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Chinese social value change and its relevant factors: an age-period-cohort effect analysis

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Abstract

Using data from the World Values Survey (1990–2012), this article attempts to describe and analyze the changing trends in public values during social transformations in China. It is found that public attitudes toward authority tend to be increasingly favorable over time, values in the private sphere tend to be more open, while post-materialist values show a trend of first rising and then falling. The most salient feature of the cohort effect is that the generations born after the reform and opening-up in 1978 identify more closely with the value of respect for authority, while their recognition of postmaterialist values tends to decline. The change in values is related to China's modernization process, global cultural diffusion, and important historical events and is also deeply influenced by the two-way interaction between tradition and modernity.

Keywords: The changing trends of values, Postmaterialist values, Openness in the private sphere, The age-period-cohort effect

Research background

Since the beginning of reform and opening-up, Chinese society has undergone a process of rapid transformation, not only in the fields of economic systems, social governance, and social structure but also in the fields of cultural norms and values (Li and Wang 2018). Among these, the social changes in values are particularly worth studying. Values are an important component of individual personality traits (Rokeach 1973). Unlike social attitudes, values are clear, systematic, relatively stable, and deep-seated social concepts (Yang 1998), ranking highly in the internal evaluation hierarchy of individuals (Hitlin and Piliavin 2004). The changes in social values reflect changes in the internal evaluations and judgments of right and wrong in the social relationships of the members as a whole (Pan and Ma 2008). The 40 years after the implementation of reform and opening-up have been a process of continuous modernization of people's material lives as well as a process of diversification and complication in spiritual life and social values with emerging discussions of value crises and value diversification. Therefore, clarifying the trajectory and analyzing the primary trends in value change in contemporary China is not only an academic exploration of the vital aspects of social transformation but also

of great significance for grasping the dynamics of social thought and promoting social governance.

The most influential theory of value change is the modernization theory of social change. This suggests that with economic modernization, urbanization, industrialization, and the increase in the proportion of service industries, a series of predictable social changes will emerge—higher living standards, further division of labor, and more extensive public education—and mass media would gradually shift people's minds from traditional conservatism to values of secular rationality, openness, and inclusiveness, free expression, and social participation (Inkeles 1969; Inglehart 1997). Modernization theory has described the changes in production and lifestyle that bring about changes in people's minds. Yet, it has been widely questioned and criticized due to its Occidentalism, apriorism of values, the dichotomy between tradition and modernity, and its neglect of diverse and complex paths and patterns of cultural change (Gusfield 1967; Tang 2010). Some scholars have pointed out that the most significant flaw in modernization research lies in its insufficient respect for the "subjectivity" of late-mover countries. Late-mover countries are not addressed as real subjects but only as objects affected by the modernization wave, passively responding and reacting to the spread and impact of modernization.

The subjectivity of nonwestern late-mover countries has already become significant on their road to modernization. Globalization is by no means simply the Westernization or Americanization of politics, economy, and cultural values at the global level; rather, the cultural traditions and autonomy of these late-mover countries and societies are much more important than the influence of the West (Ye 1998). In addition, modernization theory suggests that the relationship between tradition and modernity has a linear development, refuted first by the localization movement in social psychology. Scholars have compiled a psychological modernity scale and a psychological tradition scale based on the dichotomy of tradition and modernity and found that many Chinese people have obtained a "double-high" score in that they have both strong traditional and modern values. This indicates no zero-sum game between tradition and modernity (Guoshu 2004). Modernization is not a simple linear development from tradition to modernity but a process with the simultaneous presence of tradition and modernity. Traditional and modern relationships are both a vertical structure and a horizontal structure of practical connections (Wang 2018).

The aforementioned review of modernization theory is of great significance for studying changes in Chinese culture. On the one hand, China has a long history and a continuous Confucian culture. The national culture reflects the deep structure of the mode of thinking, value orientation, ideal personality, ethical norms, and national character of ethnic members. China is deeply influenced by the Confucian cultural tradition; its characteristics, such as the co-construction of family and state, the harmony between humanity and nature, the doctrine of moderation and harmony, the emphasis on unity and solidarity, and respect for authority, are significantly different from the culture of Western societies (Yang 2004). On the other hand, China has undergone rapid economic development, market-oriented transformation, industrialization, urbanization, and globalization in a rather short period of time. As Jing (2015) pointed out, the development of contemporary Chinese society is characterized by "time-space compression";

that is, the traditional, modern, and postmodern elements are compressed into the same time–space, making the trajectory of Chinese social change distinct from that of many developed countries. Against this backdrop, what changes have taken place in the values of the Chinese people since the establishment of the People's Republic of China? What are the characteristics of the changing patterns? This article aims to focus on these questions.

Many existing studies on cultural change have focused on philosophical discussions or subjective evaluations based on personal experience, with a lack of longitudinal and objective data, while empirical research on value changes often lacks representation of Chinese subjectivity, much less discussions on the universality and particularity of the value changes in China. Focusing on Chinese society, this article uses the multiperiod consolidated data of the World Values Survey from 1990 to 2012 to explore the changes in three important aspects according to the theory of cultural change: respect for authority, postmaterialist values, and openness of the private sphere. These three aspects are chosen because questioning authority, emphasizing free expression over material wealth and stability, and freedom of sex and marriage are the important manifestations of modernity in modernization theory (Inglehart and Baker 2000) while respecting authority, valuing harmony and stability, and valuing family are the important characteristics of Chinese traditional culture. By showcasing the transformations of these three aspects, we can explore the interaction between modernity and traditional Chinese culture. It is worth noting that these three aspects are not employed as a measurement or evaluation of the degree of modernization but rather adopted to analyze how values in different periods and generations have changed with transformations in Chinese society.

The change in values is affected not only by the transformation of social, economic and cultural factors but also by individual factors such as age, gender, and education. In particular, the effect of age is often mixed with the effect of time change, which makes it difficult to make estimations. Therefore, this study uses the age-period-cohort model to separate the effects of age, period, and cohort. Among them, the age effect reflects the impact of the individual's life cycle; the period effect reflects the impact of the overall social environment (such as industrialization, urbanization, globalization), important historical events, and cultural heritage on the population at the time; the cohort effect usually indicates that the historical environment and events during the adolescence and early adulthood of a generation shape their unique collective memories and habits and influence their unique values (Elder 1994). The period effect and cohort effect can reflect the influence of macroeconomic structure, historical events, state policies, and culture, making them ideal indicators for testing changes in values.

Literature review and research hypotheses

Review and reflection of the modernization theory of value changes

Since the Industrial Revolution in the eighteenth century, human society has undergone profound changes, transitioning from an agriculture-based production mode to industrialization and a knowledge-based mode of production. With the transformations in production methods, the organization of society and lifestyle have also undergone significant changes. The proportion of the population living in cities is constantly increasing, and basic education and mass media are increasingly popularized. Modern society

is also characterized by a further division of labor, more liberal gender norms, lower fertility rates, a wider range of social participation, and a more rational and independent manner of thinking. Scholars conceptualize the characteristics of the agricultural society before modernization as tradition and term the characteristics of the modern industrial society modernity. Inglehart and Baker (2000) further divided the changes in values due to modernization into two dimensions: traditional-secular rationality and survival-free expression. Tradition refers to the emphasis on religion and family, an intolerant attitude toward nonnormative marriage and intimate behaviors such as divorce and homosexuality, and the affirmation of patriarchal stances in economic and political life. These stances include obedience to parental authority and passive acceptance of collective authority. In contrast, secular rationality emphasizes rationality, autonomy, independence, inclusiveness, and openness. The key content of the survival-free expression dimension is economic materialism and post-materialism (Inglehart 1997). People growing up in an era of economic scarcity pay more attention to security, material satisfaction, and governmental authority, while young people growing up in an era of economic prosperity and affluence give more attention to freedom of expression, quality of life, and increased political participation. In addition, there are two important assumptions in Inglehart's theory of value changes: the scarcity hypothesis and the socialization hypothesis. The scarcity hypothesis suggests that economic development has a decisive impact on the public value system; that is, the improvement of economic life will inevitably be accompanied by the transformation of values from tradition to secular rationality and from survival to free expression. The socialization hypothesis emphasizes the impact of the social environment during the critical period of growth, as well as the social influences on public value systems generated by cohort changes.

The modernization theory of values describes some typical changes that have occurred in the public values during the modernization process, but there are also some problems. First, its "unitary tendency" and Occidentalist approach position Western modernization as a universal model, neglecting tradition and the particular development models of different countries and regions (Gusfield 1967; Tang 2010). Second, it regards tradition-modernity as two poles at opposition. Many scholars point out that this binary analytical framework is too simplistic, ignoring an important social reality: modern society also contains many characteristics of traditional society or culture (Wang 2018; Eisenstadt 1973). In addition, the theory also implies the assumption of convergence that with economic development and globalization, public values will become increasingly consistent. This assumption has been widely questioned. In fact, Inglehart later revised the convergence hypothesis, acknowledging the importance of national and ethnic cultural traditions and suggesting that they may have an impact on the direction, speed, mode, and paths of modernization (Inglehart 1997). Compared with Western societies, China experienced social changes that reflect the universal social transformation of the modernization process and have a rather strong particularity. Specifically, this particularity is mainly reflected in the following aspects.

First, the national characteristics of traditional Chinese society have had a profound impact on China's political, economic, social, and cultural life, which cannot be ignored when analyzing the value changes in China. Confucianism is a unique cultural system formed by Chinese people based on long-term historical development and

the accumulation of experience. It is a collective term for national spirit and ideology, including the traditional governance model, traditional thinking mode, and traditional values, for instance, emphasizing harmonious order, emphasizing stability over freedom, valuing hierarchical order, and strong family values, moderation, and dialectical thinking modes (Zhang et al. 2005). These values and thinking modes have had a profound impact on the Chinese people; even though they have gone through different historical periods, they still have a profound impact on public psychology and value preferences.

Second, as a socialist transitional country, China has obvious uniqueness in its starting point and social reality (Sun 2005). The state-led system and the top-down social mobilization model have profoundly impacted public values, especially in the political field. Anthropologist Yunxiang Yan (2016) explains the state-society relationship after reform and opening-up by presenting the changes in people's daily lives, which he calls "individualization under state management." On the one hand, with the development of the market economy and the decentralization and deregulation of the state, people's lives have undergone a fundamental transformation from collectivist ethics to individualist ethics; on the other hand, the state manages the process of individualization by defining boundaries and norms, and individuals also internalize the direction of individual development within the socialist framework set by the state. Overall, in the era of reform and opening-up, the country has continuously lifted the restrictions of the planned system on personal life, stimulated the vitality of members of society, and advocated for the public to follow the core socialist value system.

Third, China has experienced rapid industrialization, urbanization, and globalization in a short period of time. Its social changes represent a time-space compression, and to some extent, society also simultaneously presents traditional, modern, and postmodern characteristics (Jing 2015). In this modernization process, the distinctive culture and political systems, important social policies, historical events, and various other forces they interacted, jointly shaping the ideology of the Chinese people. Therefore, what are the characteristics of the trajectory of value changes in China? To answer this question, this article uses the data of the World Values Survey from 1990 to 2012 to explore the changes in the aspects of modern cultural change identified as important: respect for authority, postmaterialism, and openness of the private sphere. By showcasing the changes in the above three aspects, we can glimpse the trends and patterns of the collision and integration of forces between tradition and modernity, as well as how China's unique social transformation influences them. It should be pointed out that the modernity mentioned in this article does not refer to a certain inevitable fate for social values under the influence of modernization but rather to the possible direction of value changes predicted by the modernization theory of values in particular.

Because the level of economic development, industrialization, education, and globalization in the process of modernization roughly increases linearly over time and the role played by the state, national policies, and national attitudes toward traditional culture vary in different historical stages, we can clarify how several different forces influence the value changes by analyzing the changing trends in public values in different periods and generations. The following section proposes hypotheses on the cohort effect, period effect, and age effect of the aforementioned values.

The period-cohort-age effect of values

According to socialization theory and life course theory, the historical environment and events experienced by every cohort shape their unique collective memories and habitus, especially during the important period of value formation in adolescence and early adulthood (Elder 1994). Academia has varying opinions on how to define China's cohorts but generally agrees to use major historical events in modern China as the watershed. The beginning of reform and opening-up is a major historical event in contemporary China. The country's developmental policy has changed since 1978, and subsequent reform measures have profoundly impacted several cohorts. The 1990s was also a watershed for reform and opening-up in that the period before the 1990s was regarded as the early stage of reform and later as the period of social transformation (Li 2006). In addition, since the critical period for value formation often starts around the age of 10 (Abramson and Inglehart 1994), this article uses the critical period for value formation as the criterion for cohort division. This article roughly divides growth periods as follows: the cohort of 1949 (born before 1939) is the cohort before the PRC, the cohort from 1949 to 1965 (born between 1939 and 1955) is the cohort of the early PRC, the cohort from 1966 to 1976 (born between 1956 and 1966) is the cohort of the Cultural Revolution, the cohort from 1977 to 1989 (born between 1967 and 1979) is the cohort of reform and opening up, and the cohort after 1990 (born after 1980) is the cohort of the social transformation, all of which are grouped and named by the critical period of value formation. Each growth period is further divided into one cohort every 5 years.

The period-cohort-age effect of attitude toward authority

The attitude toward authority is an important aspect of measuring the modernization of values. In traditional society, attitudes toward authority are manifested in respect and obedience to God in religious countries and respect and obedience to the authority of parents and elders in nonreligious countries. In the process of modernization, with the advance of industrialization, the improvement of public education, and the secularization of social life, two changes have occurred in the attitude toward authority. One is that the authority recognized by people has shifted from religious and familial authorities to bureaucratic, expert, and technical authorities; the other is that people place greater emphasis on equality, leading to a tendency to question and criticize the authorities rather than mindlessly following directives from above (Yang 2010). Especially in the trend of postmodernism, deconstructing authority and opposing authority are two of its main characteristics.

There are also two dimensions of changes in the attitude toward authority in Chinese society: one is the change in the subject of authority, and the other is the change in attitude toward authority. The Chinese cultural tradition has a strong value tendency to respect authority, which is closely related to the Confucian ideology that privileges hierarchical relationships and has a long history of centralization (Su 2011). The patriarchal system and the Three Cardinals and Five Constants in traditional society reflect respect for patriarchy and imperial power. After the establishment of the PRC, these value systems were abolished. This change can also affect public attitudes toward authority in a general sense.

With the advance of reform and opening-up, Chinese society has entered the process of industrialization, marketization, and globalization, and public attitudes toward authority have entered another stage. New authoritative agents such as expert, authority, and organizational authority have gained public respect; meanwhile, the spirit of respecting elders, parents, and teachers in traditional culture has been strengthened as a positive aspect of traditional culture in the education system. In addition, in terms of national authority, China's economy and public living standards have rapidly developed after reform and opening-up, and government performance has further strengthened public support for national and political authority. Therefore, the attitude of Chinese society toward authority is deeply influenced by traditional culture, the socialist system, and major historical events, demonstrating considerable particularity.

Furthermore, from a self-interested perspective, the older people are, the more likely they are to become elders and authorities and, therefore, have a more positive attitude toward a value that respects authority (Deutsch and Jones 2008). Hence, we propose the following hypotheses:

Hypothesis 1.1 Period effect: After reform and opening-up, public attitudes toward authority will show an increasing trend over time.

Hypothesis 1.2 Cohort effect: Cohorts before the PRC and of the early PRC have a higher recognition of authority; the cohort of the Cultural Revolution has the lowest level of recognition for "whether to give greater respect to authority," while the cohorts born after reform and opening-up tend to have a positive attitude toward authority.

Hypothesis 1.3 Age effect: As people age, their attitudes toward authority tend to be positive.

The period-cohort-age effect of postmaterialist values

Postmaterialist values are put forward relative to materialist values, describing the changes in political values in Western European countries and the United States after experiencing rapid economic development. Materialist values emphasize economy and personal safety, while postmaterialist values pay more attention to autonomy and self-expression. Postmaterialist values mainly have two vital assumptions: the scarcity hypothesis and the socialization hypothesis. The scarcity hypothesis suggests that people tend to assign the highest value to the most urgent needs under different social conditions. When people are relatively rich, they will put more emphasis on postmaterialist goals such as freedom and autonomy. The socialization hypothesis emphasizes that the transformation of values is gradual, as younger generations gradually replace older generations in the population, resulting in changes across all of society.

After reform and opening-up, China experienced rapid economic development and significant improvement in living standards. According to modernization theory, China should also have a tendency toward postmaterialist values, and this change should have certain commonalities. However, there is still controversy among scholars regarding this issue, debated among three main viewpoints. One believes that China's economy has developed rapidly in just a few decades, while the development

of society and public values usually lag behind economic development. At present, China is still in the stage of economic materialism, and the pursuit of economy and security is still more important than that of freedom and autonomy (Inglehart 2013). Another view is that Chinese culture has considerable uniqueness. Unlike Western tradition, which emphasizes freedom, Chinese culture emphasizes stability and harmony, and this cultural legacy of valuing stability over freedom affects the public choice of political values. The third view holds that the basis of postmaterialist values is the sense of economic security, which is not completely related to the absolute material level but is affected by relative economic stability. The research shows that in recent years, the scores of postmaterialist values of European and American people have decreased due to the economic downturn caused by the financial crisis (Kafka and Kostis 2021). The same economic pressure and insecurity also exist in contemporary Chinese society. These various perspectives show that postmaterialist values in China are complex. According to the above different perspectives, we propose two competitive hypotheses.

Hypothesis 2.1.1 Period effect: After reform and opening-up, public postmaterialist value scores gradually increased with the development of the economy.

Hypothesis 2.1.2 Period effect: After reform and opening-up, public postmaterialist value scores have not significantly improved with the development of the economy.

The scarcity hypothesis of postmaterialist values has a critical point of view; that is, people born in the era of material prosperity would have a much higher level of postmaterialist values than people born in the era of scarcity since the level of material wealth in their youth has a profound impact on their ideas. American scholars compared people born during the Great Depression with those born after World War II during the American economic boom and found that their postmaterialist values differed significantly (Higgs 1997). In the case of China, since the establishment of the PRC, China's economy has experienced development, three famine years, restructuring, and rapid development after reform and opening-up. People born and raised in natural disasters have experienced significant material scarcity and economic insecurity, while the generations born after reform and opening-up have a richer life and a higher sense of economic security. Therefore, Hypothesis 2.2 is proposed.

Hypothesis 2.2 Cohort effect: People born before and in the early stage of PRC have lower levels of postmaterialist values, while those born after reform and opening-up have higher postmaterialist values.

Regarding the effect of age on postmaterialist values, according to life course theory, older people place more emphasis on stability and safety, while young people usually give more attention to freedom and autonomy (Baltes and Silverberg 2019). Hence, Hypothesis 2.3 is proposed.

Hypothesis 2.3 Age effect: With increasing age, public postmaterialist values show a downward trend.

The period-cohort-age effect of openness in the private sphere

Values in the private sphere are mainly about family, marriage, childbirth, and sex. Traditional society values family relationships and the role of childbirth, while religion also restricts people's private lives. Marriage and childbirth are highly institutionalized. In the process of modernization, the economic status and the level of education of women have continuously improved, resulting in two major changes in marriage in the twentieth century: from institutional marriage to partner marriage and then from partner marriage to personalized marriage, which is called the "deinstitutionalization of marriage" (Cherlin 2004). This means that marriage has undergone changes in two senses: first, individuals face diverse choices in their personal lives, and diverse forms of marriage are also accepted by society; second, the returns people receive on a decision to get married have changed such that people give more attention to personal choices, emotional experiences, and self-development than concern about the social norms of personal and family life roles. In this context, premarital sex, cohabitation, divorce, and same-sex marriage are increasingly accepted.

The changes in marriage, love, and sexual attitudes in China are both universal in the sense of modernization and are particular to Chinese society. Its particularity is first manifested in the fact that there is no restriction from Christian culture on childbearing, marriage, and sexual behavior in China. Traditional China has historical and cultural phenomena such as prostitutes, male homosexuality, and same-sex relationships, which have long existed as a supplement to the family system. Although freedom in the private sphere has not become a public issue, it has been tacitly allowed to exist to a certain extent. Second, the state also plays an important role in regulating the private sphere. For example, in the early PRC, the Marriage Law was promulgated and implemented nationwide, which significantly promoted gender equality, marriage freedom, and monogamy (Lu 1997). China also experienced a high degree of politicization of the private sphere during the Cultural Revolution, which was manifested in the state's strong restrictions on public expressions of sex and even private life (Pan 2008). Since the 1980s, with the advance of marketization and the abolishment of the danwei system, population mobility has increased, and private living spaces have expanded, resulting in stranger societies beginning to form in cities. In addition, with the continuous deepening of globalization, Chinese society has undergone a "sexual revolution" with rapid, widespread, and multidimensional changes in the short term (Huang 2020). This "sexual revolution" is not only due to the development of individuality and autonomy brought about by modernization but also to the nonreligious attitude toward sex in traditional Chinese culture and the withdrawal of the state from the private sphere in contemporary China. Considering the development of traditional culture, social individualization, and the impact of important historical events on sexual norms, this article proposes the following hypotheses.

Hypothesis 3.1 Period effect: Since reform and opening-up, public openness in the private sphere has gradually increased over time.

Hypothesis 3.2 Cohort effect: People born before the PRC and in the early PRC have lower levels of openness in the private sphere. People born during the Cultural

Revolution have the lowest level of openness in their personal sphere, while those born after reform and opening-up gradually increase their level of openness in their private sphere.

Life course theory suggests that public values become increasingly conservative as people age (Elder et al. 2003). Especially when people marry, family life makes people more supportive of some traditional concepts (Ciabattari 2001), thus leading to a more conservative attitude toward sex.

Hypothesis 3.3 Age effect: as people age, their openness in the private sphere gradually decreases.

Research methods and variables

Research methods

This study used the age-period-cohort model. Generally, in the context of rapid socio-economic transformation, age, period, and cohort represent different information. The age effect represents the changes in physiological and psychological characteristics at different stages of an individual's life course. The period effect represents the changes in macro social, economic, institutional, and policy structures at the survey time point and the impact of major events. The cohort differs from the previous two and refers to people born in the same cohort or who have experienced the same historical event. Cohort analysis emphasizes the interaction between life and social history at all stages. Specific social changes or specific impacts of historical events lead to similar experiences for this group, while different cohorts of people show different life paths. There are well-developed analytical methods and models for studying age, period, and cohort effects. Yang et al. (2008) proposed two methods for model recognition. One is the hierarchical-age-period-cohort (HAPC) analysis, which is a cross-classified random effect model (Yang and Land 2006). Another is the intrinsic estimator (IE) model (Yang et al. 2008). For this study, both HAPC and IE are applicable. However, when the period covered by the survey is too short, the HAPC estimation may not have good statistical validity (Yang and Land 2006) and is less likely to obtain significant cohort effects (Fosse and Winship 2019). The advantage of the IE estimation method is that the estimated value has the smallest sample variance, which can generate the estimated value set for age, period, and cohort. In addition, it is unbiased, which means that the estimated value is applicable to the population at the same time. Considering the advantages and disadvantages of HAPC and IE methods and drawing on the analysis used by earlier scholars in the study of APC values (Hu 2017), this study mainly employs the IE method while using HAPC for robustness testing.

Data and variables

This study used data from the World Value Survey. The World Values Survey is a study of social transformation, especially on the international scale of value change. It covers more than 60 countries around the world. Since 1980, it has been carried out every four years on average, and thus far, six rounds of data have been collected. This study used data from five rounds of surveys in China (1990, 1995, 2001, 2007, 2012), spanning 23

years, with a total sample size of 7,764. Due to the limited sample size in each period, this paper used the age, gender, and urban–rural weights of the national censuses of 1990, 1995, 2000, 2005, and 2010 and the population sampling survey of the National Bureau of Statistics to conduct a weighted analysis of the sample.

In the five rounds of the World Value Survey, we selected several representative value items in the public and private spheres: respect for authority, postmaterialism, and openness in the private sphere. The survey items measuring respect for authority include statements such as "If there will be some changes in our life in the future, such as more respect for authority, you will think it is a good thing or a bad thing, or it does not matter." The survey section about postmaterialism is composed of four items, and the respondents are asked to rank the issues of the country in the next decade by priority, including "maintaining the stability of the national order" (materialism), "giving the people more voice in government decision-making" (postmaterialism), "lowering price inflation" (materialism), and "protecting freedom of speech" (postmaterialism). If the respondent chose two materialist items as the primary and secondary goals, the score is 1 point; if the primary and secondary goals were both postmaterialist items, the score is 3 points; in mixed cases, the score is 2 points (Inglehart and Abramson 1999). Since the α coefficients (internal consistency coefficients) of the two items of "respect for authority" and "postmaterialism" in the public sphere are all below 0.2, the two items will be analyzed separately in this article.

The items measuring values in the private sphere include assessments of the acceptance of homosexuality and prostitution. It is worth noting that when asked about the legitimacy of homosexuality and prostitution, the English expression of the questions in all surveys maintains the same wording, but the wording of the Chinese version in the 1990, 1995, and 2001–2012 questionnaires was different. In 1990, the text was "Do you think the things listed below are always correct, or always incorrect, or are they between correctness and incorrectness, rated on a scale of 1–10?"; in 1995, the text reads, "Can the following statements always be justified, never be justified, or between the two, 1 is never, and 10 is always?" The texts for 2001, 2007, and 2012 were "To what extent can you accept the following practices? 1 indicates complete rejection, and 10 indicates complete acceptance?" The 1990 and 1995 wordings were more rigorous, making it more difficult for people to choose the lowest score and thus obtain higher scores. When explaining the results, we take into account the differences caused by the questionnaire itself. We take the average of the two items in the private sphere and name it "openness in the private sphere."

The independent variables of this study are mainly age, period, and cohort; the control variables are gender, marital status, and subjective socioeconomic status. The World Values Survey did not directly inquire about household registration (*hukou*). To test whether the residency permits of farmers and urbanites affect the results, this study distinguishes between agricultural and nonagricultural occupations. The sample is divided into two categories based on the highest educational level received: "no college

Table 1 Descriptive statistics of variables

Variable	Variable coding	Mean	Variance	Min	Max
Dependent variable					
Respect for authority	1 = Bad; 2 = Don't mind; 3 = Good	2.28	0.77	1	3
Postmaterialism	1 = Materialism; 2 = Mixed-type; 3 = Postmaterialism	1.56	0.58	1	3
Acceptance of homosexuality	1 = Disagree; 10 = Strongly agree	1.62	1.61	1	10
Acceptance of prostitution	1 = Strongly disagree; 10 = Strongly agree	1.41	1.23	1	10
Openness in the private spheres	1 = Strongly disagree; 10 = Strongly agree	1.51	1.28	1	10
Control variables					
Gender	1 = Male; 0 = Female	0.5	0.5	0	1
Marital status	1 = Married; 0 = Others	0.75	0.4	0	1
Subjective socioeconomic status	1 = Low socioeconomic status; 5 = High socioeconomic status	2.5	0.91	1	5
Occupation	1 = Agricultural occupations; 0 = Nonagricultural occupations	0.45	0.5	0	1
Employment status	1 = employment; 0 = unemployment	0.78	0.41	0	1
The highest educational level	1 = Some college education or above; 0 = No college education	0.14	0.35	0	1
Independent variable					

education" and "some college education or above."¹ Descriptive statistics of the variables are shown in Table 1.

Findings

Period-cohort-age effect

The following parts of this article will use the age-period-cohort effect analysis method to separate age, period, and cohort effects while taking gender, marital status, nonagricultural hukou, employment status, and subjective social status as control variables. The results are shown in Table 2.

The period effect

Figure 1 shows the period effect of values in which the values of respect for authority, postmaterialism, and the private sphere show different trends. Respect for authority was the lowest during the 1990s and steadily increased and maintained a high level in the following decade, but with a certain degree of decline in 2012. According to the prediction of modernization theory, with the development of the economy and the improvement of public living standards, people tend to de-emphasize obedience to authority and value autonomy, while in China, the trend is exactly the opposite. However, it is interesting that this trend coincides with the economic development of Chinese society. By comparing the trend chart of China's economic growth rate and

¹ Since China's 1990 World Values Survey only inquired about the "age at which the highest education was completed" and did not investigate the actual highest education level, the former was used as the dividing criteria. 21 years old or above were labeled as "some college education", while others were coded as "no college education".

Table 2 Model results of age-period-cohort intrinsic estimator method (IE method)

Independent variable		Dependent variable					
		Respect for authority		Postmaterialism		Openness in the private sphere	
		Coef.	S.D	Coef.	S.D	Coef.	S.D
Gender		− 0.003 ⁺	0.024	0.045**	0.017	0.059 ⁺	0.034
Marital status		0.020	0.037	− 0.035	0.028	− 0.123 ⁺	0.063
Subjective social status		− 0.049	0.040	0.043	0.044	0.064	0.063
College education		− 0.069	0.040	0.111***	0.027	0.590***	0.082
Occupation		− 0.003	0.023	− 0.025	0.017	− 0.036	0.035
Employment		0.002	0.030	− 0.051*	0.024	− 0.025	0.045
Age	18–24	− 0.158*	0.063	0.101*	0.046	− 0.092	0.082
	25–29	− 0.076 ⁺	0.039	0.051 ⁺	0.029	0.095 ⁺	0.052
	30–34	− 0.044	0.036	0.008	0.026	0.075	0.046
	35–39	0.001	0.036	− 0.011	0.026	0.009	0.042
	40–44	0.041	0.035	− 0.036	0.025	0.054	0.046
	45–49	0.051	0.036	0.011	0.026	0.086 ⁺	0.046
	50–54	0.013	0.036	− 0.029	0.026	0.102*	0.049
	55–59	0.093*	0.039	− 0.031	0.029	0.053	0.050
	60–64	0.000	0.048	− 0.064	0.034	− 0.144**	0.049
	65 +	0.079 ⁺	0.044	0.001	0.034	− 0.239***	0.039
Period	1990	− 0.380***	0.036	− 0.001	0.023	− 0.341***	0.022
	1995	− 0.023	0.023	− 0.125***	0.018	− 0.116***	0.026
	2001	0.227***	0.028	0.071**	0.021	− 0.215***	0.022
	2007	0.220***	0.022	0.093***	0.017	0.111**	0.034
	2012	− 0.045*	0.021	− 0.039**	0.015	0.562***	0.035
Cohort	1925–1929	0.132	0.121	− 0.148 ⁺	0.083	− 0.004	0.057
	1930–1934	0.028	0.075	− 0.008	0.056	0.006	0.039
	1935–1939	0.017	0.076	0.087	0.066	− 0.023	0.036
	1940–1944	− 0.103 ⁺	0.054	− 0.045	0.038	− 0.033	0.044
	1945–1949	− 0.003	0.047	0.012	0.032	− 0.050	0.041
	1950–1954	− 0.083 ⁺	0.046	0.007	0.032	− 0.136***	0.041
	1955–1959	− 0.063	0.042	0.006	0.031	− 0.089 ⁺	0.047
	1960–1964	− 0.083*	0.041	0.031	0.029	− 0.113*	0.048
	1965–1969	− 0.096*	0.038	0.030	0.027	0.005	0.052
	1970–1974	− 0.095**	0.036	0.037	0.026	− 0.083 ⁺	0.046
	1975–1979	0.021	0.040	0.055 ⁺	0.030	− 0.086	0.060
	1980–1984	0.093*	0.042	0.010	0.035	0.010	0.077
	1985–1989	0.029	0.049	0.010	0.034	0.211*	0.104
	1990–1994	0.206*	0.093	− 0.084	0.063	0.386*	0.191
Intercept		2.313***	0.044	1.509***	0.033	1.473***	0.064
AIC		2.268		1.699		3.237	
BIC		− 49,930.8		− 51,810.7		− 47,971.2	

⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed)

respect for authority from 1990 to 2012 (see Fig. 2), it can be seen that the trend of the economic growth rate is consistent with the trend of respect for authority. In the early stages, respect for authority and economic development speed increased simultaneously. After the 2008 global economic crisis, China's economic growth slowed

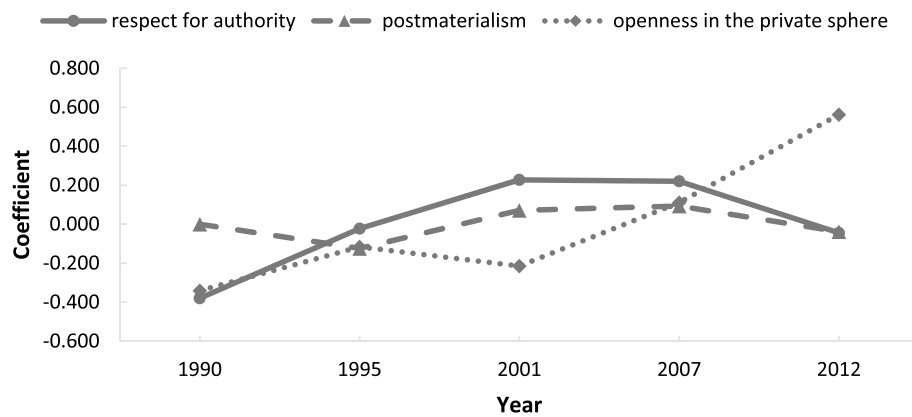


Fig. 1 The period effect (IE)

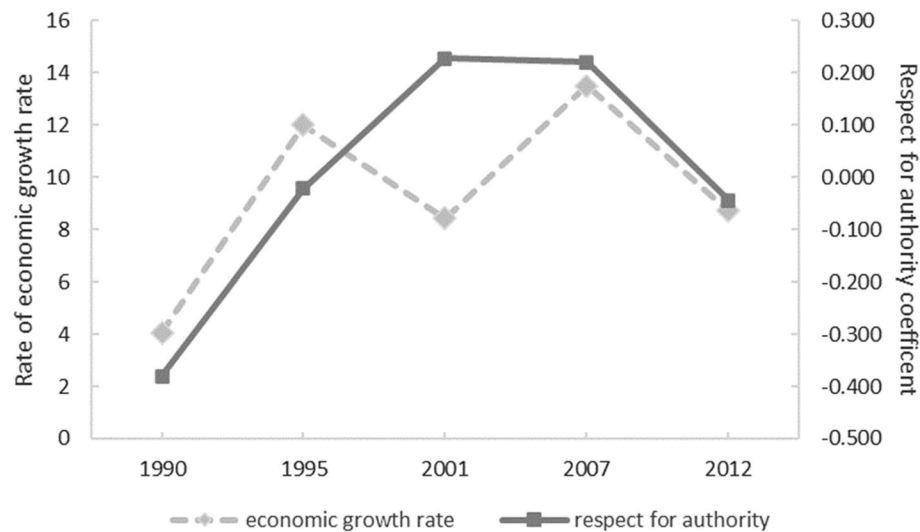


Fig. 2 The comparison of trends of respect for authority and economic growth rate

down, and the period effect of respecting authority also experienced a certain decline. In China, a higher rate of economic development not only does not reduce public respect for authority but also enables people to combine economic performance with the legitimacy of the state (Zhao 2016), thereby strengthening public recognition of the authorities (Roy 1994).

Postmaterialist values were low in 1995 ($\beta_{1995} = -0.125, p < 0.001$), followed by a significant increase in 2001 and 2007 ($\beta_{2001} = 0.071, p < 0.01$; $\beta_{2007} = 0.093, p < 0.001$) and experienced a significant decrease in 2012 ($\beta_{2012} = -0.039, p < 0.01$). The Chinese public's postmaterialist values changed from 1990 to 2012, which is inconsistent with the prediction of modernization theory. These changes can be explained to a certain extent if combined with different social backgrounds and historical events of different periods. In the 1990s, with the advance of market reform, public attention turned to economic and social development, so there was a temporary fall in postmaterialist values. The trend of postmaterialist values from 1995 to 2007 conforms to the prediction of modernization theory, which may indicate the presence of a benefit from the rapid development of the

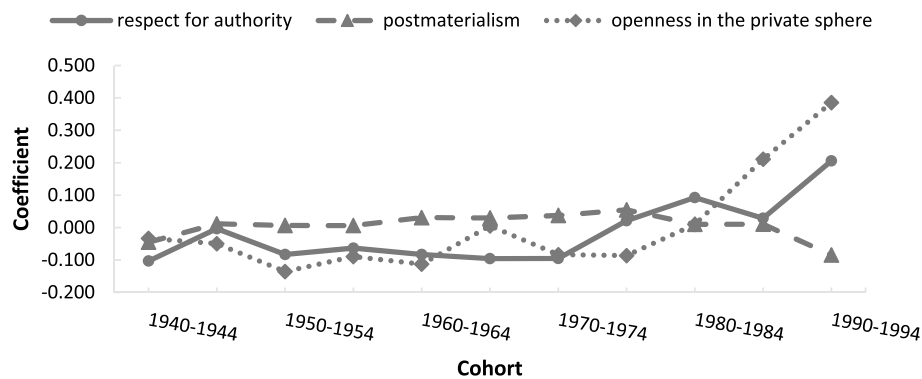


Fig. 3 The cohort effect (IE)

economy and the deepening influence of Western culture during globalization. In the 2012 survey, there was a significant decline again. The economic crisis in 2008 slowed global economic growth, increased the unemployment rate, and reduced national welfare. There was a wave of anti-globalization, populism, and authoritarianism in Europe and the United States. Driven by further social inequality and the sense of relative deprivation, survival values became a public priority again (Norris and Inglehart 2019; Ma 2016). Although China was less impacted by the economic crisis, it was significantly affected in terms of the unemployment rate and economic growth rate (Hong 2009), which is a possible reason for the decline of postmaterialist values in 2012. The theory of "economic insecurity" proposed by Inglehart is still applicable, but "economic security" is related to the level of social prosperity and factors such as the overall economic trend and social inequality in society.

In terms of values in the private sphere, due to significant differences between the wordings used in 1990 and 1995 and those used in 2001 and beyond, the period effect is mainly assessed for the trends in 2001 and beyond. The openness in the private sphere significantly increased between 2001 and 2012, and the coefficient value also changed from negative to positive. This is basically in line with the prediction of modernization theory that there is a relatively obvious trend of individualization and liberalization.

The cohort effect

Figure 3 shows the cohort effect on values. In general, there are two trends in the changes in the cohort effect coefficient: first, as cohorts change, people exhibit stronger characteristics of modernization, such as a more tolerant attitude toward nontraditional behaviors in the private sphere; the second finding is not in line with the transformation theory of modern culture, which is mainly manifested in the attitude to authority and postmaterialist values. The score for respecting authority is negative for people born between 1940 and 1970, and the score for people born between 1980 and 1990 becomes positive ($\beta_{1980} = 0.093, p < 0.05$; $\beta_{1990} = 0.206, p < 0.05$). This indicates that public attitudes toward authority do not decrease with the passage of cohorts, as predicted by the modernization hypothesis. The analysis of the high and low scores shows that people who have experienced the Cultural Revolution and those born not long after the end of the Cultural Revolution showed the most negative attitude toward authority. In contrast,

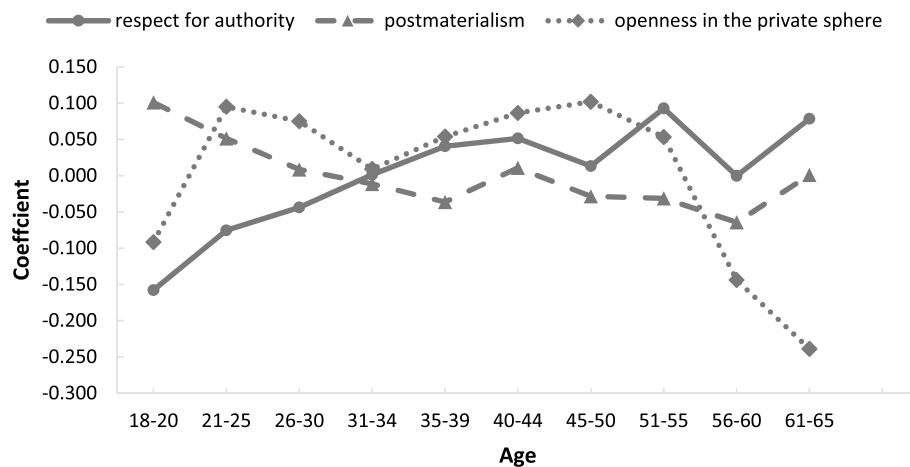


Fig. 4 Age effect (IE)

those who grew up or were born during the social transformation period after reform and opening-up showed a more positive attitude, which supports Hypothesis 1.2.

The cohort effect of postmaterialist values does not fluctuate much, only showing a small high point in the 1975 cohort ($\beta_{1975} = 0.055$, $p < 0.1$) and subsequent slight decreases. Generally, public postmaterialist values did not rise with the level of material wealth in the growth period. In contrast, the postmaterialist values of the "post-80s" and "post-90s" cohorts who lived in relatively rich years scored even lower. Many studies also show that the survival pressure and economic security faced by cohorts before and after reform and opening-up have also affected their attitudes toward postmaterialist values. Therefore, there is no significant increase in the scores of postmaterialist values among the "post-80s" and "post-90s" cohorts. In addition, China's bureaucracy has advocated elite governance throughout its long history (Chen 2004; Zhang 2017), and postmaterialist values are relatively weak in China. The state's guidance of ideology in the public sphere also makes the change in postmaterialist values between cohorts less significant.

The changes in values in the private sphere are basically in line with the predictions of modernization theory, and with the passage of cohorts, the openness in the private sphere gradually increases. Before 1980, it was negative or approximately 0, and after 1980, the score significantly increased ($\beta_{1990} = 0.386$, $p < 0.05$), which generally supports Hypothesis 3.2. The values in the private sphere are apparently influenced by globalization and individualization in the modernization process, resulting in a significant cohort effect.

Age effect

According to life course theory, as people age, they tend to be more conservative, pursue a sense of security, and value family and tradition. Figure 4 shows the effect of age. First, respect for authority shows an upward trend with age. The older people get, the more they recognize that 'authority needs to be respected,' which is also related to their own authoritative identity as elders. Second, postmaterialist values tend to decrease with age. People younger than 30 years show a higher level of postmaterialist values ($\beta_{20} = 0.101$, $p < 0.05$; $\beta_{25} = 0.051$, $p < 0.1$). As people age, their attitudes toward liberalism tend

Table 3 Summary of the age-period-cohort effects of value changes

	Respect for authority	Postmaterialism	Openness in the private sphere
Period effect	From 1990 to 2012, people's attitudes towards authority became increasingly positive, with only a slight decline in 2012	Between 1990 and 2012, post-materialistic values first rose, then declined	Starting from 2001, people's attitudes towards openness in the private sphere have been progressively becoming more positive
Cohort effect	People born in the 1950s to 1970s showed the most negative attitudes towards respecting authority, while those born in the "Post-80s" and "Post-90s" tended to have more positive attitudes towards respecting authority	People born in the 1950s and 1960s held the highest levels of post-materialistic values, while the "Post-80s" and "Post-90s" had lower levels of post-materialistic values	Individuals born before 1980 held relatively negative attitudes towards openness in the private sphere, while starting from the "Post-80s" generation, attitudes became increasingly positive
Age effect	As people age, they increasingly emphasize the importance of respecting authority	As people age, their post-materialistic values gradually weaken	As people age, attitudes towards openness in the private sphere tend to become increasingly negative

to become conservative and cautious. A high level of openness in the private sphere is found in the groups of middle and young ages ($\beta_{40}=0.07$, $p<0.05$; $\beta_{45}=0.088$, $p<0.01$). There is a significant decline among older people ($\beta_{60}=-0.103$, $p<0.01$; $\beta_{65}=-0.180$, $p<0.001$), which also conforms to the changing patterns of public attitudes toward nontraditional behaviors in the private sphere (such as homosexuality and divorce) in different life stages.

Robustness test

This study uses the HAPC method to test the robustness of the above trends (Hu 2017). The period effect, cohort effect, and age effect trends obtained through the HAPC method are consistent with the IE method results.² Specifically, for the period effect, respect for authority and postmaterialist values both showed a trend of rising first and then declining, while the openness in the private sphere after 2001 showed a steady upward trend. For the cohort effect, although the fluctuation of the HAPC results is quite small, the trend is consistent with the IE method. By comparing the variance estimates of the period effect and cohort effect, it is found that the period effect is much greater than the cohort effect, indicating that changes in public attitudes toward authority, choices between free speech and economic stability, and attitudes toward private life are accompanied by periodic changes in the market reform, urbanization, and globalization processes across society. Different cohorts of people have experienced similar changes. Comparatively speaking, the distinction between cohorts is relatively limited. Therefore, the changes in these values are holistic and are more influenced by the comprehensive effects of modernization and the interaction between the state and society in the larger context.

² Due to word limit, the detailed results of robustness test are not reported in this article. Readers can contact the first author for the detailed report.

Conclusion and discussion

This article uses age-period-cohort effect analysis to study the changes in contemporary Chinese values, such as respect for authority, postmaterialist values, and openness in the private sphere. The conclusions are shown in Table 3.

Modernization theory, as a theoretical system originating from the West, prevailed in Western academia after World War II. This theory has been followed, criticized, abandoned, and revised since it has included Occidentalism, single-factor determinism, and the misreading of the relationship between tradition and modernity since its inception. This article attempts to re-examine and reflect on modernization theory in the field of cultural change by discussing the trends of value changes in contemporary Chinese society. This examination and reflection identify the existing problems in modernization theory and further analyze the interaction between modernization forces, China's historical and cultural traditions, and national policy development to explore the results and patterns of change in cultural values. Data were based on the reality of China's social transformation, and analysis started from historical consciousness and subjective consciousness, thus presenting a unique aspect of China's modernization. The main findings and reflections of this article are as follows.

First, as for the value of respect for authority, it can be seen that the Chinese people have not decreased their respect for authority. Instead, they have shown relatively stable growth in both period and cohort effects. The interpretation of this value should highlight not only the weakening effect of economic development, industrial production mode, and educational improvement on traditional authority but also the enhancement of organizational, professional, and national authority. In this ebb and flow, we can always see the stable tendency of the Chinese people to respect for authority. This stability is related to China's traditional ideology prioritizing hierarchy and order, as well as its long history of centralization (Su 2011). In the transitional period, although modernization has changed who the authoritative agent is, the basic value tendency of respect for authority has not decreased but increased, reflecting the continuation, rather than a rupture, of tradition and modernity. In addition, the growing trend of respect for authority is also related to the increasing recognition of new authoritative agents (organizational authority, professional authority, and national authority). China's modernization practice differs from that of the West, and "authority" should not be seen as an antagonist to modernization without scrutiny. Tradition and modernity are not two poles on a continuum (Guoshu 2004) but may merge in different ways to produce new values. Modernization theory and its later revision of the cultural path dependency hypothesis underestimate the continuity of traditional culture, overlook its potential to combine with modern factors, and become an important force influencing the development of contemporary values.

Second, the period effect of postmaterialist values rises first and then slightly decreases. The cohort effect shows that the generations of "post-80s" and "post-90s" have lower postmaterialist values than the cohorts of the "post-50s" and "post-60s." The period effect and cohort effect do not show an upward trend over time. The changes in postmaterialist values in China, Europe, and North American countries show that postmaterialist values are not completely linearly related to material wealth and economic development but are extremely vulnerable to the impact of economic security in

a specific period. Even in North European countries with high levels of industrialization and well-developed welfare systems, people may tend to prioritize stability and material well-being due to economic crises and shrinking employment. Therefore, there are some problems using postmaterialism as an indicator to measure the degree of modernization. Moreover, it needs to be pointed out that postmaterialist values regard social stability and free expression as a set of opposing concepts to determine the modernity of the values, which not only ignores the diversity of the needs of different social classes of the same society but also pays little attention to the differences in social value orientations. From the reality of China, an opposition between stability and freedom is not valid. Chinese culture emphasizes order, harmony, and stability, and there are significant differences in understanding freedom in Chinese and Western cultures. The Occidental tendency in modernization theory is reflected not only in its predictions but also in the concepts and dimensions it measures, which should be treated with caution.

In terms of values in the private sphere, there is an overall trend consistent with the predictions of modernization theory, which is that it has become increasingly open over time and across cohorts. However, we also need to conduct a specific analysis of its connotations. In Western society, due to the constraints of Christian culture on choices about fertility, marriage, and sexual behavior for a long time in history, secularization brought about by industrialization has increased the openness and inclusiveness in the private sphere. In China, there are no religious constraints, and in traditional Chinese culture, there has been a long-standing attitude of “no taboo” toward sex. On such a historical and cultural basis, social change, such as the abolishment of the danwei system, the rise of population mobility, and changes in the way of living, further promoted the concept of the private sphere. The trend of increasing openness in the private sphere of Chinese people refutes the opposition between tradition and modernity; rather, when traditional and modern elements are consistent, rapid changes will take place during the promotion of social change. Other examples include when traditional Chinese culture is consistent with contemporary environmental development concepts, promoting China’s ongoing environmental modernization (Cao and Jiang 2018).

In addition, the research results also demonstrate the profound impact of important historical events on public values. The results of the cohort effect reflect that people born in the 1950s and 1960s who experienced the special period of the Cultural Revolution in adolescence have the lowest scores regarding respect for authority and relatively high scores in postmaterialist values. However, the new cohort born in the 1980s and 1990s scored higher on respect for authority than those born in the 1950s and 1960s, while their scores of postmaterialist values were lower. This contrast contradicts the view that people born into affluence will question authority and become attached to postmaterialism. By comparing the magnitude of the period effect and the cohort effect, it can be seen that the cohort effect is weaker than the period effect, and the impact of cohort replacement on social values is weaker than the overall effect brought about by the social environment. In other words, the changes in national policies, economic development, and global participation in China after reform and opening-up significantly impact the shaping of contemporary Chinese values. However, considering the effect of future population turnover, the values and characteristics of the “post-80s” and “post-90s” cohorts are also worth noting. When the influence of age is separated, the

"post-80s" and "post-90s" cohorts show conservative authoritarianism in the political field and a certain modernism in private life, which is consistent with the findings of Li and Zhong (2015) who state that the "post-80s" cohort prefers "capable people to run the country" more than their predecessors. It can be predicted that in the coming decades, when the younger generation becomes middle-aged and elderly, their values in the public sphere will be relatively more conservative, which undoubtedly has certain reference value for predicting the future development of China's political and social mentality.

In brief, the age-period-cohort effect analysis can clearly distinguish the impact of periods, cohorts, and age on values. There are still some limitations in this study, mainly in measuring values. First, the measurement of the values is relatively singular. For example, the concept of respect for authority has rich connotations. The typical authority measurement includes government, superior, parental, and traditional authority (Dalton and Ong 2005). However, in this study, only the question of 'greater respect for authority is a good thing' was used to measure the changes in Chinese public social values and their influencing factors, which is not comprehensive. In fact, public attitudes toward authority should be complex, and using a single-item measurement cannot capture the changes in public attitudes toward different authoritative agents. The limitation in measurement is mainly due to the lack of longitudinal survey data on values. Second, the measurement of values in the World Values Survey is based on Western society, and whether its indicators can serve as representative of China's experience of modernization and reflect the connotations of change still needs to be discussed and treated with caution. This study uses attitudes toward authority, postmaterialist values, and openness in the private sphere, all taken directly from the indicators set in the World Values Survey based on the theoretical framework of modernization. The adaptability of Chinese culture and social reality to this framework is questionable. Due to data acquisition limitations, this article attempts to explain and reflect on the connotations of change in the findings and discussion section. We look forward to future surveys on Chinese values using typical questions that reflect the characteristics of Chinese behavior and values to better track and study the changes in Chinese values. Finally, this article attempts to use economic development indicators, the interaction between the state and society, and historical events to interpret the cohort and period effects. However, the relationship between these background factors and the change in values is only a correlation, not a causal inference. With the abundance of relevant survey data in China, we look forward to further exploring these topics.

Abbreviations

PRC	People's Republic of China
HAPC	Hierarchical-age-period-cohort cross-classified random effects models. It treats age groups as fixed effects and nest individuals in groups of time periods and birth cohorts to estimate random coefficients pertaining to period and cohort effects
IE	Intrinsic estimator. It is a method of estimation that yields a unique solution to age-period-cohort identification problem and is the unique estimable function of both the linear and nonlinear components of the APC model

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Author contributions

Gao Haiyan designed the study and conducted research, Wang Peng and Tony Tam contributed in analysis and modeling.

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Availability of data and materials

We based our study on data, publicly available of the World Values Survey (WVS, 1990–2012).

Declarations

Competing interests

The authors declare they have no competing interests.

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