Development and Validation of a Semantic Differential Questionnaire for Fertility Attitudes among Childless Youth

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Abstract

Based on the tripartite attitude model, this study developed a semantic differential questionnaire for assessing fertility attitudes among childless young adults and examined its reliability and validity. Vocabulary was collected through free association and semantic anchors were extracted to form initial items. Following item analysis and factor analysis, the questionnaire yielded three dimensions: cognitive, affective, and behavioral tendency, demonstrating good model fit. The total score was positively correlated with positive fertility motivation and fertility intention, and negatively correlated with negative fertility motivation and fertility stress. Both internal consistency reliability and test-retest reliability met acceptable standards. The results indicate that the questionnaire can be used to effectively and multidimensionally evaluate fertility attitudes among Chinese childless young adults.

Full Text

Development and Psychometric Validation of the Semantic Differential Scale for Fertility Attitudes among Childless Young Adults

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Abstract: Based on the tripartite attitude model, this study developed a semantic differential questionnaire for assessing fertility attitudes among childless young adults and examined its reliability and validity. Through free association, fertility-related vocabulary was collected and semantic anchor points were extracted to form initial items. Following item analysis and factor analysis, the

questionnaire yielded three dimensions: cognitive, affective, and behavioral tendency components, with good model fit. Total scale scores were positively correlated with positive fertility motivations and fertility intention, and negatively correlated with negative fertility motivations and fertility stress. Both internal consistency reliability and test-retest reliability met acceptable standards. Results indicate that this questionnaire can serve as an effective and multidimensional instrument for assessing fertility attitudes among Chinese childless young adults.

Keywords: childless young adults, fertility attitudes, semantic differential method, questionnaire development, psychometric validation

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Against the backdrop of persistently declining global fertility rates, China' s newborn population fell below ten million in 2022, marking the first negative population growth since 1962 (Du, 2024). Despite the implementation of a three-child policy, over 40% of university students report that policy adjustments will not influence their reproductive decisions (Mao et al., 2024), suggesting limited explanatory power of macro-level policies for individual decision-making. As the primary demographic bearing future reproductive potential (He, 2023), childless young adults' fertility attitudes serve as a crucial intermediary linking external environments to individual reproductive behaviors. Therefore, systematically revealing the internal structure and formation mechanisms of fertility attitudes from a psychological perspective holds significant theoretical and practical value.

Current domestic fertility research has extensively documented the substantial impacts of socioeconomic factors (Hou et al., 2023), regional culture (Huang, 2024), policy institutions (Tan & Wei, 2024), and social support (Xu & Sun, 2025) on fertility rates at macro and meso levels. However, these approaches struggle to explain individual decision-making differences under identical external conditions. Although micro-level research has shifted toward individual variables such as time allocation (Wang & Fan, 2025) and cognitive factors (Wei et al., 2025; Xu & Guo, 2024), conceptual confusion persists: most studies equate "fertility intention" (e.g., ideal number of children) directly with "fertility attitude," neglecting the cognitive and affective components of attitude structure and resulting in insufficient explanation of the "intention-behavior gap."

To clarify concepts and advance theory, this study returns to the tripartite attitude model proposed by Rosenberg and Hovland (1960). This model emphasizes that attitude is a stable psychological structure composed of three components—cognitive, affective, and behavioral tendency—which jointly form an individual' s overall evaluative orientation toward a given object. Drawing on this model and Li' s (1992) 本土化阐释, this study defines fertility attitudes among childless young adults as: the comprehensive psychological tendency held by young individuals without children toward the phenomenon of childbearing, which is built upon cognitive evaluations and emotional experiences of multiple factors

including economics, time, family, and health, with an internal structure encompassing three dimensions: cognitive, affective, and behavioral tendency. Within this framework, the cognitive dimension manifests as rational judgments and outcome expectations regarding childbearing, the affective dimension encompasses emotional reactions and subjective feelings, and the behavioral tendency dimension represents a generalized state of psychological readiness. It should be clarified that fertility attitude differs from fertility intention—attitude is a foundational evaluative system, whereas intention is a specific behavioral plan formed on this basis; it also differs from fertility motivation—attitude is the psychological evaluative outcome of motivation, while motivation is the internal drive or external incentive that propels behavior.

Although the tripartite attitude model provides a theoretical foundation, its effective application in empirical research depends on reliable and appropriate measurement tools. However, existing instruments suffer from incomplete dimensional coverage, focusing only on value cognition (Chen & Hu, 2025) or behavioral intention, or failing to match the psychological semantic characteristics of childless populations (Wu, 2019), thereby limiting effective capture of this group' s attitudes. Therefore, developing a standardized measurement tool with clear theoretical constructs, complete dimensions, and applicability to childless young adults is urgently needed. The semantic differential method (Osgood et al., 1957), as a classic attitude measurement technique, captures individuals' emotional and meaning-based evaluations of target concepts through paired opposite adjectives, offering advantages of simple administration, low respondent burden, and high measurement validity (Heise, 1970), making it particularly suitable for measuring attitudes toward abstract social concepts such as childbearing.

Based on the above analysis, this study aims to develop the *Semantic Differential Scale for Fertility Attitudes among Childless Young Adults* using the tripartite attitude model, combined with free association to capture core semantic representations of childbearing among this population. The scale' s reliability and validity will be systematically examined to provide an effective measurement instrument with both theoretical and methodological rigor for related research.

2.1 Participants

Sample 1 consisted of 1,200 questionnaires collected through an online platform. After excluding responses with patterned answering, failed attention checks, or abnormal demographic information, 1,035 valid questionnaires were retained (effective recovery rate: 86.33%). Following further exclusion of 203 respondents who reported having children, 832 childless young adults remained (see). This sample was randomly divided into Sample 1a (mean age = 24.19 ± 3.65) for item analysis and exploratory factor analysis, and Sample 1b (mean age = 23.97 ± 3.32) for confirmatory factor analysis.

Sample 2 comprised 600 questionnaires, with 557 valid responses retained after

the same screening procedure (effective rate: 92.83%; mean age = 23.65 ± 3.26). This sample was used for criterion validity and reliability testing. From this sample, 130 participants were randomly selected for test-retest reliability assessment, with 100 valid paired questionnaires recovered after four weeks (effective rate: 76.92%; mean age = 23.26 ± 2.99). Sample demographic characteristics are presented in .

This study was approved by the institutional ethics committee, and all participants provided informed consent before completing the assessments. Research materials have been shared through the Science Data Bank.

2.2.1 Initial Vocabulary Collection for Childless Young Adults' Fertility Attitudes

This study employed the free association method to collect fertility-related vocabulary from young adults, drawing on the research paradigm of Dong et al. (2018) and the lexical analysis procedure of Ma et al. (2025). Online surveys yielded data from 309 valid participants (114 males, 195 females; mean age = 26.91 ± 6.11 years), generating 1,089 non-repeated valid words (from 3,475 original entries). Through word frequency analysis, the top 100 most frequent words were identified as high-frequency terms, including "responsibility," "happiness," "education," "growth," and "pressure." In subsequent lexical categorization and conceptual anchor extraction, two coders independently classified high-frequency words based on synonym and semantic similarity principles, then integrated low-frequency words through discussion to refine the category system. Representative and semantically unique "conceptual anchors" were then extracted from each category to provide a theoretical basis for subsequent scale dimension construction (see).

2.2.2 Item Development for the Semantic Differential Scale

Based on the tripartite attitude model and semantic differential method requirements, this study selected non-neutral, non-obscure terms from the categorized vocabulary and constructed opposite pairs: natural antonyms were prioritized, and when direct antonyms were unavailable, pairs were generated based on conceptual meaning. For high-frequency and semantically complex concepts, distinctive expressions were created according to their functional differences in the psychological system to systematically capture their measurable attributes as evaluative tendencies, resulting in 24 initial adjective pairs. After three psychology doctoral students independently judged dimensional 归属, four semantically ambiguous or redundant items were deleted, retaining 20 pairs for the formal questionnaire (see).

2.3 Criterion Measures

Based on the Theory of Planned Behavior (Ajzen, 1991), this study examined the predictive power of attitudes on behavioral intention through fertility inten-

tion and reflected subjective pressure perception through fertility stress. Simultaneously, according to Self-Determination Theory (Deci & Ryan, 1985, 2000), fertility motivation represents the internal psychological drive elicited by attitudes—positive attitudes trigger approach motivation, while negative attitudes induce avoidance motivation. These three constructs provide systematic and multidimensional validation evidence for questionnaire validity from the perspectives of behavioral intention, subjective perception, and motivational orientation.

Positive Fertility Motivation: The positive fertility motivation subscale from Liu et al.' s (2025) Fertility Motivation Scale was used to assess internal psychological drive toward childbearing. This subscale contains 18 items rated on a 5-point Likert scale (0 = "strongly disagree" to 4 = "strongly agree"), with higher total scores indicating stronger positive fertility motivation. Cronbach' s α in this study was 0.96.

Negative Fertility Motivation: The negative fertility motivation subscale from Liu et al.' s (2025) Fertility Motivation Scale was used to assess internal psychological drive to avoid childbearing. This subscale contains 13 items rated on a 5-point Likert scale (0 = "strongly disagree" to 4 = "strongly agree"), with higher total scores indicating stronger negative fertility motivation. Cronbach' s α in this study was 0.94.

Fertility Stress: Following Yao et al. (2025), fertility stress was measured with the item: "When thinking about or discussing childbearing and child-rearing, I feel stressed." Responses were rated on a 7-point Likert scale (1 = "strongly disagree" to 7 = "strongly agree"), with higher scores indicating greater fertility stress.

Fertility Intention: Following Xing et al. (2019) and Zheng (2014), fertility intention was measured using three indicators: "ideal number of children,""degree of liking children," and "intensity of fertility intention." The "ideal number of children" was rated on an 8-point scale (0 = no children to 7 = seven children), while the latter two items used a 7-point Likert scale (1 = "not at all strong" to 7 = "very strong"). Higher total scores indicated stronger fertility intention.

2.4 Data Analysis

SPSS 26.0 was used for item analysis, exploratory factor analysis, criterion-related validity analysis, and reliability analysis. Amos 23.0 was used for confirmatory factor analysis.

3.1 Item Analysis

Item-total correlation analysis was conducted for the Fertility Attitude Semantic Differential Questionnaire, calculating correlation coefficients between each of the 20 items and the total score. All item correlations ranged from 0.65 to 0.89, exceeding the 0.30 threshold; therefore, no items were deleted (see).

3.2 Validity Analysis

Exploratory factor analysis (EFA) was conducted on Sample 1a. Results indicated the data were suitable for factor analysis (KMO = 0.97; Bartlett' s test: ^{2} = 7629.26, df = 190, p < 0.001). Principal component analysis was used to extract common factors (limited to three factors), with varimax rotation applied to factor loadings. Items were iteratively screened based on the following criteria: (1) factor loadings below 0.50 on all factors; (2) significant cross-loadings; (3) conceptual appropriateness for the dimension. Only one item was deleted at a time before re-running EFA. This process resulted in deletion of five items, retaining 15 items.

EFA was reconducted on the retained 15 items (limited to three factors), which cumulatively explained 76.87% of total variance. After rotation, all items loaded on their primary factor between 0.59 and 0.83, with communality values above 0.60. Based on the semantic characteristics of items in each factor and the tripartite attitude theory, the three factors were labeled "fertility cognition," "fertility emotion," and "fertility behavioral tendency" (see).

Confirmatory factor analysis (CFA) was conducted on Sample 1b. Results showed good overall model fit: ^{2}/df = 3.31 (< 5), CFI = 0.96, GFI = 0.92, TLI = 0.95, IFI = 0.96, NFI = 0.94 (all > 0.9), SRMR = 0.04 (< 0.05), and RMSEA = 0.075 (< 0.08), indicating satisfactory fit for the three-factor model (see [Figure 1: see original paper]).

Analysis based on Sample 2 revealed significant correlations among all dimensions of the Fertility Attitude Semantic Differential Questionnaire and between each dimension and the total score (see).

3.3 Reliability Analysis

Cronbach' s α coefficients and split-half reliability were calculated using Sample 2 data. Test-retest reliability was assessed four weeks later (see).

This study developed the *Semantic Differential Scale for Fertility Attitudes among Childless Young Adults* based on the tripartite attitude model, integrating the semantic differential method with free association. The questionnaire encompasses three dimensions—cognitive, affective, and behavioral tendency—enabling multidimensional systematic assessment of fertility attitudes and providing a novel perspective and effective tool for analyzing this population' s attitudinal structure.

From a family systems theory perspective, the extracted semantic anchors such as "relationship fairness" and "temporal autonomy" reveal the inherent tension among intergenerational responsibility, gender roles, and individual autonomy within Chinese families. For instance, "widowed parenting" (丧偶式育儿) not only reflects actual inequality in gender division of labor but also illuminates deep conflicts between traditional family role expectations and contemporary individuals' pursuit of self-worth and autonomy (Cox & Paley, 1997). This demon-

strates that Chinese youth' s fertility attitudes are deeply embedded in power structures, emotional interactions, and intergenerational relationships within family systems, providing empirical support for the applicability of this theory in non-Western cultural contexts.

According to sociocultural theory (Vygotsky, 1978), Chinese youth' s frequent use of terms like "responsibility," "pressure," "bride price," and "school district housing" when describing childbearing are not isolated psychological labels but rather composite psychological representations integrating cognition, emotion, and behavioral intention, carrying specific ethical concepts and cultural contracts. During operationalization, this study did not simply assign these composite concepts to single dimensions; instead, they were distinguished based on their functional roles in the psychological system. For example, "responsibility" was deconstructed within the fertility attitude structure into multidimensional evaluative tendencies, measured through "costly–rewarding" (cognitive evaluation), "painful–happy" (emotional experience), and "avoidant–confrontational" (behavioral readiness). In contrast, within the fertility motivation construct, the same concept was operationalized as socially normative drive (e.g., "Childbearing is an important duty of a wife") to capture behavior-promoting forces formed through internalized external norms. This strategy, leveraging the evaluative structure advantage of the semantic differential method, achieved effective transformation from cultural semantics to measurable constructs, offering a pathway for indigenous adaptation of cross-cultural psychological theories.

During item selection, five inappropriate pairs were eliminated based on theoretical and statistical criteria. Theoretically, items like "loved–bound" conflated affective and cognitive dimensions, while "autonomous–forced" used "forced," which reflects behavioral intensity rather than stable attitude. Statistically, these items exhibited cross-factor loadings or low factor loadings, compromising construct purity.

It should be noted that the "fertility behavioral tendency" dimension in this study measures individuals' generalized psychological readiness for childbearing (e.g., "prepared–procrastinating") rather than specific behavioral intentions (e.g., "ideal number of children") or motivations (e.g., "reasons for childbearing"). The semantic differential method captures overall evaluative structures through bipolar adjectives, effectively distinguishing attitudes from related concepts and ensuring theoretical validity.

Several limitations remain. First, the sample source was relatively homogeneous. Second, the questionnaire' s predictive validity for actual childbearing behavior has not been examined. Future research should consider diverse sampling to improve representativeness and employ longitudinal designs to validate predictive validity, such as long-term follow-up of participants' actual reproductive decisions to establish links between attitude scores and behavioral outcomes. Additionally, cross-cultural comparisons could further test the questionnaire' s universality and cultural specificity.

In summary, the *Semantic Differential Scale for Fertility Attitudes among Childless Young Adults* developed in this study demonstrates good reliability and validity, serving as a standardized instrument for measuring fertility attitudes among Chinese childless youth. The findings provide an important quantitative methodological foundation for understanding youth reproductive psychology and supporting family policy formulation.

References

Chen, T., & Hu, A. N. (2025). The impact of fertility support packages on childbearing attitudes among people of reproductive age: Findings from an online survey experiment. *Chinese Journal of Population Science, 39*(03), 19-34.

Dong, S. H., Wu, J., Zhu, H. J., & Wang, Y. (2018). The structure and relationship of explicit and implicit stigma toward mental illness based on the semantic differential scale. *Studies of Psychology and Behavior, 16*(05), 694-700.

Du, H. T. (2024). Challenges and opportunities for China' s economic development under negative population growth. *China Collective Economy,* (27), 21-24.

He, D. (2023). Establishing a fertility support policy system with emphasis on first-child support. *Population and Health,* (04), 6-7.

Hou, J. J., Yue, N. Y., & Zhang, L. (2023). Housing prices and migrant workers' reproductive intentions: A perspective of social integration. *Journal of Hunan University (Social Sciences), 37*(05), 54-63.

Huang, J. J. (2024). Does regional culture affect fertility intentions? An empirical test based on dialect. *Guangdong Social Sciences,* (06), 221-

Li, Q. H. (1992). A comparative study of fertility attitudes among Han, Zhuang, and Yao farmers in Guangxi. *Ethno-National Studies,* (01), 24-37.

Liu, T. L., Dong, Y. X., Yang, T., Ye, Z. H., Yang, F., Zhang, Y. Q., ···Zhu, T. S. (2025). Development and psychometric validation of the fertility motivation scale. *Population and Development, 31*(02), 94-104.

Ma, Y. T., Wang, H. Y., Yang, L., & Wei, Z. L. (2025). Grievance: A prototype analysis. *Journal of Psychological Science, 48*(3), 686-697.

Mao, Z. Y., Ji, S. M., & Wan, L. L. (2024). Trends in contemporary university students' views on love, marriage, and childbearing under low fertility rates: An analysis based on 32,282 national survey data. *Youth Exploration,* (02), 88-101.

Tan, L. Z., & Wei, W. Q. (2024). Can family-friendly policies enhance fertility intentions among young professional women? *Contemporary Youth Research,* (06),

Wang, H. M., & Fan, X. H. (2025). Trade-offs between time and life: Leisure

time and family fertility decisions—New evidence from micro-survey data. *Journal of Shanxi University of Finance and Economics, 47*(06), 29–39.

Wei, Y. H., Chang, B. R., Sheng, H. Y., & Fang, J. D. (2025). Perception of involution reduces individuals' fertility intention: The mediating role of basic psychological need satisfaction. *Chinese Journal of Applied Psychology,* Online first. https://link.cnki.net/urlid/33.1012.b.20250926.1240.001

Wu, J. W., Luo, M., & Qian, Y. D. (2019). Does attitude affect second-child fertility? *Journal of Nanjing Medical University (Social Sciences), 19*(05), 359

Xing, C., Meng, Y. Q., Lin, Q. Q., & Qin, Z. Y. (2019). Perceived age constraints on childbearing increase women's planned number of children. *Acta Psychologica Sinica, 51*(04), 428–436.

Xu, C. F., & Guo, C. (2024). The influence of filial piety on fertility behavior and policy implications. *Beijing Social Sciences,* (10), 116–128.

Xu, S. C., & Sun, Q. (2025). The impact of family social capital on university students' fertility intentions. *Jilin University Journal Social Sciences Edition, 65*(02), 181–195+239.

Yao, L. S., Tao, L., Xiao, L. B., & Li, Y. X. (2025). Development and psychometric validation of the Chinese reproductive anxiety questionnaire for people of childbearing age. *Chinese Journal of Clinical Psychology, 33*(03), 474–478.

Zheng, Z. Z. (2014). The measurement and application of fertility intention. *Chinese Journal of Population Science,* (06), 15–25+126.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Cox, M. J., & Paley, B. (1997). Families as systems. *Annual review of psychology, 48*(1), 243–267.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-determination in Human Behavior.* Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.

Heise, D. R. (1970). The semantic differential and attitude research. *Attitude Measurement,* 235–253.

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The Measurement of Meaning.* University of Illinois Press.

Rosenberg, M. J., Hovland, C. I., McGuire, W. J., Abelson, R. P., & Brehm, J. W. (1960). *Attitude Organization and Change: An Analysis of Consistency Among Attitude Components.* (Yales Studies in Attitude and Communication.). Yale University Press.

Vygotsky, L. S. (1978). *Mind in society: The Development of Higher Psychological Processes.* Harvard University Press.

Semantic Differential Scale for Fertility Attitudes among Childless Young Adults (Final Version)

Instructions: This section concerns your perceptions and views about childbearing. All items consist of pairs of opposite adjectives, each with 7 response points. Points 1–3 correspond to the left-side adjective, points 5–7 correspond to the right-side adjective, and point 4 represents neutrality. On the 1–7 scale, the closer the selected number is to the left end, the closer its meaning to the left-side adjective; conversely, the closer to the right end, the closer its meaning to the right-side adjective. *Indicates reverse-scored items.

Fertility Cognition Dimension: - Costly–Rewarding - Burdensome–Manageable - Exploitative–Fair - Uncontrollable–Controllable - Harmful–Beneficial

Fertility Emotion Dimension: - Lonely–Warm - Empty–Fulfilling - Stagnant–Growing - Sad–Joyful - Painful–Happy

Fertility Behavioral Tendency Dimension: - Procrastinating–Prepared - Rejecting–Trying - Neglecting–Attentive - Avoidant–Confrontational - Hesitant–Determined*

Note: Figure translations are in progress. See original paper for figures.