Calculation of Future Population Change Based on Structural Equation Model

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Abstract. As the main body of childbearing in the future, college students' childbearing intention will undoubtedly affect their childbearing behavior. In this paper, we analyzed 289 valid data collected in Zhoushan City qualitatively and quantitatively in the questionnaire survey. We have constructed the structural equation model of influencing factors of college students' fertility intention. Results of the survey show the perceived value has a decisively positive effect on the behavior attitude, and the behavior attitude also has a positive effect on the reproductive intention of college students; there was no correlation between perceived behavioral control and the reproductive intention of college students; policy support has a positive effect on behavioral attitude but a negative effect on perceived behavioral control.

Keywords: Fertility Desire; College Students; Structural Equation Model; Influence Factor

1   Introduction

Currently, China is undergoing rapid social transformation. While experiencing the deepening separation of public and private sectors and the transition to a market economy, it also faces challenges such as deglobalization in the post-pandemic era, an aging population, and declining birth rates, which exert significant downward pressure on the birth population. Since 2017, the total number of births in the country has decreased annually, with 12.02 million in 2020, 10.62 million in 2021, and 9.56 million in 2022.[1]It can be foreseen that the birth rate in 2023 will be lower than 6.77‰ in 2022, reaching a new record low. As the leading force for future fertility, the shift in marriage and childbearing attitudes among college students will inevitably change their behaviors, closely related to national development and people's well-being. Therefore, exploring the factors influencing college students' willingness to have children is urgent. Existing research has shown that college students' fertility attitudes exhibit new changes and characteristics, with a clear gender differentiation emerging

alongside an increased emphasis on personal meaning and value. However, there is limited research on fertility intentions, specifically among college students in China, and few studies have systematically investigated the factors influencing their willingness to have children, often focusing more on the changing trends of fertility attitudes.

Furthermore, existing research primarily focuses on women, neglecting the vital role of men in determining reproductive behaviors and outcomes. Based on this, this study aims to investigate the factors influencing the change in fertility attitudes among college students. Specifically, it adopts research methods such as surveys, literature reviews, empirical research, and qualitative analysis to address the existing research gap in analyzing factors influencing college students' fertility intentions. This research aims to investigate the marital and childbearing psychological demands of college students, study the current difficulties and challenges they face, and quantitatively identify the factors influencing their willingness to have children to reverse the declining trend in fertility.

2   Literature Review

Firstly, this study finds the influencing factors of college students' fertility intention through literature analysis. Relevant and typical studies, according to their citations and influence, mainly include the following aspects:

Feng Xiaotian et al. found that the change speed of the ideal number of children is relatively fast. In contrast, change speed of gender preference is relatively slow.[2]Wang Tianyu concluded that the new rural cooperative medical care with subsidies could replace the function of raising children, thus reducing the family's fertility intention.[3]G. M. A. Higginbottom, N. Mathers, P. Marsh, M. Kirkham, J. M. Owen, L. Serrant-green believes that families have a positive role to play in supporting young parents, most of whom have strong family ties and, in the case of young women, are close to their mothers.[4]Wung Lik Ng, Yin-Chi Wang believes that early childbearing can delay and decrease fertility when it signals a woman's attachment to her family.[5] Gamze Fiskin and Esra Sari argue that environmental and economic reasons have been cited for young people's concerns about childbearing.[6]Although many scholars have conducted many studies on the problem of fertility intention, there are also areas for improvement in the research. Because of the problems neglected in previous studies, this paper studies the factors that affect the change of college students' fertility concept.

3   Empirical Research

3.1   Descriptive Statistics of Data

In this study, the author published a circle of friends to randomly find college students under the gymnasium, playground, and dormitory building of Zhejiang Ocean University and ask them to fill in the questionnaire. The specific data is as follows: filtering the collected data and deleting samples with too short response times. Among the 289 college students, 138 are male, and 151 are female, with a similar proportion. There are

12 first-year students, 126 sophomores, 109 juniors, 22 seniors, and 20 graduate students. There are 16 junior college students and 234 undergraduate students at the school level.

3.2   Scale Reliability and Validity Test

Table 1. Factor Load Coefficient Table of the Scale

Latent Variable	Explicit Variable	Coef.	Std. Error	z	p	Std. Estimate	α	CR	AVE
SNS	SNS1	1.000	-	-	-	0.870	0.779	0.785	0.648
	SNS2	0.822	0.089	9.274	0.000	0.734			
PS	PS1	1.000	-	-	-	0.956	0.930	0.933	0.824
	PS2	0.938	0.033	28.468	0.000	0.922			
	PS3	0.907	0.041	22.308	0.000	0.841			
PR	PR1	1.000	-	-	-	0.778	0.811	0.814	0.687
	PR2	1.124	0.089	12.610	0.000	0.877			
EE	EE1	1.000	-	-	-	0.834	0.888	0.888	0.725
	EE2	1.028	0.060	17.155	0.000	0.853			
	EE3	1.011	0.058	17.498	0.000	0.866			
PV	PV1	1.000	-	-	-	0.882	0.832	0.834	0.715
	PV2	0.953	0.056	16.995	0.000	0.808			
PBC	PBC1	1.000	-	-	-	0.837	0.894	0.897	0.744
	PBC2	0.959	0.056	17.180	0.000	0.843			
	PBC3	0.975	0.052	18.851	0.000	0.907			
BA	BA1	1.000	-	-	-	0.714	0.840	0.847	0.650
	BA2	1.091	0.083	13.187	0.000	0.856			
	BA3	1.065	0.082	13.048	0.000	0.842			
FD	FD1	1.000	-	-	-	0.894	0.902	0.902	0.822
	FD2	1.004	0.060	16.609	0.000	0.919			

The table 1 shows all the Factor Load Coefficient and the reliability and validity of each factor of the research scale.

3.3   Discrimination Test of Scale

The so-called differential validity means a low correlation or significant difference between the potential characteristics represented by potential variables and those represented by other potential variables. The square root value of AVE should be greater than the correlation coefficient between this factor (latent variable) and other factors (latent variable). For social network support, policy support, perceived risk, emotional

experience, perceived value, perceived behavior control, behavior attitude, and fertility willingness, the square root values of AVE are respectively 0.805, 0.908, 0.829, 0.851, 0.846, 0.863, 0.806 and 0.906, which are greater than the maximum absolute value of correlation coefficient among factors. As shown in the following Table 2:

Table 2. Discriminant Validity of Latent Variables: Pearson Correlation and AVE Square Root Value

	SNS	PS	PR	EE	PV	PBC	BA	FD
SNS	0.805							
PS	0.293	0.908						
PR	0.393	0.088	0.829					
EE	0.290	0.406	0.156	0.851				
PV	0.242	0.571	0.044	0.714	0.846			
PBC	0.423	0.178	0.601	0.393	0.337	0.863		
BA	0.202	0.546	0.014	0.405	0.614	0.180	0.806	
FD	0.211	0.441	0.125	0.436	0.494	0.186	0.538	0.906

3.4   Model Fitting Degree of Scale

The chi-square freedom ratio $\chi2/df$ of the scale is 2.124 less than 3, GFI is 0.908 greater than 0.9, which meets the standard, RMSEA is $0.062 < 0.1$, and CFI, NFI, NNFI, and NNFI also meet the model fitting index. The RMR is $0.122 > 0.05$, which is not up to the standard. However, there are many fitting indexes in this model, and it is usually tricky for all indexes to meet the standard, so the comprehensive analysis of this model has an excellent fitting degree. As shown in the following Table 3.

Table 3. Model Fitting Indicators

Common index	$\chi2$	df	Chi-square freedom ratio $\chi2/df$	GFI	RMSEA	RMR	CFI	NFI	NNFI
value	301.640	142	2.124	0.908	0.062	0.122	0.960	0.928	0.947

Default Model: $\chi2$ (190) =4217.209, p=1.000

3.5   Structural Equation Model Analysis

The final regression coefficients of the structural equation model are summarized in Table 4 below.

Table 4. Summary Table of Model Regression Coefficients

X	→	Y	Non-standardized regression coefficient	SE	z	p	Standardized regression coefficient
SNS	→	PBC	0.126	0.070	1.808	0.071	0.126
PS	→	BA	-0.138	0.050	-2.772	0.006	-0.180
PS	→	PBC	0.157	0.061	2.573	0.010	0.201
PR	→	BA	0.714	0.083	8.564	0.000	0.622
EX	→	BA	-0.271	0.130	-2.081	0.037	-0.283
PV	→	PBC	0.390	0.058	6.737	0.000	0.469
PV	→	BA	0.707	0.148	4.779	0.000	0.834
BA	→	FI	0.753	0.084	8.921	0.000	0.637

3.6   Overall SEM Model Effect Analysis

Based on the establishment and test of the previous model, the final structural equation model is shown in Figure 1 below.
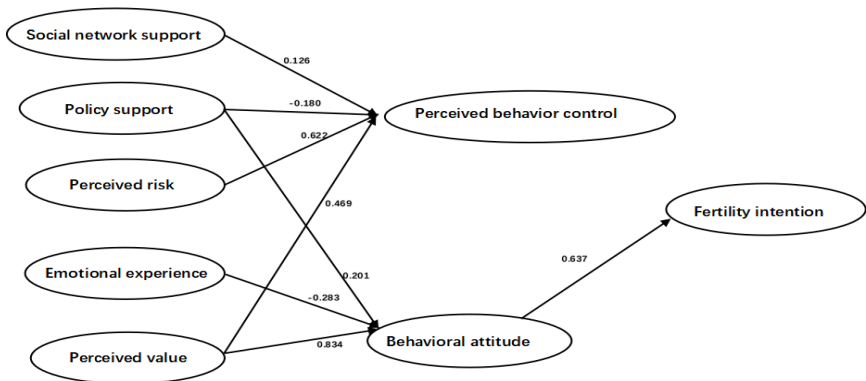
Fig. 1. The Structural Equation Model of Fertility Intention Influence Analysis

The structural equation model of fertility intention influence analysis is shown in Table 5 below. Direct effects have been identified in the figure above. The effect values of social network support, policy support, perceived risk, and perceived value on perceived behavior control are 0.126, -0.180, 0.622, and 0.469, respectively. The effect of policy support, emotional experience, and perceived value on behavior attitude was 0.201, -0.283, and 0.834, respectively. Policy support, emotional experience, and perceived value do not directly influence students' fertility intentions. However, through their mediating effect on behavior and attitude, the indirect effect values of policy support, emotional experience, and perceived value on students' fertility intention are 0.128, -0.180, and 0.531, respectively.

Table 5. Results Equation Model of Marriage and Childbearing Intention Influence on Sex Analysis

	Independent variable / Independent variable	Social network support	Policy support	Perceived risk	Emotional experience	Perceived value	Behavior attitude
Standard direct effect	PBC	0.126	-0.180	0.622		0.469	
	BA		0.201		-0.283	0.834	
	FI						0.637
Standard indirect effect	FI		0.128		-0.180		0.531

4 Results and Conclusions

4.1 Research Results on Factors Influencing Fertility Intention

This paper construct a structural equation model of influencing factors of college students' fertility willingness, which consists of 8 latent variables and 20 observed variables. The results obtained are as follows.

Behavior attitude plays a decisive role in college students' fertility wishes, and there is no correlation between perceived behavior control and fertility wishes. Perceived value plays a decisive and positive role in behavior attitude and control of perceived behavior. Policy support positively affects behavior attitude but negatively affects perceived behavior control. Emotional experience negatively affects behavior and attitude. There is no correlation between material support and college students' fertility will.

According to the equation model research, questionnaire survey, and empirical research, this paper analyzes the psychological demands of college students for childbearing. It suggests that Zhoushan Municipal Government should improve the fertility will of college students from the following three aspects to reverse the depressed fertility trend.

4.2 Strengthen the Publicity and Education of Scientific Reproductive Concepts.

According to the questionnaire, family stability and happiness significantly affect the fertility willingness of college students. College students pay more attention to the spiritual pursuit, advocate personal feelings and attach importance to personal family emotional experiences. Therefore, their views on whether childbirth improves family stability and happiness will significantly affect their willingness to have children.

The government can publicize the correct concept of marriage and childbirth, guide college students to form a good and correct concept of it.Besides,provide support for sex education and reproductive health knowledge.The government can also carry forward the marriage and childbirth culture of family virtues, make the civilized and healthy new trend of marriage and childbirth more deeply rooted in people's hearts.These measures can enhance college students' expectation and happiness of marriage and childbirth, and thus enhance their fertility will.

4.3   Provide Vocational and Financial Support

The structural contradiction between supply and demand of employment makes college students pay attention to personal career development, and the future economic and work pressure will significantly impact college students' fertility willingness.

The government can unite enterprises by providing more employment opportunities and career development support. In addition, we can strengthen the protection of women's reproductive and work rights, help college students balance maternity and work in turn, and promote their future career development. The government can also give birth to economic subsidies and housing support, such as prioritizing housing allocation or providing housing subsidies to alleviate college students' economic and survival pressure.

4.4   Promulgating Effective Welfare Policies

The public policies promulgated by the government play a guiding, controlling, and regulating role in college students' fertility will. The government's policies should be carried out; we should prioritize guidance instead of deliberately making birth plans. We can promote the implementation of welfare, such as free birth check-ups, extending maternity leave, and popularizing free primary education by introducing relevant policies to improve the fertility willingness of college students.

Acknowledgements

References

1. Red and black population bank. How many people were there in the seventh census? 2023.02.14.https://www.hongheiku.com/China/221.html.
2. Feng Xiaotian, Zhang Qingsong. Study on the Changes of Fertility Desire of Urban and Rural Residents in the Past Twenty Years [J]. Market and Population Analysis, 2002(05):21-31.
3. Wang Tianyu, Peng Xiaobo. The influence of social security on fertility willingness: evidence from the new rural cooperative medical system [J]. Economic Research, 2015,50(02):103-117.
4. G.M.A. Higginbottom, N. Mathers, P. Marsh, M. Kirkham, J.M. Owen, L. Serrant-Green,Young people of minority ethnic origin in England and early parenthood: Views from young parents and service providers,Social Science & Medicine,Volume 63, Issue 4,2006,Pages 858-870.
5. Wung Lik Ng, Yin-Chi Wang,Waiting as a signal: Why women are delaying fertility?,Economic Modelling,Volume 87,2020,Pages 471-479,
6. Gamze Fiskin, Esra Sari,Evaluation of the relationship between youth attitudes towards marriage and motivation for childbearing,Children and Youth Services Review, Volume 121,2021,105856,ISSN 0190-7409.