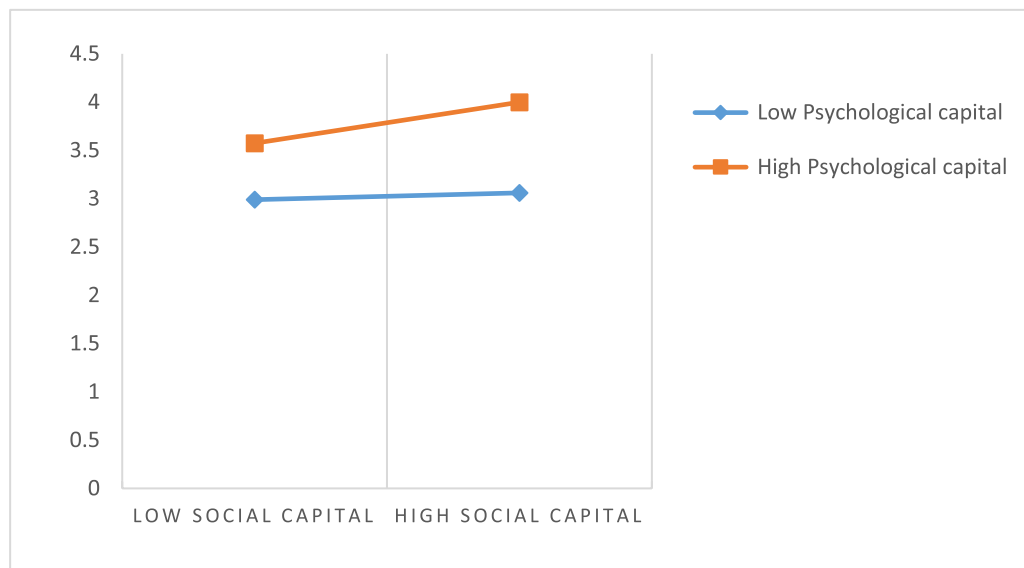


Figure 3 The Moderating Effect of Psychological Capital in the Relationship between Social Capital and Innovation Potential

4 Discussion

In this study, the relationship between social capital and innovation potential was explored in depth through the mediating and moderating role of psychological capital while also controlling for variables such as gender and age. The descriptive results showed that these variables were positively related and that social capital positively predicted innovation potential (H1). Further regression analysis indicated that psychological capital positively predicted innovation potential when controlling for social capital (H2). Furthermore, the mediation analysis revealed that psychological capital partially mediated the effect of social capital on innovation potential (H3). Finally, the moderating role of psychological capital in the relationship between social capital and innovation potential was verified (H4). This study has made some new findings based on previous studies, which provide a theoretical basis for the development of innovation potential and provide inspiration for future research.

First, both psychological capital and social capital are positively related to innovation potential. Social capital has a significant positive predictive effect on innovation potential, which further validates existing research findings (Liu et al., 2020; Nahapiet & Ghoshal, 1998; Yeşil, 2019), which suggest that people receive resources from being in social networks, such as unit leaders, mentors, and local government, etc., can help individuals develop their innovative potential. Furthermore, psychological capital was found to be a significant predictor of innovation potential, even when controlling for social capital. This suggests that psychological capital is more critical than social capital in predicting innovation potential because it reflects a person's mental state and ability to think creatively (Avey et al., 2011). The joint explanatory power of 9.5% for the amount of variance in innovation potential between the two is not a high percentage, but it deserves attention. Decomposing the variance in innovation potential into different factors and giving reasonable explanations and predictions provides an excellent and referable path for the development of innovation potential.

Second, psychological capital mediates between social capital and innovation potential. This result validates the view of Xian & Yong (2017) that psychological capital mediates the relationship between social capital and innovation

potential of Ph.D. students. Psychological capital is a psychological characteristic that can be cultivated and invested (Luthans, 2002). Its relationship with social capital is mutually reinforcing. This study emphasizes the importance of psychological capital in the path of “social capital-psychological capital-innovation potential”. It inspires people to make full use of the strengths in social capital. This study emphasizes the importance of psychological capital in the “social capital-psychological capital-innovation potential” pathway. It inspires people to make full use of the strengths of social capital to develop psychological capital, such as confidence and self-efficacy, to promote innovation potential and innovation activities better.

Third, our study found a moderating effect of psychological capital between social capital and social potential, suggesting that psychological capital enhances the impact of social capital on innovation potential. Individuals with higher levels of psychological capital may be better able to leverage their social network and use it to generate creative ideas and innovative solutions. Psychological capital can enhance the impact of social capital on innovation potential, and combining the two can help individuals maximize their innovation potential, which has important implications for both organizations and individuals. By understanding the interplay between psychological and social capital, governments and people can better target people’s innovation potential. Individuals can strengthen their social capital by making connections and collaborating with others. In addition, governments can invest in programs that encourage people to build psychological capital in order to increase people’s social capital and, ultimately, their innovation potential.

This study contributes to the literature in three ways. Firstly, this study extends the scope of research beyond a specific group to the general population and thus produces more generalizable results. Previous studies focus on a particular group, such as knowledge workers (Yan & Guan, 2018). They are limited to a smaller population, and results may not apply to a broader population. By using a sample of the general population as the research object, the findings are universal since innovation is a way to promote progress, and economic development does not only involve individuals and particular groups. However, it requires greater participation and consideration of all. Secondly, this study provides new insights and evidence into the relationship between people’s social capital, psychological capital, and innovation potential in the Chinese context. It provides valuable information for future cross-cultural research. Finally, this study contributes to the field by providing a comprehensive theoretical model that can be used to inform policy decisions related to fostering innovation.

This study made meaningful findings, but future studies need to improve certain limitations. Due to the large-scale survey conducted in this study, the internal consistency of the variable topics could have been higher; future studies should adopt more rigorous and targeted questionnaires or experimental designs to authenticate the results. Moreover, the influence of psychological capital was considered. However, the influence of human capital should be studied as well in order to explore the relationship between social capital, psychological capital, human capital, and innovation capital. Additionally, the scope of this study was focused on innovation potential, yet extending this to process and outcome variables, such as innovation behavior and performance, could provide a more comprehensive examination of the influence of social capital.

5 Conclusion

In summary, in order to examine the role of social capital on innovation potential, this study examined in depth the internal occurrence mechanism and boundary conditions of the influence of social capital on innovation potential

by including psychological capital as an intermediate variable, and the results are as follows: (1) Social capital is a facilitator of innovation potential; (2) Psychological capital can have a facilitating effect on innovation potential together with social capital; (3) Psychological capital plays a mediating role between social psychological capital plays a mediating role between social capital and innovation potential, and social capital plays a part in promoting innovation potential indirectly through psychological capital; (4) Psychological capital has a moderating role between social capital and innovation potential, and individuals with a high level of psychological capital have a more significant promotion effect of social capital on innovation potential. This study is an essential contribution to the field of innovation, as it provides valuable insight into the internal mechanism of the effect of social capital on innovation capabilities. Innovation potential is a prerequisite for innovation, and innovation is a driving force for social progress; this study is essential for promoting innovation.

Data Availability Statement

The original data supporting the conclusions of this article will be made available to any qualified researcher by the authors without necessary reservation.

Ethical Statement

The study involving human participants was reviewed and approved by the Ethics Committee of Peking University. Patients/participants provided written informed consent for participation in this study.

Author Contributions

ZQY contributed to the initial idea generation, analyzed/interpreted the data, and wrote this manuscript. HJP analyzed/interpreted the data and made extensive revisions to this manuscript. LXY was responsible for data collection and collation. And ZLT contributed to supervision and some critical review of this manuscript.

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