The Weight and Lightness of Life Choices: How Modernization Predicts Multiple Transformations of Chinese Individualism

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Abstract

The transformation of individualism has long attracted widespread attention in academia. However, existing literature on the transformation of individualism in China has yielded contradictory results. This paper argues that this may be due to differences in the measurement indicators of individualism employed by various studies. Furthermore, this paper proposes that individualistic practices in daily life can be divided into two categories: high-stake individualistic choices (high-stake choices, involving high opportunity costs) and low-stake individualistic choices (low-stake choices, involving low opportunity costs), and argues that modernization has a greater impact on high-stake individualistic choices than on low-stake individualistic choices. Study 1 examined Chinese people' s subjective perceptions of the significance of different life choices through a questionnaire survey (N = 312). The results revealed significant differences between four types of choices—whether to marry, whether to divorce, whether to have children, and whether to live separately from parents—and two types of choices such as naming newborn children (male, female), indicating that the former belong to high-stake individualistic choices and the latter to low-stake individualistic choices. Study 2, by analyzing 30-year panel data from 26 provinces in China, found that: 1) individualism in Chinese provinces, including both high-stake and low-stake choices, showed an overall upward trend, and modernization significantly positively predicted both types of individualism; 2) however, compared with low-stake individualistic choices, modernization demonstrated stronger predictive power for high-stake individualistic choices, with smaller inter-provincial differences in predictive trends. By categorizing the measurement of individualism, this study provides a new theoretical perspective for re-examining research on the transformation of individualism within China and globally.

Full Text

High- vs. Low-Stake Choices in Life: How Does Modernization Predict the Multidimensional Shifts of Individualism in China

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Abstract

The shifts of individualism have long been a topic of academic attention. However, existing research on the shifts of individualism in China has yielded conflicting results. The present article suggests that such discrepancies may arise from the use of different measurement indicators for individualism across studies. Further, we propose that the practical manifestations of individualism in daily life can be categorized into two types: individualistic high-stake choices (HSC, involving high opportunity costs) and individualistic low-stake choices (LSC, involving low opportunity costs), with modernization having a stronger impact on individualistic HSC than on individualistic LSC. Study 1, through a questionnaire survey (N = 312), examined Chinese participants' perception of the significance of various life choices. The results revealed that life choices such as marriage, divorce, having children, and living apart from parents were significantly different from life choices of naming a newborn (male or female), showing that the former were individualistic high-stake choices whereas the latter represented individualistic low-stake choices. Study 2, through analyzing 30 years of panel data from 26 provinces in China, demonstrated: 1) Individualism (including HSC and LSC) at the provincial level in China generally showed an upward trend, and modernization significantly positively predicted both types of individualism; 2) Compared to individualistic LSC, modernization showed stronger predictive power for individualistic HSC, along with smaller inter-provincial differences in the prediction trend. Taken together, by categorizing the measurement of individualism from the perspective of life choices, this study offers

a new theoretical perspective for re-examining the shifts of individualism both within China and around the globe.

Keywords: individualism, multidimensional shift, modernization, the perspective of life choices, the provincial level in China

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"Life is a series of choices between birth and death."
—French philosopher Jean-Paul Sartre

Introduction

Since the reform and opening-up, China' s rapid economic development has been accompanied by profound social and cultural changes that have attracted considerable scholarly attention (Cai et al., 2020), with a particular focus on the shifts of individualism. While numerous studies have indicated that individualism in China is on the rise (Cai et al., 2018; Bao et al., 2021), other research has suggested that individualism has not significantly increased or may even be declining (Hamamura et al., 2021). Notably, these studies have measured individualism using different methods (e.g., individual-level self-reports or social-level archival data) and different indicators (e.g., frequency of specific words, name uniqueness) (Cai et al., 2023). Individualism itself is not a unitary concept; its theoretical structure and practical manifestations are complex and multidimensional (Morales et al., 2000). Therefore, the divergent or even contradictory conclusions in previous research may stem from different methods and indicators measuring different facets of individualism.

This study proposes a novel framework for interpreting individualism based on the perspective of life choices, arguing that individualism is reflected in individuals' decision-making practices regarding life choices, which can be categorized into two types based on their significance: high-stake choices and low-stake choices. The former refers to choices involving high opportunity costs that typically require major changes in personal lifestyle, such as marriage and childbearing; the latter involves low opportunity costs and usually does not entail significant social or economic consequences, such as naming a child. By analyzing provincial-level panel data from China spanning 1981 to 2010, this study examines the shifting trends of these two types of individualism (high-stake and low-stake choices) at the provincial level, while simultaneously testing the differential impact of modernization on their shifts. Through investigating cultural shifts at the intra-national regional level, this study aims to dissect the shifting trends of the two types of individualism and the differential influence of modernization on individualism, thereby providing a more comprehensive interpretation of the shifts of individualism in China.

1.1 Individualism and Its Measurement

As one of the fundamental cultural dimensions (Hofstede, 1980), individualism/collectivism has long attracted scholarly attention. Individualism emphasizes individual agency, free choice, and independent self-construal, whereas collectivism focuses on relationships between individuals and interdependent self-construal (Markus & Kitayama, 1991; Oyserman et al., 2002). Initially conceptualized as opposite ends of a single dimension (Hofstede, 1980), subsequent scholars have argued that they are two independent dimensions (Markus & Kitayama, 1991), with each dimension further divided into horizontal and vertical forms (Triandis & Gelfand, 1998). Researchers have also proposed that individualism comprises different components. For instance, Chen and West (2008) suggested that individualism can be divided into three components: independence, competitiveness, and uniqueness. Thus, individualism is not a unidimensional concept but possesses multiple facets (Morales et al., 2000).

In empirical research, scholars have proposed various indicators to measure or represent individualism/collectivism, including a society' s rates of living alone, divorce, and family size (Grossmann & Varnum, 2015), the frequency of first-person singular/plural pronoun usage in texts such as books, song lyrics, and news (Twenge et al., 2013; Yu et al., 2016), the degree of preference for name uniqueness (Bao et al., 2021), and the endorsement of values such as freedom and independence (Greenfield & Quiroz, 2013).

Given the multifaceted nature of individualism, different measurement tools may capture different aspects of individualism. This raises a potential issue: even when examining the cultural intensity or shifting trends of the same social group during the same period, using different measurement methods or indicators may yield different or even opposite results. For example, studies using indicators such as preference for uniqueness in newborn names (Bao et al., 2021), first-person pronouns (Hamamura & Xu, 2015), and frequency of culture-related words (Liu et al., 2020) have found that individualism in China has increased over the past decades. However, Hamamura et al. (2021) found that individualism in China did not significantly increase during the second half of the 20th century through word similarity analysis. Santos et al. (2017) distinguished between individualistic practice and individualistic value, with the former based on macro-social indicators such as family size, living alone rate, and divorce rate, and the latter based on individuals' self-reported value preferences in questionnaires. The results showed that individualistic practice in China increased year by year, but individualistic values declined. In a recent study, Wu et al. (2023) proposed that individualism can be divided into utilitarian individualism and rational individualism, with the former involving independent personality and enterprising spirit unrelated to specific interests or contexts, and the latter emphasizing individual interests and rights. Through word frequency analysis of the Google Chinese Books corpus, Wu et al. (2023) found that from 1980 to 2019, utilitarian individualism (represented by words such as property and enjoyment) showed an upward trend, while rational indi-

vidualism (represented by words such as independence and autonomy) clearly declined. These studies reflect the phenomenon of multidimensional shifts in individualism and demonstrate the importance of considering different facets of individualism when examining its shifts.

1.2 Modernization and Individualism

Why does individualism change over time? Existing research has proposed various possible causes, including modernization (Inglehart & Baker, 2000; Greenfield, 2009), disaster frequency (Grossmann & Varnum, 2015), infectious disease prevalence (Fincher & Thornhill, 2012), and climate stress (Boyd et al., 2011). Among these, the earliest proposed and most widely tested factor is modernization (Inglehart & Baker, 2000; Greenfield, 2009, 2016). Modernization Theory (Inglehart & Baker, 2000) posits that changes in social and economic structures, particularly economic development, are important drivers promoting the rise and prevalence of individualism. As an extension of modernization theory, the Theory of Social Change and Human Development (Greenfield, 2009) more explicitly states that four factors—economy, education, urbanization, and technology—drive the transformation of human social environments from traditional Gemeinschaft (community) to modern Gesellschaft (society), with individualism being an adaptive product of modernization (Greenfield, 2016).

Scholars have proposed multiple explanations for how modernization promotes the formation of individualism. Kashima et al. (2004) noted that compared to rural areas, urban life provides residents with greater anonymity, fewer social constraints, and more freedom to break away from in-groups, making urban residents more likely to develop individualistic values that pursue independence and emphasize uniqueness. Varnum and Grossmann (2017), from an ecological stress perspective, pointed out that in the process of modernization, socio-economic development enhances resource abundance, thereby reducing individuals' dependence on others and prompting them to pay more attention to their own needs, ultimately leading to strengthened individualistic values. Bianchi (2016) found that economic development, as a typical indicator of modernization, was significantly negatively correlated with individuals' sense of uncertainty and positively correlated with individualism, thus inferring that economic development reduces individuals' need for certainty, predictability, and order, enhances their pursuit of uniqueness, and overall demonstrates stronger individualism. Bianchi (2020) further noted that economic recession increases uncertainty and reduces sense of control, enhancing individuals' need for order and structure, thereby leading to weakened individualism.

In summary, modernization implies higher per capita GDP, urbanization rates, and education levels. The improvement of economic income and education levels enables individuals to have stronger senses of control and certainty at both material and spiritual levels. Meanwhile, the urbanized lifestyle reduces traditional interpersonal social constraints, decreases individuals' dependence and interdependence on others, and increases attention to their own needs (Hamamura,

2012), which also makes individuals more willing and able to make rational choices that maximize their own interests (LeFebvre & Franke, 2013).

1.3 The Perspective of Life Choices

Culture (including individualism) refers to shared beliefs, norms, and behavioral habits among social members that influence individual psychology and behavior (Hofstede et al., 2010). Conversely, cultural characteristics at the social level are manifested through individuals' psychological reactions and behavioral practices in daily life. For individuals, making decisions when facing choices is a universal behavioral practice. Philosophically, the existentialist school emphasizes the importance of individual autonomous choice for the meaning of life (Aho, 2024). Existential philosopher Jean-Paul Sartre even proposed that life is a series of choices between birth and death (Sartre, 1972). However, the importance and consequences of different choices vary greatly. According to Rational Choice Theory, individuals will weigh the potential benefits and possible costs of different options and make choices that maximize their own interests (Hechter & Kanazawa, 1997). From the perspective of life choices, individualism is not only an adaptive choice result in response to changes in the social environment but also a macro-level manifestation of rational choices made by individuals in life practice. Conversely, the choice behavior patterns of social members in life practice can be used to characterize individualism.

Life choices include different types, and existing research has distinguished them from different perspectives. Some scholars focus on the difficulty of life choices. For example, Chang (2017) noted that difficult choices mean that the options are comparable but not clearly superior, making it hard to select a better one. Yates et al. (2003) proposed seven characteristics of difficult decisions: unclear differences in pros and cons among options, too many options, cumbersome decision-making processes, unimaginable consequences, serious consequences, uncertain value of consequences, and contradictory external advice or guidance. Other scholars focus on the importance of life choices. For instance, Ullmann-Margalit (2006) believed that major life choices will greatly change and determine a person' s future to a large extent, and once made, are difficult to revoke or reverse. Weiss et al. (2009) proposed that major choices shape an individual's life strategy and will also affect their subsequent life choices. Camilleri (2023) defined big life decisions as life choices that have significant and long-term impacts on an individual' s lifestyle and proposed ten characteristics of big life decisions (including that such choices are rarely made, require substantial resource investment, and have long-term impacts on life). Camilleri (2023) further found through questionnaire surveys that the most significant life choices include marriage, divorce, having and raising children, and buying/selling houses. In contrast, making budgets, buying and selling daily necessities, and even starting non-romantic relationships are all life choices with relatively low significance.

When facing different types of life choices, individuals' behavioral practices may be influenced by social environmental factors to varying degrees. Therefore,

in the process of social environmental changes (such as modernization), the cultural characteristics (such as individualism) reflected by different types of choice behavior practices are also likely to present different shifting trends.

1.4 The Present Research

Based on the above literature review, this study explores the shifts of individualism from the perspective of life choices and proposes that life choices reflecting individualism can be divided into two types based on their significance: high-stake choices (HSC) and low-stake choices (LSC). Specifically, HSC refers to major behavioral decisions in life practice that involve high opportunity costs, often producing major consequences and long-term impacts on interpersonal relationships, social status, financial conditions, etc., such as "life milestones" like marriage and childbearing. LSC refers to behavioral decisions in life practice that require only low opportunity costs and do not involve major social or economic consequences, usually concerning personal expression or aesthetic expression, such as clothing and grooming.

"High-stake choices" involving high costs and major consequences require individuals to possess sufficiently strong economic resource foundations and cognitive decision-making abilities, which largely depend on economic income and education level, and are therefore more susceptible to modernization at the macro level. In contrast, "low-stake choices" requiring only low opportunity costs and not involving major consequences have relatively lower demands on individuals' economic strength and educational qualifications. Therefore, we argue that in the modernization process characterized by economic development and educational advancement, the two types of individualism based on LSC and HSC differ in the degree to which they are influenced by modernization and may present different shifting trends.

To verify the above viewpoints, we conducted two studies. Study 1, based on classic indicators of individualism (living alone rate, divorce rate, family size, extended family proportion, and newborn name uniqueness), used a questionnaire survey to examine Chinese participants' subjective perceptions of the overall significance and related characteristics of six types of life choices (marriage, divorce, having children, living apart from parents, and naming newborn boys and girls) to verify whether these life choices (and their corresponding individualism indicators) can be classified into "high-stake choices" and "low-stake choices." Study 2, based on provincial-level panel data spanning 30 years in China, conducted a cross-temporal dynamic analysis of individualism and modernization levels across Chinese provinces from 1981 to 2010 to answer two questions: 1) What are the shifting trends of individualistic HSC and LSC over time? 2) Does modernization differentially predict the shifts of the two types of individualism?

Study 1

In individualism research, living alone rate, divorce rate, family size, extended family proportion, and newborn name uniqueness are commonly used as individualism indicators. The first four indicators all point to family structure characteristics, primarily determined by marital status (marriage or divorce), fertility status, and establishing separate households. Specifically, marriage and childbearing reduce the living alone rate, increase family size, and raise the likelihood of forming extended families, while divorce, childlessness, and establishing separate households have opposite effects. Corresponding to life choices in daily practice, decisions to change marital status (marriage or divorce), have children, and live apart from parents (establishing separate households) often involve relatively high opportunity costs (including time, energy, and finances) and usually have significant impacts on family relationships and other interpersonal relationships (Camilleri, 2023). This article argues that these belong to "high-stake choices" in life practice. In contrast, newborn name uniqueness is reflected in the life choice of naming newborns, which usually does not involve high economic costs or significantly impact social relationships. This article argues that this belongs to "low-stake choices" in life practice.

Study 1 aims to test Chinese participants' subjective perceptions of the overall significance and related characteristics of six types of life choices (marriage, divorce, having children, living apart from parents, naming newborn boys, and naming newborn girls) through a questionnaire survey, thereby verifying the reasonableness of classifying them as individualistic high-stake choices and low-stake choices.

2.1 Method

2.1.1 Participants Questionnaires were distributed through the Credamo platform (www.credamo.com), recruiting 327 participants. Due to failing attention check questions (i.e., "What is 100+100 equal to?" with the correct answer being "200"), 15 responses were automatically rejected by the system, yielding 312 valid responses. Among them, 221 were female (70.83%) and 91 were male (29.17%). Age distribution showed 174 participants (55.77%) aged 21-30, 113 (36.22%) aged 31-40, and 15 (4.81%) aged over 40. Regarding education, 217 participants (69.55%) held bachelor' s degrees and 89 (28.53%) held master' s or doctoral degrees. Monthly income distribution showed 110 participants (35.26%) earning 5,001-10,000 RMB, 106 (33.97%) earning 5,000 RMB or less, and 96 (30.77%) earning over 10,000 RMB. In terms of residence background, 108 participants (34.62%) were from rural/town areas, 94 (30.13%) from county towns, and 110 (35.26%) from large cities. Regarding sibling status, 112 participants (35.9%) were only children and 200 (64.1%) had siblings. Marital status showed 148 participants (47.44%) unmarried and 164 (52.56%) married. Childbearing status showed 160 participants (51.28%) without children and 152 (48.72%) with children. Thus, the survey sample demonstrated relatively high diversity in demographic characteristics.

2.1.2 Measures Based on the ten characteristics of big life decisions proposed by Camilleri (2023) (e.g., "This decision involves multiple considerations"), a life choice characteristics scale was generated using translation-back-translation methods. Since Camilleri' s (2023) ten characteristics did not specify which aspects were affected by "affecting multiple aspects of life," and our definition of HSC and LSC emphasizes differences in the degree of impact on specific life aspects such as interpersonal relationships, economic conditions, and lifestyle, we added three items to more directly correspond to our proposed HSC concept (i.e., "This choice has a great impact on interpersonal relationships/economic conditions/lifestyle"). A total of 13 items (see Table 1) were measured using a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree). Participants were required to complete all items for one type of life choice before evaluating the next type. To avoid possible order effects, the presentation order of the six types of life choices was randomized. Finally, the questionnaire also required participants to provide an overall evaluation of the significance of the six types of life choices (presentation order randomized) on a scale from 0 (completely insignificant) to 10 (extremely significant).

Table 1 Life Choice Characteristics Evaluation Scale for Study 1

Scale Item Content
{_}{This} choice rarely occurs in a person' s life
{}{The} consequences of this choice are uncertain
{_}{This} choice involves multiple considerations
{_}{This} choice relates to personal morality or values
{}{This} choice requires substantial resource investment
{_}{This} choice excludes many other options
{_}{This} choice affects multiple aspects of life
{}{This} choice has a great impact on interpersonal relationships
{_}{This} choice has a great impact on economic conditions
{_}{This} choice has a great impact on lifestyle
{}{This} choice affects many people
{_}{This} choice has long-term effects on life
{___}{This} choice is difficult to revoke or withdraw once made

Note: In the actual questionnaire, the underlined parts corresponded to specific life choices, namely marriage, divorce, having children, living apart from parents, naming a newborn (boy), and naming a newborn (girl). To avoid misunderstanding, the instruction for each type of life choice clearly stated that the choice refers not merely to having or considering the idea but to making a decision and taking action. For "having children," the instruction specified "(including biological or adopted, etc.)," and for "living apart from parents," it specified "(specifically referring to establishing separate households after adulthood)."

2.2 Results

2.2.1 Common Method Bias Test Harman' s single-factor test was used for exploratory factor analysis on the 13 characteristic evaluations and overall significance evaluation for the six types of life choices (84 items total), using principal component analysis with no rotation. The common method bias test results showed that 21 factors with eigenvalues greater than 1 could be extracted, with the first factor explaining 16.0% of the variance, far below the critical value of 40.0%, indicating that the survey data did not suffer from serious common method bias.

2.2.2 Factor Analysis For each type of life choice, the arithmetic mean of its corresponding 13 characteristic evaluations was calculated as the total characteristic score. Next, exploratory factor analysis was conducted on the characteristic intensity of the six types of life choices to test whether and how the six types of life choices would cluster into different factors based on overall characteristic intensity.

The results showed that the KMO measure of sampling adequacy was 0.70, and Bartlett' s test of sphericity was significant ($p < 0.001$), indicating that the data were suitable for factor analysis. Maximum likelihood method was used for factor extraction, and varimax rotation was used to optimize factor loadings. The results (see Table 2) showed that marriage, divorce, having children, and living apart from parents all loaded on the first factor (loadings all > 0.40, corresponding to individualistic high-stake choices), while naming newborn boys and naming newborn girls loaded on the second factor (loadings all > 0.90, corresponding to individualistic low-stake choices).

Table 2 Rotated Factor Matrix

Life Choice Type	Factor 1	Factor 2
Marriage	0.70	0.09
Divorce	0.67	0.07
Having children	0.66	0.12
Living apart from parents	0.44	0.01
Naming newborn (boy)	0.01	0.95
Naming newborn (girl)	0.01	0.95

2.2.3 Analysis of Variance A one-way repeated measures ANOVA was conducted with life choice type as the independent variable and overall significance evaluation as the dependent variable.

The results showed (see Figure 1 [Figure 1: see original paper]) that the main effect of life choice type was significant, $F(5, 1555) = 260.76$, $p < 0.001$, indicating significant differences in overall significance evaluation among the six types of life choices. Post-hoc multiple comparisons showed that the significance levels

of marriage (9.63 ± 0.08), divorce (9.48 ± 0.09), having children (9.69 ± 0.09), and living apart from parents (7.60 ± 0.11) were all significantly higher than those of naming a newborn boy (6.76 ± 0.13) and naming a newborn girl (6.93 ± 0.13) (ps < 0.001).

Figure 1 [Figure 1: see original paper] Comparison of significance ratings for six types of life choices

As shown above, in terms of choice characteristic evaluation, marriage, divorce, having children, and living apart from parents belong to a different dimension from naming newborns; in terms of significance evaluation, the former four types of life choices are significantly higher than the latter two. Therefore, the questionnaire survey results indicate that Chinese participants' perceptions of the significance of the six types of life choices are consistent with the life choice classification proposed in this article, namely that marriage, divorce, having children, and living apart from parents belong to high-stake choices in life practice, while naming newborns belongs to low-stake choices.

Study 2

Study 1 verified that marriage, divorce, having children, and living apart from parents correspond to individualism indicators of living alone rate, divorce rate, family size, and extended family proportion, belonging to high-stake choices, while naming newborns corresponds to the individualism indicator of newborn name uniqueness, belonging to low-stake choices. Study 2 measured individualistic high-stake and low-stake choices based on these indicators, collecting 30 years of provincial-level panel data in China to test the shifting trends of individualistic high-stake and low-stake choices and whether modernization differentially predicts the shifts of the two types of individualism.

3.1 Method

3.1.1 Variables The core variables in Study 2 included modernization level and individualism level, both measured through archival data.

For the explanatory variable of modernization level, following previous research (Kraus et al., 2012; Santos et al., 2017; Varnum et al., 2010), we collected four types of data as representative indicators, including per capita gross domestic product (GDP) of Chinese provinces in different years, urbanization rate (i.e., the proportion of urban population to total population), proportion of population with higher education (i.e., the proportion of population with college degree or above among the total population aged 6 and above), and illiteracy rate (i.e., the proportion of illiterate population among those aged 15 and above, reverse-coded).

For the outcome variable of individualism level, we collected four indicators corresponding to individualistic high-stake choices: living alone rate (i.e., the proportion of "one-person households"among total households in national census

data), divorce rate (i.e., the proportion of divorced population among total population aged 15 and above), family size (i.e., the average number of persons per household obtained by dividing total household population by total number of households, reverse-coded), and extended family proportion (i.e., the proportion of households with 8 or more persons among total households, reverse-coded).

The measurement of individualistic low-stake choices was based on residents' preference for name uniqueness when naming newborns. Choosing uncommon names for newborns reflects individuals' pursuit of uniqueness (Twenge et al., 2010), and the pursuit of uniqueness is a typical characteristic of individualism (Markus & Kitayama, 1991; Oyserman et al., 2002). According to Study 1 results, naming newborns belongs to individualistic low-stake choices and can be measured by quantifying the preference for newborn name uniqueness, specifically the sum of the proportions of the top 10 most common baby names in each province and year among the total number of newborns (separately for boys and girls; reverse-coded).

3.1.2 Data Sources All data were collected at the provincial level in China. Per capita GDP data came from the China Statistical Yearbook Database (1981-2010), and the total proportion of top 10 most common baby names came from the National Citizen Identity Information Center (NCIIC) of the Ministry of Public Security of China. These two indicators had annual data points (30 each). All other indicator data came from the National Population Census Database, including data from four census years: 1982, 1990, 2000, and 2010. For missing data in other years, following previous research (Santos et al., 2017), linear interpolation was used between any two adjacent data points to supplement the data, resulting in 30 data points for each indicator (1981-2010).

Study 2 covered 26 of China's 34 provincial-level administrative regions. Among the 8 excluded regions, Hong Kong, Macao, and Taiwan have different political systems from mainland China, while Xinjiang, Tibet, and Inner Mongolia have vastly different living systems, religions, and even languages from other regions of China. To minimize the confounding effects of these factors, these 6 provincial-level regions were not included. Additionally, Chongqing and Hainan were excluded due to missing 1982 and 1990 national census data.

3.2 Results

This study used SPSS 25.0 (IBM Corporation, New York) to process and analyze data, including the following four parts:

3.2.1 Correlation Analysis of Core Variables First, Pearson simple correlation analysis was used to test the correlations among indicators within the three core variables (modernization, individualistic high-stake choices, and individualistic low-stake choices) to ensure internal consistency of measurement. After standardizing each indicator variable, their mean was calculated as the composite index score for the core variable.

(1) Modernization

The four indicators of modernization (per capita GDP, urbanization rate, proportion of population with higher education, and illiteracy rate) were all significantly correlated with each other in expected directions, $0.47 < |r|s < 0.83$ (see Table 3). For each indicator, after standardizing data from all provinces and years, the mean of the four indicators was calculated as the annual composite index of modernization level for each province (illiteracy rate was reverse-coded before calculation). Higher composite index scores represent higher modernization levels.

Table 3 Simple Correlation Analysis of Modernization and Its Individual Indicators

Modernization Indicator	1	2	3	4
1. Per capita GDP	—			
2. Urbanization rate	0.71***	—		
3. Higher education proportion	0.83***	0.77***	—	
4. Illiteracy rate (reverse)	-0.56***	-0.63***	-0.47***	—
Modernization composite	0.90***	0.90***	0.89***	-0.77***

Note: p < 0.05; ** p < 0.01; *** p < 0.001.*

(2) Individualistic High-Stake Choices

The four indicators of individualistic high-stake choices (living alone rate, divorce rate, family size, and extended family proportion) were all significantly correlated with each other in expected directions, $0.35 < |r|s < 0.89$ (see Table 4). For each indicator, after standardizing data from all provinces and years, the mean of the four indicators was calculated as the annual composite index of individualistic high-stake choices for each province (family size and extended family proportion were reverse-coded before calculation). Higher composite index scores represent stronger individualistic high-stake choices. During the 30-year period from 1981 to 2010, the three provinces with the highest average scores for individualistic high-stake choices were Shanghai, Beijing, and Zhejiang, while the three provinces with the lowest average scores were Gansu, Jiangxi, and Ningxia (see Appendix 1 Table S1 for more information).

Table 4 Simple Correlation Analysis of Individualistic High-Stake Choices and Its Individual Indicators

Individualistic HSC Indicator	1	2	3	4
1. Living alone rate	—			
2. Divorce rate	0.42***	—		
3. Family size (reverse)	-0.70**	-0.54***	—	

Individualistic HSC Indicator	1	2	3	4
4. Extended family proportion (reverse)	-0.43**	-0.35**	0.89***	—
Individualistic HSC composite	0.78***	0.71**	-0.96***	-0.82***

Note: p < 0.05; ** p < 0.01; *** p < 0.001.*

(3) Individualistic Low-Stake Choices

The two indicators of individualistic low-stake choices (total proportion of top 10 most common boy names and total proportion of top 10 most common girl names) were significantly positively correlated, r = 0.90, p < 0.001 (see Table 5). For each indicator, after standardizing and reverse-coding data from all provinces and years, the mean of the two indicators was calculated as the annual composite index of individualistic low-stake choices for each province. Higher composite index scores represent stronger individualistic low-stake choices. During the 30-year period from 1981 to 2010, the three provinces with the highest average scores for individualistic low-stake choices were Guangdong, Guangxi, and Fujian, while the three provinces with the lowest average scores were Ningxia, Sichuan, and Shaanxi (see Appendix 1 Table S1).

Table 5 Simple Correlation Analysis of Individualistic Low-Stake Choices and Its Individual Indicators

Individualistic LSC Indicator	1	2	3
1. Top 10 boy names proportion (reverse)	—		
2. Top 10 girl names proportion (reverse)	0.90***	—	
Individualistic LSC composite	-0.97***	-0.97***	—

Note: p < 0.05; ** p < 0.01; *** p < 0.001.*

3.2.2 Multilevel Modeling of Individualism Shifts Over Time Multilevel modeling (Hox, 2002) was used with time (year) as the explanatory variable and the composite indices of individualistic high-stake and low-stake choices as outcome variables to examine the shifting trends of individualism at the provincial level in China from 1981 to 2010. To control for possible temporal autocorrelation, year was specified as a repeated variable in the multilevel model, and the repeated covariance type was set to ARMA (autoregressive moving average model).

The results showed that individualism overall increased significantly over time (individualistic high-stake choices: b = 0.073, 95% CI = [0.063, 0.082], SE = 0.005, t(25.000) = 15.76, p < 0.001; individualistic low-stake choices: b = 0.034, 95% CI = [0.021, 0.048], SE = 0.007, t(25.554) = 5.21, p < 0.001).

Furthermore, in the multilevel model predicting individualistic high-stake choices from time, the random effects test was significant (ps < 0.001), indicating that the initial levels and time trends of individualistic high-stake choices varied across provinces. Separate linear regression models for each province with year as the explanatory variable and individualistic high-stake choices as the outcome variable (see Appendix 2 Figure S2.2) showed that although individualistic high-stake choice levels in all provinces increased significantly over time (ps < 0.001), the magnitude of increase varied. Qinghai showed the fastest growth (b = 0.108), while Shanxi showed the slowest growth (b = 0.024).

In the multilevel model predicting individualistic low-stake choices from time, the random effects test was also significant (ps < 0.05). Similarly, separate linear regression models for each province (see Appendix 2 Figure S2.2) showed that 22 provinces exhibited significant growth in individualistic low-stake choice levels (ps < 0.001), with Liaoning and Sichuan showing the fastest growth (b = 0.130 and 0.121, respectively). Yunnan and Gansu showed no significant growth (p = 0.199 and 0.329, respectively), while Guangdong and Fujian even showed significant declines (b = -0.008 and -0.010, respectively, ps < 0.001).

These results suggest that the shifting trends of the two types of individualism show obvious inter-provincial differences, but compared to individualistic low-stake choices, the shifting trends of individualistic high-stake choices show smaller inter-provincial differences: not only are the shifting speeds inconsistent, but two provinces even show opposite shifting directions (see Figure 2 [Figure 2: see original paper]).

Figure 2 [Figure 2: see original paper] Shifting trends of individualistic high-stake choices (left) and low-stake choices (right) at the provincial level in China from 1981 to 2010. Circles represent the composite index values of individualistic high-stake/low-stake choices for each province in the corresponding year, and dashed lines represent the shifting trends of individualism fitted by multilevel models.

3.2.3 Multilevel Modeling of Modernization Predicting Individualism

Group-mean centering was performed for modernization (including the composite index and its four individual indicators) by province. Then, multilevel models were established with these five modernization indicators as explanatory variables and individualistic high-stake and low-stake choices as outcome variables. Similarly, to control for temporal autocorrelation, year was specified as a repeated variable, and the repeated covariance type was set to ARMA.

The results showed that the modernization composite index and its four individual indicators all significantly predicted both individualistic high-stake and low-stake choices in expected directions (note: per capita GDP' s prediction of individualistic low-stake choices was not significant, see Table 6). Overall, higher modernization levels were associated with stronger individualism. Mean-

while, as shown in Table 6, the association strength (i.e., absolute value of regression coefficient b) between modernization indicators (including the composite index and individual indicators) and individualistic high-stake choices was higher than that with individualistic low-stake choices. This suggests that, as expected, modernization provides stronger prediction for individualistic high-stake choices compared to low-stake choices.

Table 6 Effects of Modernization on Individualistic High-Stake and Low-Stake Choices at the Provincial Level in China

Modernization Indicator	Individualistic HSC	Individualistic LSC
Per capita GDP	0.262*** (0.030) [0.188, 0.336]	0.002^ (0.032) [-0.061, 0.065]
Urbanization rate	0.953*** (0.106) [0.737, 1.168]	0.396** (0.115) [0.159, 0.634]
Higher education proportion	0.855*** (0.073) [0.705, 1.006]	0.356** (0.107) [0.130, 0.582]
Illiteracy rate (reverse)	-0.472*** (0.045) [-0.566, -0.378]	-0.366*** (0.085) [-0.546, -0.185]
Modernization composite	0.859*** (0.076) [0.702, 1.015]	0.303** (0.092) [0.108, 0.498]

Note: ^ p = 0.953; p < 0.05; ** p < 0.01; *** p < 0.001.*

Additionally, in the multilevel model predicting individualistic high-stake choices from the modernization composite index, the random effects test was significant (ps < 0.05), indicating that the influence pattern of modernization on the shifts of individualistic high-stake choices varied across provinces. Separate linear regression models for each province with the modernization composite index as the explanatory variable and individualistic high-stake choices as the outcome variable (see Appendix 2 Figure S2.3) showed that modernization significantly positively predicted individualistic high-stake choices in all 26 provinces (ps < 0.05), with prediction strength ranging from 2.080 (Heilongjiang) to 0.470 (Shanxi).

In the multilevel model predicting individualistic low-stake choices from the modernization composite index, the random effects test was also significant (p < 0.001). Similarly, separate linear regression models for each province (see Appendix 2 Figure S2.3) showed that modernization significantly positively predicted individualistic low-stake choices in 22 provinces (ps < 0.001), with prediction strength ranging from 2.284 (Sichuan) to 0.082 (Qinghai). In Yunnan and Gansu provinces, modernization was not significantly associated with individualistic low-stake choices (p = 0.114 and 0.344, respectively). In Guangdong and Fujian provinces, modernization even negatively predicted individualistic low-stake choices (regression coefficients = -0.091 and -0.109, respectively, ps < 0.001).

These results suggest that the association between modernization and individualism shows obvious inter-provincial differences, and compared to individualistic high-stake choices, the prediction trend of modernization for individualistic low-stake choices shows greater inter-provincial differences: not only does the association strength vary, but the association direction is opposite in two provinces (see Figure 3 [Figure 3: see original paper]).

Figure 3 [Figure 3: see original paper] Prediction patterns of modernization for individualistic high-stake choices (left) and low-stake choices (right) across different provinces in China. Dots represent the composite index values of individualistic high-stake/low-stake choices for each province in the corresponding year.

3.2.4 Time-Lag Effect Analysis of Modernization To further verify the possible causal relationship between modernization level and individualism, we tested the time-lag effect of modernization. Multilevel models were established with the modernization composite index as the explanatory variable and individualistic high-stake and low-stake choice indices 10 years later as outcome variables (Santos et al., 2017). The results showed that the modernization composite index significantly positively predicted individualistic high-stake choice levels 10 years later ($b = 1.224$, 95% CI = [1.026, 1.421], SE = 0.097, $t(32.39) = 12.61$, $p < 0.001$) and individualistic low-stake choice levels 10 years later ($b = 0.878$, 95% CI = [0.599, 1.157], SE = 0.131, $t(15.07) = 6.70$, $p < 0.001$). This result further verified the positive driving effect of modernization on the shifts of both types of individualism.

General Discussion

This article offers a new interpretation of individualism from the perspective of life choices, arguing that individualism is reflected in individuals' decision-making practices regarding life choices, and that individualism can be distinguished into two types based on the significance of choices: high-stake choices and low-stake choices. By exploring the possible differences in the shifting trends of the two types of individualism and their influences by modernization, this study provides a more comprehensive analysis and reveals the shifts of individualism.

Study 1, through questionnaire survey, found that Chinese participants' subjective perceptions of the significance of different life choices varied significantly. Marriage, divorce, having children, and living apart from parents belong to a different dimension from naming newborns, with the former being significantly higher than the latter in significance evaluation. This result is consistent with existing research on life choices. For example, Camilleri (2023) noted that marriage, divorce, and having/raising children are among the most significant life decisions. More importantly, given that the six types of life choices in the questionnaire correspond to classic cultural indicators in individualism research,

Study 1 results validate our proposed distinction between high-stake and low-stake choices in individualism. Specifically, marriage, divorce, having children, and living apart from parents correspond to classic individualism indicators of living alone rate, divorce rate, family size, and extended family proportion, belonging to individualistic high-stake choices proposed in this article. Naming children corresponds to the classic indicator of name uniqueness, i.e., individualistic low-stake choices proposed in this article.

Study 2, based on cultural indicators of individualistic high-stake and low-stake choices, collected and analyzed 30 years of panel data from 26 provinces in China, further testing the shifting trends of the two types of individualism at the intra-national regional level and the prediction patterns of modernization on their shifts. The results showed that individualism at the provincial level in China gradually increased overall from 1981 to 2010, but compared to individualistic low-stake choices, the shifting trends of individualistic high-stake choices showed smaller inter-provincial differences. Meanwhile, although modernization level provided significant positive prediction for the shifts of both types of individualism, there were differences in association strength and pattern, manifested in two aspects: 1) The association strength between modernization and individualistic high-stake choices was higher than that with low-stake choices, and per capita GDP significantly positively predicted individualistic high-stake choices but did not significantly predict low-stake choices. This suggests that modernization provides stronger prediction for individualistic high-stake choices compared to low-stake choices. 2) The association strength between modernization and individualistic high-stake choices showed smaller inter-provincial differences, indicating that modernization' s prediction trend for individualistic high-stake choices is more consistent across provinces.

In examining individualism shifts, this study is the first to distinguish individualism into high-stake and low-stake choices from the perspective of life choices, and also the first to consider possible differences in socio-economic and cultural development across different regions within a nation, testing the shifting trends of the two types of individualism at the provincial level and revealing differences in modernization' s influence on their shifts. This helps expand understanding of social and cultural shifts (Grossmann & Varnum, 2015) and provides a new analytical perspective for more comprehensively examining social and cultural shifts. Moreover, as the world' s largest developing country and one of the most typical collectivist cultures, China has experienced tremendous changes in its socio-economic structure in recent decades. Meanwhile, China' s modernization process and cultural individualization path have their particularities (Yan, 2010; Wu et al., 2023). Compared with Western countries, national-level institutions and policies have played a more prominent role in promoting China' s modernization and individualization. Examining how these rapid and massive modernization processes influence the evolution of Chinese society and culture not only helps reveal the changing patterns of contemporary Chinese psychology and behavior but also provides insights for more comprehensively understanding the mechanisms of human social and cultural shifts (Cai et al., 2020; Huang et

al., 2021).

4.1 Shifts of Individualism in China

Based on the perspective of life choices and provincial panel data, this study found that both types of individualism (high-stake and low-stake choices) in China gradually strengthened overall from 1981 to 2010, consistent with numerous previous studies. For example, scholars have found that the uniqueness of Chinese names has shown an upward trend over the past decades (Bao et al., 2021; Cai et al., 2018; Su et al., 2016). Other scholars have found that words reflecting individualistic values (such as choice, competition, etc.) appear with increasing frequency in Chinese publications like e-books and newspapers (Zeng & Greenfield, 2015; Liu et al., 2020). These studies all indicate that individualism has shown a gradually strengthening trend during China's social shifts. This article provides further empirical support for this trend based on intra-national regional-level data for the first time.

However, some studies have presented different views. For example, Santos et al. (2017), based on the World Values Survey (WVS) database, found that individualistic values in China showed a clear declining trend from 1990 to 2007. Hamamura et al. (2021) conducted word similarity analysis on books published in China from 1950 to 1999 using the Google Books Ngram database and found that in the half-century since the founding of the People' s Republic of China, individualistic words did not show high similarity with positive emotion words but instead showed higher similarity with negative emotion words. The authors noted that this result indicated that modernization in Chinese society did not promote the rise of individualism. Santos et al. (2017) and Hamamura et al. (2021) provided new insights for cultural shift research in terms of research perspectives and methods. The reasons for the inconsistency between their findings and this study and other research may lie in the different measurement indicators and time windows used. Specifically, in Santos et al. (2017), the measurement of individualistic values was based on three subjective value evaluations in the WVS questionnaire (e.g., "the degree to which friends are considered more important than family"). Compared with indicators such as name uniqueness preference and cultural word usage frequency, these indicators may reflect different facets of individualism. For Hamamura et al. (2021), on the one hand, the study focused on the period from 1950 to 1999, with most of the period being before China' s reform and opening-up. After the implementation of reform and opening-up policies in 1978, Chinese society underwent tremendous changes. The shifts of culture, particularly individualism, may have been vastly different or even opposite before and after reform and opening-up. On the other hand, Hamamura et al. (2021) analyzed the association strength between individualism-related words and positive/negative emotion words in books, rather than directly pointing to the popularity of individualism-related concepts. In a latest study, Bao et al. (2022) pointed out that Hamamura et al. (2021) had flaws and even fallacies in indicator calculation and result inter-

pretation, and obtained inconsistent or even opposite results from the original study after reanalyzing the data.

4.2 Modernization and the Shifts of Individualism

Based on multiple analyses including multilevel regression models and time-lag effect models, this study consistently found that modernization has a positive driving effect on individualism in China (including both high-stake and low-stake choices), indicating that macro-level changes in socio-economic structures such as economy, education, and urbanization are key factors in social and cultural shifts.

The higher a society's modernization level, the more developed its economy (e.g., per capita GDP growth and increased urbanization rate) and the higher its education level (e.g., increased proportion of higher education talent). Economic and educational development provides people with more material resources, better cognitive abilities, and stronger subjective consciousness (Bianchi, 2016; Varnum & Grossmann, 2017). From the perspective of rational choice theory, correspondingly, individuals are more capable and willing to make rational choices that focus on their own needs and interests. The promoting effect of modernization on rational choices at the individual level is ultimately reflected at the social macro level as modernization' s boosting effect on individualism.

However, modernization' s influence on different types of life choices varies. When people face major choices such as marriage, childbearing, divorce, and establishing separate households, these often involve multiple resources including economic strength, cognitive thinking, time, and energy (Camilleri, 2023). In more modernized societies, people, especially women, are more likely to possess these resources and thus make choices in major decisions that better meet their own needs rather than the interests of others or the collective (such as choosing divorce or single living), and can reduce the constraints brought by social relationships (Kashima et al., 2004). At the social level, this is manifested as the high rates of living alone and divorce and the lower proportion of extended families and smaller family sizes that this study focuses on.

In contrast, when life choices themselves do not involve high opportunity costs or serious social consequences, their influence by modernization will be relatively limited. Corresponding to the newborn naming behavior focused on in this study, modernization has generally improved people's education levels, and their sense of autonomy has correspondingly increased, making them more inclined to pursue uniqueness in life practice, including in naming their children. This to some extent reflects modernization' s promoting effect on the individualistic choice of pursuing newborn naming uniqueness. However, compared with major choices such as marriage, childbearing, divorce, and establishing separate households, naming newborns usually does not involve high economic costs or major social consequences, and the behavior itself may simultaneously be influenced by other social environmental factors such as religious beliefs and customs (Ren

et al., 2024; Su & Ren, 2015), thereby crowding out modernization' s influence on the pursuit of newborn naming uniqueness. For example, Berger et al. (2012) found that the popularity of newborn names is influenced by the popularity of other names with similar phonemes in the previous year, and also found that typhoon names can influence the popularity of names with similar phonemes. In China, compared with northern provinces, southern provinces (especially Guangdong and Fujian) have stronger clan concepts (Ren et al., 2024), and the custom of using generational names is more prevalent. In these regions, naming newborns emphasizes using characters to indicate generational order, i.e., using the same character in the names of family members of the same generation (usually the first character of the given name) to represent generational status (the generational name). The prevalence of such generational name customs makes three-character names more mainstream. Compared with two-character names, three-character names are less likely to be duplicated, manifesting as higher newborn name uniqueness levels. Study 2 of this article found that individualistic low-stake choices in Guangdong and Fujian provinces showed a declining trend, and modernization provided negative prediction. On the one hand, this may be because residents in Guangdong and Fujian provinces already tended to use three-character names with relatively low duplication rates, so their name uniqueness was already at a relatively high level. On the other hand, since the reform and opening-up, Guangdong and Fujian have been typical inter-provincial labor import destinations, receiving large influxes of population from other provinces, which may have "diluted" the original naming patterns to some extent, ultimately leading to a declining trend in individualism represented by newborn name uniqueness. Overall, the results of this study indicate that modernization has differential influences on the shifts of the two types of individualism, with a greater influence on individualistic high-stake choices than on low-stake choices.

4.3 Limitations and Future Directions

The limitations of this study are as follows: First, when examining Chinese participants' subjective perceptions of different types of life choices through questionnaire survey, Study 1 did not address possible changes in participants' evaluations of the significance of various life choices over time. For example, before or in the early stages of reform and opening-up, divorce rarely occurred in Chinese people' s lives. Meanwhile, married women often played the role of housewives, and divorce was more likely to cause changes in their economic conditions and more easily trigger negative perceptions from families or society, bringing greater changes in interpersonal relationships. These characteristics are themselves features of major life choices (Camilleri, 2023). Over time and with modernization, Chinese participants' cognition of the significance of divorce as a life decision may have changed. Changes in the perception of life choice significance themselves can to some extent reflect social and cultural shifts. Future research could longitudinally track participants' perceptions of the significance of various life choices, providing richer empirical evidence for the shifting trends

and mechanisms of individualism or other social cultures through panel data.

Second, this study treats individualism and collectivism as opposite ends of a single dimension and measures them through six archival data points. Whether the results can comprehensively represent the shifting trends of individualism and collectivism in China requires cautious consideration. On the one hand, some scholars have pointed out that individualism and collectivism may be two independent dimensions (e.g., Markus & Kitayama, 1991). Existing research has found that when individualism rises in a society, collectivism does not necessarily decline. For example, Zeng and Greenfield (2015) found that individualism in China showed an overall upward trend from 1970 to 2008, but typical collectivist values such as "responsibility" and "obligation" remained stable or even gradually strengthened during the same period. This phenomenon of simultaneous strengthening of individualism and collectivism has also been confirmed by multiple studies in Japan, another traditional collectivist culture (Ogihara, 2017). On the other hand, research has pointed out that cultural values may manifest differently across life domains. For example, Hamamura et al. (2021) found that in Chinese books published from 1950 to 1999, individualistic words had high similarity with leisure words belonging to the private life domain, while collectivism had high similarity with work words belonging to the public life domain. The researchers suggested this indicates that the importance of collectivist values in public domains such as workplaces remained stable and did not decline in China from 1950 to 1999. In this study, individualistic high-stake choices were measured by living alone rate, divorce rate, family size, and extended family proportion, reflecting mainly individualism in the private domain. Newborn name uniqueness also tends to reflect individualism in the private domain and cannot correspond to individualism in public life domains such as workplaces and social occasions. This study found that compared to individualistic high-stake choices, the shifting trends of individualistic low-stake choices and their association patterns with modernization show greater differences across provinces (see Appendix 2 Figures S2.2 and S2.3). This suggests that other regional-level factors may have played moderating roles in the shifting process of individualism (especially low-stake choices). However, which specific characteristics of regional variables play the role of moderators requires sufficient cross-temporal data for testing. Future research examining cultural shifts may need to consider boundary conditions such as cultural components, life domains, and geographical regions to more accurately and comprehensively reveal cultural shifting patterns and mechanisms.

Third, this study examined cultural shifts of individualism in China from 1981 to 2010. This period represents the three decades of most rapid modernization progress in China since reform and opening-up. The results show that during this stage, both individualistic high-stake and low-stake choices in Chinese provinces showed upward trends, with modernization playing a significant driving role. An interesting and important question is how individualism will change when the modernization process undergoes significant changes. According to National Bureau of Statistics data, the average annual GDP growth

rate in China was 10.1% from 1981 to 2010, but only 6.8% from 2011 to 2020, suggesting that China' s economic growth seems to have entered a slowdown phase in recent years. Based on the original data collection methods, we collected data on modernization and individualism (high-stake choices) indicators for Chinese provinces from 2011 to 2020 and conducted reanalysis. The results showed that from 1981 to 2020, the level of individualistic high-stake choices in China gradually increased over time, and modernization played a significant driving role (see Appendix 3 for more information). These results are consistent with the original findings based on 30 years of data from 1981 to 2010. However, in all analyses, the predictive power of time and modernization for individualistic high-stake choices decreased to some extent, suggesting that when modernization growth slows down, the development of individualism itself (at least the high-stake choice component) may weaken, and modernization' s driving effect on individualism may also weaken. Nevertheless, existing data are insufficient to answer how individualism will change when socio-economic development trends show obvious changes (such as stagnation or even regression). Some scholars have found through multiple empirical studies (Bianchi, 2016) that individualism strengthens during economic prosperity and weakens during economic depression. However, it should be noted that this result was observed in the United States—a typical individualist country—and its applicability to China as a collectivist cultural society requires cautious consideration. Particularly, China experienced high-speed modernization development over the past decades, and if it now faces serious slowdowns, how social culture will shift may be a very different situation. This suggests that examining the shifting patterns of Chinese individualism under different economic development trends still requires more directly corresponding local data, awaiting further verification in future research.

The conclusions of this study are as follows: 1) Life choices can be divided into "high-stake choices" involving high costs and major consequences (e.g., marriage, childbearing, divorce, living alone) and "low-stake choices" requiring only low opportunity costs without major social or economic consequences (e.g., naming children). Given that life choices are an important manifestation pathway of social culture in daily practice, individualism can correspondingly be divided into two types: individualistic high-stake choices (measured by living alone rate, divorce rate, family size, extended family proportion, etc.) and individualistic low-stake choices (measured by newborn name uniqueness, etc.). 2) During the 30 years from the beginning of reform and opening-up to the early 21st century, Chinese provinces generally showed a cultural shifting trend of "rising individualism," with modernization level significantly positively correlated with individualism (both high-stake and low-stake choices) and positively predicting individualism levels 10 years later. By revealing the overall consistent upward trend of individualism across different provinces in China, this study provides the first empirical validation and extension of modernization theory (Inglehart & Baker, 2000) based on intra-national regional-level data. 3) The different prediction strengths and trends of modernization for individualistic high-stake and

low-stake choices reflect the multidimensional shifts of individualism in China. On the one hand, compared to low-stake choices, modernization provides higher direct prediction strength for high-stake choices. On the other hand, modernization' s prediction trend for high-stake choices shows more consistent patterns (including slope and direction) across provinces. This further demonstrates that modernization exerts a more powerful influence on individualistic high-stake choices compared to low-stake choices.

This study provides new analytical perspectives and empirical support for more comprehensively analyzing and understanding social and cultural shifts.

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Appendix 1

Table S1 Comparison of Composite Indices of Modernization, Individualistic High-Stake Choices, and Individualistic Low-Stake Choices Across Chinese Provinces from 1981 to 2010

Province	Modernization	Province	Individualistic HSC	Province	Individualistic LSC
Beijing	1.74#	Shanghai	1.43#	Guangdong	1.10#
Shanghai	1.52#	Beijing	1.40#	Guangxi	0.69#
Tianjin	1.43#	Zhejiang	1.06#	Fujian	0.96#
...	...	...	...	...	...
Guizhou	-1.21^	Gansu	-0.63^	Ningxia	-0.66^
Yunnan	-1.15^	Jiangxi	-0.57^	Sichuan	-0.65^
Gansu	-0.66^	Ningxia	-0.56^	Shaanxi	-0.64^

Note: # represents the three provinces with the highest composite index scores; ^ represents the three provinces with the lowest composite index scores.

Appendix 2

Figure S2.1 Shifting trends of modernization levels across different provinces in China

Figure S2.2 Shifting trends of individualistic high-stake choices (left) and low-stake choices (right) across different provinces in China

Figure S2.3 Prediction strength of modernization levels for individualistic high-stake choices (left) and low-stake choices (right) across different provinces in China

Appendix 3

Extended Analysis: Individualism High-Stake Choices from 1981 to 2020

Since 2010, China' s economic growth has slowed down. According to National Bureau of Statistics data, the average annual economic growth rates for the three decades of 1981-1990, 1991-2000, and 2001-2010 were 9.35%, 10.45%, and 10.49%, respectively. However, during 2011-2020, the annual economic growth rate decreased from 9.3% (2011) to 2.3% (2020) year by year, with an average annual growth rate of only 6.80%, representing a significant drop from the previous three decades. Based on the original data collection methods, modernization indicator data from 2011 to 2020 (from China Statistical Yearbook and the 7th Population Census Database) were included in the data analysis. Multilevel modeling and time-lag modeling were used to test the shifting trends of individualistic high-stake choices at the provincial level in China over the 40 years from 1981 to 2020, the influence of modernization indicators and composite index on individualistic high-stake choices, and the time-lag effect of modernization on individualistic high-stake choices.

The results showed that over the 40 years from 1981 to 2020, the level of individualistic high-stake choices in China gradually increased over time, and modernization significantly positively predicted both concurrent and 10-year-later individualistic high-stake choice levels, consistent with the original results based on 30 years of data. However, in all analyses, the predictive power of time and modernization for individualistic high-stake choices decreased to some extent, suggesting that when modernization growth slows down, the development of individualism itself (at least the high-stake choice component) may weaken, and modernization' s driving effect on individualism may also weaken. Specific results are as follows:

1) Individualistic high-stake choice levels increased significantly over time from 1981 to 2020 ($b = 0.066$, 95% CI = [0.064, 0.068], SE = 0.001, $t(920.36) = 75.64$, $p < 0.001$, see Figure S3), consistent with the 30-year data result ($b = 0.073$), though the regression coefficient decreased slightly.

2) The modernization composite index and its four individual indicators all significantly predicted individualistic high-stake choices in expected directions, i.e., higher modernization levels were associated with stronger individualistic high-stake choices, also consistent with the 30-year data results, though the predictive power (regression coefficients) of all indicators decreased to some extent (see Table S3).

3) The modernization composite index significantly positively predicted individualistic high-stake choice levels 10 years later ($b = 1.172$, 95% CI = [1.026, 1.318], SE = 0.072, $t(33.11) = 16.32$, $p < 0.001$), consistent with the 30-year data result ($b = 1.224$, $p < 0.001$), though the regression coefficient decreased slightly.

Figure S3 Shifting trends of individualistic high-stake choices at the provincial level in China from 1981 to 2020

Table S3 Effects of Modernization on Individualistic High-Stake Choices

Modernization Indicator	1981-2010 Data	1981-2020 Data
Per capita GDP	0.262*** (0.030)	0.175*** (0.024)
	[0.188, 0.336]	[0.124, 0.226]
Urbanization rate	0.953*** (0.106)	0.899*** (0.073)
	[0.737, 1.168]	[0.750, 1.047]
Higher education proportion	0.855*** (0.073)	0.429*** (0.026)
	[0.705, 1.006]	[0.376, 0.483]
Illiteracy rate (reverse)	-0.472*** (0.045)	-0.449*** (0.065)
	[-0.566, -0.378]	[-0.528, -0.370]
Modernization composite	0.859*** (0.076)	0.796*** (0.058)
	[0.702, 1.015]	[0.676, 0.916]

Note: $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.*

Appendix 4

Supplementary Analysis: Modernization Predicting Individual Individualism Indicators from 1981 to 2010

Multilevel models were established with province as the grouping variable, modernization composite index as the explanatory variable, and the four individual indicators of individualistic high-stake choices (living alone rate, divorce rate, family size, and extended family proportion) and the two individual indicators of individualistic low-stake choices (total proportion of top 10 most common boy names and girl names) as outcome variables. Similarly, to control for temporal autocorrelation, year was specified as a repeated variable and the repeated covariance type was set to ARMA.

The results showed that the modernization composite index significantly predicted all four individual indicators of individualistic high-stake choices and both individual indicators of individualistic low-stake choices in expected directions (see Tables S4.1 and S4.2). Specifically, higher modernization levels were associated with higher living alone rates and divorce rates, smaller family sizes, lower extended family proportions, and lower total proportions of top 10 most common boy and girl names, indicating higher levels of individualism (both high-stake and low-stake choices), consistent with the main results.

Table S4.1 Effects of Modernization on Individual Indicators of Individualistic High-Stake Choices

Individualistic HSC Indicator	b (SE)	95% CI
Living alone rate	3.248***	[2.693,
	(0.272)	3.804]
Divorce rate	0.004***	[0.003,
	(0.001)	0.005]
Family size (reverse)	-0.498***	[-0.589,
	(0.044)	-0.407]
Extended family proportion (reverse)	-2.092***	[-2.762,
	(0.327)	-1.421]

Note: p < 0.05; ** p < 0.01; *** p < 0.001.*

Table S4.2 Effects of Modernization on Individual Indicators of Individualistic Low-Stake Choices

Individualistic LSC Indicator	b (SE)	95% CI
Top 10 boy names proportion (reverse)	-0.695*	[-1.183,
	(0.245)	-0.207]
Top 10 girl names proportion (reverse)	-0.752***	[-1.115,
	(0.185)	-0.389]

Note: p < 0.05; ** p < 0.01; *** p < 0.001.*

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