The Impact of Residents’ Leisure Time Allocation Mode on Individual Subjective Well-being: The Case of China

Pengfei Wang1,2 · Xiang Wei3,4 · Xu Yingwei5 · Cao Xiaodan1

Received: 28 May 2021 / Accepted: 13 September 2021 / Published online: 19 October 2021 © The Author(s) 2021

Abstract
As the main tension in Chinese society has become that between people’s growing need for a better life and unbalanced and inadequate development, leisure activities have become a main factor affecting the subjective well-being of Chinese residents. This study uses micro data from the 2019–2020 Chinese Residents’ Economic Life Survey as the sample, applies the latent class analysis (LCA) method to conduct a joint analysis of all leisure activities of individuals, and then divides individual leisure time modes into four types: general leisure, stationary leisure, family-friendly leisure and sports/health care-related leisure. To overcome endogeneity problems from missing variables, sample selection bias, and two-way causality, this paper uses the Heckman two-step and propensity score matching methods to empirically analyse the impacts of residents’ leisure time allocation patterns on individual subjective well-being. The study finds that sports/health care-type leisure is most helpful in improving individual subjective well-being, followed by general leisure, family-friendly leisure and stationary leisure, which have relatively weaker impacts on subjective well-being. The estimation results remain robust and reliable after we introduce the idea of misclassification probability to test the robustness of the findings. On this basis, a group heterogeneity analysis by region, income level, education level, marital status and age is carried out. The research conclusions of this article can help guide residents in rationally allocating their leisure time and provide a policy reference for the construction of leisure facilities in China’s cities.

Keywords Leisure time allocation mode · Subjective well-being · China · Latent class analysis

Xiang Wei
weixiang8888@sohu.com

Extended author information available on the last page of the article
Introduction

As the main social tension in China has become that between people’s growing needs for a better life and unbalanced and inadequate development, leisure has become the main factor affecting the subjective well-being of Chinese residents (Liu & Jia, 2020; Wang, 2020). From the perspective of the macro holiday level, China’s vacation time is already at a relatively high level. At present, China has 11 annual legal holidays and 104 annual weekend days. The average annual leave of Chinese people has thus reached 115 days, which means that Chinese residents spend nearly 1/3 of their time on leisure every year. At the micro level, the daily leisure time of residents is gradually increasing. According to data released by the China National Bureau of Statistics, the average daily leisure time of Chinese residents reached 3 h and 56 min in 2018. However, despite the increase in leisure time and disposable income, the subjective well-being of Chinese residents has not improved (Xu et al., 2017). Some studies hold that the choice of leisure activities is the main driver of improvement in subjective well-being (Hills & Argyle, 1998; Schmiedeberg & Schröder, 2017). Therefore, choosing suitable leisure activities from the perspective of time allocation to improve subjective well-being has become an important issue that urgently needs to be solved in China.

Leisure and subjective well-being are longstanding topics of interest. In ancient Greece, Aristotle clearly pointed out that leisure is necessary for individuals’ well-being. In modern times, there has been much research on leisure and well-being (Jiang et al., 2011; Liu & Jia, 2020; Newman et al., 2014; Schulz et al., 2018; Song & Jin, 2015). However, consistent conclusions on the impact of leisure activities on subjective well-being have not been reached (Lee et al., 2020). Many studies hold that active activities (such as exercising and socializing) can significantly improve individual subjective well-being. For example, physical exercise can relieve tension and anxiety (Steptoe & Bolton, 1988) and enhance subjective well-being by relieving fatigue (Argyle, 1996). Csikszentmihalyi and Hunter (2003) find that participating in social activities such as chatting with friends and attending parties can also significantly improve individual subjective well-being. However, Wei et al. (2015) argue that compared with active leisure activities, passive leisure activities (such as watching TV and surfing on the Internet) can promote the subjective well-being of Chinese residents to a greater extent. For Chinese residents, leisure is seen as a kind of inner peace (Wang & stringer, 2000). Therefore, socializing and shopping may be considered opposed to a peaceful life. In addition, under the influence of Confucian culture, Chinese people advocate hard work to increase their wealth, so they have a negative attitude towards leisure (Li, 2009). Therefore, in the Chinese context, the applicability of Western leisure theory still needs to be further verified.

Scholars have conducted rich and detailed studies on the impact of leisure on individual subjective well-being, and relevant research conclusions have also laid a solid foundation for follow-up research. However, previous studies still suffer from some shortcomings, embodied in the following three points (Argyle, 1996; Korpela & Kinnunen, 2010; Wei et al., 2015). First, the traditional method of
analysing single variables in relation to leisure activities ignores the dynamic attributes of individual leisure behaviours. Individual leisure behaviour is subject to the dual constraints of subjective individual factors and objective environmental factors. Therefore, the dynamic properties of leisure behaviour may seriously affect the robustness of the research conclusions (Wei & Pang, 2012). Second, the impact of leisure behavior on individual subjective well-being has not reached a consistent conclusion. Some studies believe that positive leisure activities such as leisure sports and social networking can help improve individual well-being (Korpela & Kinnunen, 2010), while others believe that passive leisure activities such as watching TV and Internet surfing can significantly improve individual subjective well-being (Wei et al., 2015). Third, leisure theory requires further verification based on micro-level big data for the Chinese context. In existing empirical analyses of leisure activities and Chinese residents’ well-being, most of the literature is based on local sampling and case analysis (Wang and Sun 2019). The small sample sizes limit the applicability of the research conclusions in China to a certain extent.

To sum up, the academic contribution of this study is mainly reflected in the following aspects. First, research paradigm innovation. This paper abandons the traditional method of variable-oriented analysis of leisure behavior, and uses the research method of latent category analysis (LCA) to jointly analyze all individual leisure behaviors. Second, the determination of leisure time allocation mode. In this paper, the individual’s leisure time allocation model is divided into general leisure, stationary leisure, family-friendly leisure and sports/health care-related leisure four types. Third, studying the impact of leisure time allocation model on individual subjective well-being. Previous studies have done a lot of research on the relationship between leisure and subjective well-being (Brajša-žganec et al., 2011; Deleire & Kalil, 2010; Noll & Weick, 2015). However, there were few studies on the impact of leisure time allocation mode on subjective well-being. Because individual’s leisure behavior is random and variable, and leisure mode is difficult to change in the short term (Dunn et al. 1988). Therefore, to study the impact of leisure time allocation mode on subjective well-being, the research conclusion is more stable and reliable. Fourth, this study enriches the research literature on leisure and subjective well-being. The data used in this study are from the 2019–2020 Chinese Residents’ Economic Life Survey which jointly undertaken by the China National Bureau of Statistics, China Post Group and CCTV. The survey covers the detailed information of residents’ daily leisure time, leisure behavior, evaluation of economic life quality and demographics. In the Chinese context, the study of the impact of residents’ leisure behavior on subjective well-being is a useful supplement to the Western leisure theory.

The remaining parts of this article are arranged as follows: The second part is a literature review. The third part models the impact of leisure behaviour on subjective well-being. The fourth part describes the research design, including the basic information of the analysis sample and variable selection. The fifth part presents the empirical analysis of the impact of leisure patterns on well-being, including endogeneity and robustness tests. The sixth part conducts the heterogeneity analysis of different groups. The final part presents conclusions and recommendations.
Literature Review and Research Hypothesis

Literature Review

A review of research output from around the world reveals that scholars have conducted in-depth analyses and interpretations of the relationship between leisure and well-being from different perspectives and with different frameworks (Covan, 2017; Dolan & Peasgood, 2008; Noll & Weick, 2015). As Song (2018) points out, it is precisely because scholars work from different analytical perspectives and with different research frameworks that they can confirm a basic general fact: appropriate leisure activities can have positive impacts on individuals, families, communities, and society and improve people’s subjective well-being and life satisfaction. Specifically, the impacts of leisure on well-being mainly revolve around four aspects:

The first is the role of objective conditions. In the research strand on leisure constraints (also known as leisure barriers), leisure time and disposable income are the most basic and important objective factors that affect individual leisure and well-being (Jackson, 2000; Li & Liao, 2018; Song, 2014); the influence of leisure time on individual well-being has also been confirmed in sociology and psychology (Dolan et al. 2008). In well-being economics, after the consumption structure is incorporated into the effect function, leisure consumption significantly improves individual subjective well-being (Deleire & Kalil, 2010; Noll & Weick, 2015). In addition to leisure time and income level, leisure space is also an important factor restricting leisure behaviour through spatial elements such as resources, the environment, and facilities (Lloyd & Auld, 2002). Related research also shows that leisure space has a significant role in shaping and influencing leisure behaviour choices and leisure satisfaction (Oh et al., 2012).

The second aspect is the role of leisure content. Researchers who approach the connection from this perspective believe that rich participation in leisure activities can significantly improve individual subjective well-being by relieving work pressure and promoting physical and mental health (Lloyd & Auld, 2002, Brajša-žganec et al. 2011). The frequency and type of leisure participation can significantly affect leisure satisfaction, with more frequent and in-depth leisure participation bringing individuals a greater well-being experience (Song, 2018). Studies have shown that hedonistic leisure activities have the most obvious impact on the subjective well-being of Chinese residents (Li & Liao, 2018); research by Xu et al. (2017) shows that so-called pure time-consuming and achievement-based leisure activities have a significantly positive effect on individual subjective well-being, while social leisure activities have the opposite influence. This is mainly because people widely use social software such as WeChat and Skype for communication and interaction due to the ubiquity of mobile communications, but socialization through electronic screens is not actually as friendly and effective as face-to-face communication. This may be the reason why social leisure activities do no improve well-being (Xu et al., 2017).

The third aspect is the role of subjective demand. This view of the question is based on the theory of needs and regards the satisfaction of personal needs as an
intermediary variable and mechanism of action leading to increased well-being (Wang and Sun 2019). On the one hand, the degree of individual satisfaction from leisure activities serves as the motivation to participate in such activities, and when the leisure experience can meet the needs of the individual, this participation can improve the individual’s subjective well-being (Kim, 2009). On the other hand, leisure can reflect people’s understanding of and actions in relation to the self and social culture (Xia et al., 2021). Through leisure, a relatively stable personal and social identity can be constructed, and this sense of identity can also be a potential way to improve individual subjective well-being through leisure participation (Liu & Jia, 2020).

The fourth aspect highlights the theory of group differences in impact. In this view, the impact of leisure on well-being cannot be generalized, given significant effect heterogeneity at the group level. Studies have shown that there are significant differences in the evaluation of well-being among adolescents, elderly groups, women and groups with diseases in connection with leisure participation (Henderson et al., 2002; Staempfli, 2007). Demographic characteristics such as age, marital status, gender, education level, and health and regional factors such as economic development stage and social culture all influence the group differences in perceptions (Covan, 2017; Grossi et al., 2011; Ljunge, 2016; Long & Wang, 2013; Stock et al., 1986).

In summary, the impact of leisure on subjective well-being varies by demographic characteristic and social development stage. However, in the context of contemporary China, the relationship between leisure and subjective well-being is also influenced by social culture and value orientation (Liu & Jia, 2020). Under the influence of Confucian culture, people pay more attention to the quality of leisure activities than the quantity of leisure time (Wei et al., 2015). Therefore, leisure activities should be the key variables in assessing the effect of leisure on the subjective well-being of Chinese residents. However, unfortunately, the impact of leisure activities on individual subjective well-being has not been unanimously recognized by scholars. For example, some scholars believe that active leisure activities can promote individual well-being more than passive leisure activities (Argyle, 1996). However, passive leisure activities such as watching TV and surfing the Internet are more likely to make residents happy in China than in other contexts (Wei et al., 2015). In addition, research conclusions on leisure behaviour based on single variable analysis have great shortcomings in terms of stability and credibility (Bergman & Lundh, 2015). Because the single variable analysis method ignores the bias caused by the dynamic attributes of individual leisure behaviour, the research results rely heavily on sample selection. Therefore, it is necessary to conduct a joint analysis of all individual leisure activities to explore the impact of the leisure mode on individual subjective well-being in the Chinese context.

**Research Hypothesis**

Leisure time refers to the free time that has nothing to do with work and labor to maintain their own survival and can be arbitrarily controlled by individuals
(Zhou et al., 2012), and leisure time allocation is to study the time allocation mode of individuals for various leisure activities in leisure time. A large number of scholars have done sufficient research on the classification of leisure behavior. Some scholars divide leisure behaviors into positive leisure activities, passive leisure activities and creative leisure activities (Scott and Willits, & Fern, K, 1998), while others divide leisure activities into achievement type, social type and time-consuming type (Passmore & French, 2001). However, the traditional classification methods are based on leisure activities. Few scholars conduct a joint analysis of all individual leisure behaviors in a whole day from the perspective of human-oriented analysis. Bloom et al. (2018) used Latent Profile Analysis (LPA) to track and analyze the time allocation of staff, and divided leisure behavior into four leisure modes: social sports, active artists, socially & culturally inactives and inactive soloists. Under the influence of Oriental Confucian culture, Chinese people prefer static leisure activities. Therefore, if we make a joint analysis of all leisure activities of Chinese residents throughout the day, the leisure time allocation mode of Chinese residents may be significantly different. Accordingly, the following hypotheses was developed:

Hypothesis 1: there are significant differences in leisure time allocation modes of Chinese residents.

The impact of leisure activities on individual subjective well-being has always been a hot topic in the field of leisure research. A large number of studies have proved that leisure activities can promote the individual’s subjective well-being by alleviating work pressure and satisfying leisure experience (Kuykendall et al., 2015). Because leisure activities can not only effectively improve leisure satisfaction, but also improve individual physical and mental health, and then promote the improvement of subjective well-being (Yu et al., 2020). Sports leisure activities can effectively promote the subjective well-being of patients with chronic diseases by alleviating pain (Todd et al., 2020). Hu et al (2021) randomly divided 79 individuals into two groups by using the method of experimental research, and then compared the results after one week of leisure activity intervention, and the results found that active leisure activities can effectively promote individual subjective well-being. Previous studies have proved that active leisure activities can effectively promote individual subjective well-being, while passive leisure activities have no significant impact on individual subjective well-being (Korpela & Kinnunen, 2010). However, there are opposite conclusions in the study of leisure behavior and subjective well-being of Chinese residents. Research shows that passive leisure activities such as watching TV and surfing the Internet play a significant role in improving Chinese residents’ subjective well-being, while active leisure activities such as sports, social networking and shopping do not significantly improve individual subjective well-being (Wei et al., 2015). Therefore, in China, different leisure time allocation patterns may have significantly different effects on individual subjective well-being. Accordingly, the following hypotheses was developed:

Hypothesis 2: Different leisure time allocation modes have significant differences in the improvement of individual subjective well-being.
In the study of the relationship between leisure and individual subjective well-being, demographic characteristics such as gender, age, income level and residence are important contents of the study (Henderson et al., 2002; Staempfli, 2007). Compared with men, women prefer leisure activities such as shopping and social networking, because shopping and gathering with friends can better promote the subjective well-being of women (Ljunge, 2016). From the perspective of age, the leisure habits formed in adolescence often have a great impact on adults’ leisure style, because the formation of habits is difficult to change (Scott and Willts 1998). However, some studies have shown that age and education level have no effect on individual subjective well-being (Wei et al., 2015). For the elderly group, leisure activities can improve the loneliness of the elderly, and then improve individual subjective well-being (Yoshida et al., 2021). From the perspective of time allocation, due to the influence of occupational nature, family role and family life cycle, the time allocation of different groups is also quite different (Becker, 1965). Accordingly, the following hypotheses was developed:

Hypothesis 3: there are significant demographic differences in the impact of leisure time allocation mode on individual subjective well-being.

Theoretical Analysis and Model Construction

Theoretical Model

The role of leisure in promoting subjective well-being has been widely recognized by scholars (Jiang et al., 2011; Song, 2014; Newman et al., 2014). In their leisure time, individuals can not only relieve their fatigue and alleviate work pressures through leisure activities but can also improve their subjective well-being by enhancing their physical and mental health (Yu et al., 2020). In addition, the construction of individual social networks and the acquisition of knowledge and skills through leisure activities are also beneficial for individual satisfaction to a certain extent (Lloyd & Auld, 2002, Brajša-Žganec et al. 2011). To verify economic theories and basic assumptions, economists usually posit that individual subjective well-being can be used to characterize utility (Lu et al., 2008). This study draws on the practice of Xu et al. (2017) and takes subjective well-being as a proxy variable for the utility function. Therefore, the study of the impact of leisure behaviour on subjective well-being is transformed into the question of how to allocate leisure time to maximize individual utility. Based on the time allocation theory of Becker (1965), this paper constructs a theoretical model of heterogeneous leisure time allocation.

Generally, leisure time is defined as free time that can be independently controlled by an individual and that has nothing to do with work or labour to maintain their own survival (Gronau, 1980; Wei & Pang, 2012; Zhou et al., 2012). Focusing on the impact of the leisure time allocation mode on subjective well-being involves studying the impact of different patterns of leisure time utilization on individual subjective well-being. The total time of an individual can be divided into working time (WT_i), leisure time (LT_i) and life maintenance time (ST_i, including
sleeping, bathing, eating and engaging in other activities necessary to maintain life) (Zhou et al., 2012). To facilitate analysis, we keep the life maintenance time ($ST_i$) of all individuals constant; then, the sum of working time and leisure time remains unchanged and is denoted as:

$$WT_i + LT_i = T - ST_i$$ (1)

Because there is a significant difference between the individual’s returns to work time and leisure time, let the individual’s wage income be $P_i$ and the individual’s daily leisure time be $(LT_i)$. For convenience, we keep the rate of return per unit of leisure time $(LT_i)$ to individual well-being constant. The utilization of leisure time in various leisure activities can be recorded as $(L_1, L_2, L_3, \ldots, L_n)$. Then,

$$LT_i = L_1 + L_2 + L_3 + \cdots + L_n$$ (2)

The general model of the individual effect function is:

$$U_i = U(Y_i, LT_i, Z)$$ (3)

The constraints are:

$$Y_i = WT_i * P_i + V$$ (4)

$$T = WT_i + LT_i + ST_i$$ (5)

where $V$ is other income, $T$ is the total time in the day, that is, 24 h, and $Z$ is another influencing factor.

When the individual’s comprehensive utility is maximized, the following formula can be optimized:

$$U_i^* = U(WT_i^* * P_i + V, LT_i^*, Z)$$ (6)

This can be obtained from (1),

$$WT_i = T - ST_i - LT_i$$ (7)

Because $T$ (24 h) is constant and it is assumed that the individual’s life maintenance time $ST_i$ is constant, we can assume that the sum of working time and leisure time is constant and is recorded as a constant $T^*$; then:

$$WT_i = T^* - LT_i$$ (8)

The optimal time allocation combination of formula (6) is transformed into:

$$U_i^* = U((T^* - LT_i) * P_i + V, LT_i^*, Z)$$ (9)

Among them, the maximum utility of leisure time allocation is:

$$U(LT_i^*) = U(L_1, L_2, L_3 \ldots, L_n)$$ (10)
Therefore, the question of maximizing individual utility is transformed into that of how to allocate leisure time to maximize individual utility after leisure time is controlled.

**Empirical Model**

**Measurement Equation**

Based on the above theoretical analysis, the utility function of an individual is determined by the factors of leisure time, leisure time allocation mode, social economy and personal characteristics. Therefore, the equation to be estimated can be set as:

\[ Y_i = \alpha + \beta_1 pX_i + \beta_2 LT_i + C + \mu_i \]  

(11)

where \( Y_i \) represents the individual’s subjective well-being; \( X_i \) is the individual’s allocation mode of leisure time; \( LT_i \) is the individual’s daily leisure time; \( C \) represents the control variables, such as regional characteristics, economic development stage and demographic characteristics in the individual’s location; and \( \mu_i \) is the residual. The null hypothesis \( H_0 \) and alternative equation \( H_1 \) can be expressed as:

\[ H_0 : \beta_1 = \beta_2 = 0 \]  

(12)

\[ H_1 : \beta_1 + \beta_2 \neq 0 \]  

(13)

**Ordered Selection Model**

Individual subjective well-being is generally a discrete variable on a five-point scale, where 1 means “very unhappy”, 2 means “relatively unhappy”, 3 means “average”, 4 means “relatively happy”, and 5 means “very happy”. To effectively connect discrete variables and continuous variables (Xu et al., 2017), this study uses an ordered probit model for evaluation, that is,

\begin{align*}
    y = 1, & \text{if } U^* \leq m_1 \\
    y = 2, & \text{if } m_1 < U^* \leq m_2 \\
    y = 3, & \text{if } m_2 < U^* \leq m_3 \\
    y = 4, & \text{if } m_3 < U^* \leq m_4 \\
    y = 5, & \text{if } U^* \geq m_4
\end{align*}  

(14)

Here, \( m_1 < m_2 < m_3 < m_4 \). Therefore, the following probability estimates are obtained:

The probability of "very happy" can be expressed as:

\[ P(y_i = 5|x_i) = 1 - \Phi(m_4 - x_i^t\beta) \]

The probability of "relatively happy" can be expressed as:
The probability of "average" can be expressed as:

\[ P(y_i = 4|x_i) = \Phi(m_4 - x'_i \beta) - \Phi(m_3 - x'_i \beta) \]

The probability of "relatively unhappy" can be expressed as:

\[ P(y_i = 3|x_i) = \Phi(m_3 - x'_i \beta) - \Phi(m_2 - x'_i \beta) \]

The probability of "very unhappy" can be expressed as:

\[ P(y_i = 2|x_i) = \Phi(m_2 - x'_i \beta) - \Phi(m_1 - x'_i \beta) \]

The probability of "very unhappy" can be expressed as:

\[ P(y_i = 1|x_i) = \Phi(m_1 - x'_i \beta) \]

Data Source, Variable Selection and Measurement Model

Data Source

The data used in this study come from the 2019–2020 Chinese Residents’ Economic Life Survey, which is jointly led by the China National Bureau of Statistics, the Finance Channel of China Central Television and the China Post Group. It is the largest livelihood survey in China. As the member of the project survey team, our work has been authorized by the China National Bureau of Statistics and we can directly use the survey data for academic research. The database survey covers 31 provinces, municipalities and autonomous regions, 104 cities, and 300 counties across China. Every year, 100,000 Chinese families are surveyed about their satisfaction with their life and work, economic conditions, cultural development, social development and ecological environment in three dimensions: sense of acquisition, security, and subjective well-being. In order to ensure that the sample is nationally representative, the survey covers all counties and districts in the country, and the number of samples in each region is determined by population density. With reference to the sampling method of the "national 1% population sampling survey" of the China National Bureau of Statistics, random sampling shall be carried out in the sample selection of each county and district. The questionnaire consists of three parts: one is the evaluation of life and work, economic conditions, cultural development, social development and ecological environment; the second summarizes the individual’s daily leisure time, indoor leisure activities and outdoor leisure activities; the third addresses demographic characteristics such as location, gender, age, marital status, education level, employment, and family size. Each questionnaire is completed jointly by the national postal staff and the investigators, which fully ensures the effectiveness and accuracy of the questionnaire.
Variable Selection

Explained Variable

The explained variable in this study are subjective well-being. Compared with subjective well-being, the quality of life indicator combines both objective and subjective indicators (Matallana et al., 2020). Drawing lessons from Matallana et al. (2020), this article equates subjective well-being with feelings about the current quality of life. The question about subjective well-being in the questionnaire is "How do you feel about your current life?" The response options are “very happy”, “relatively happy”, “in general”, “relatively unhappy”, and “very unhappy”, and we assigned the value as an integer from 1 to 5.

Explanatory Variables

The core explanatory variable is leisure time allocation mode. The leisure activities included in the survey sample include two categories of leisure at home and outdoor leisure. Among them, leisure activities at home include 11 items: watching TV, online shopping, tidying up the house, exercising and engaging in fitness activities, using mobile phones, reading and learning, handling food and cooking, gaming, spending time with family (children/parents/spouses), caring for pets, engaging in health care and engaging in beauty and skin care. Outdoor leisure activities include 9 items: dining out, visiting night markets/shopping malls, visiting tourist attractions, watching movies/attending the theatre or comedy shows, attending bookstores, KTVing/clubbing, engaging in sports and fitness, engaging in health care, square dancing and taking hobby classes. Drawing lessons from the classification of leisure activities by Wei et al. (2014) and Leuty et al. (2015), this study preliminarily divides the above 20 leisure activities into watching TV and using mobile phones (mainly watching TV, online shopping, using mobile phones, gaming, etc.), spending time with family/doing housework (tidying up the house, handling food and cooking, spending time with family [children/parents/spouse] and taking care of pets), engaging in exercise and fitness (including indoor exercise and fitness, outdoor exercise and square dance), reading and learning (including reading and learning, visiting bookstores and taking hobby classes), engaging in health and beauty care (including family health care, beauty and skin care and outdoor health care), attending social gatherings and entertainment events (dining out, attending night markets/shopping malls, KTVing/clubbing) and traveling and engaging in art appreciation (visiting tourist attractions and watching movies/attending the theatre or comedy shows). On this basis, this research uses LCA to fit the above seven types of leisure activities into four leisure time allocation modes: general leisure, stationary leisure, family-friendly leisure and sports/health care leisure.1

1 The specific analysis process is shown in Table 2 and Table 3.
Control Variables

Based on the studies of Frey et al. (2010), Jiang et al. (2011) Song (2014), etc., on the influencing factors of well-being, this study mainly considers the influence of sociodemographic, economic, regional and situational factors on individual subjective well-being. Specifically, the main control variables in this study are as follows: ① Sociodemographic factors include gender, age, education level, marital status and usual residence (Covan, 2017; Sabatini, 2014). ② Economic factors include career choice, industry and personal annual income (Newman et al., 2014). ③ Regional factors include the region of permanent residence, city level, and regional GDP per capita (Krause, 2013; Li, 2008; Liu, 2015; Xu et al., 2016). To facilitate quantitative analysis, we take the logarithm of the regional GDP per capita. ④ Situational factors include the average leisure time during the working day of respondents (Wei & Fan, 2013; Zhang & Zhou, 2017; Jiang et al., 2020). At the same time, considering that leisure time may have a nonlinear impact on respondents, we also include the squared term of leisure time among the control variables.

Research Methods

To overcome the inconsistency in the research conclusions based on the variable-oriented approach to studying leisure activity choices and individual subjective well-being (Bloom et al., 2018), this research adopts a person-oriented approach to analyse the various leisure activities that individuals participate in in daily life as a joint whole; that is, we divide individuals into different leisure modes according to their leisure time allocation towards various leisure activities. In this study, the data on individuals’ daily leisure activity choices are discrete variables, so LCA is used to jointly analyse the recorded leisure time allocation patterns and individual subjective well-being.

From a methodological point of view, LCA takes the recorded individual leisure time allocation as an explicit variable and then uses a model to explore the potential structure of individual leisure patterns behind the explicit data. Leisure mode is a latent variable, and its best category structure can explain the variation in the explicit variables to the greatest extent. Assuming that there are N kinds of leisure activity choices for an individual and that the leisure mode can be divided into T potential categories, the response probability of the individual’s time allocation towards each leisure activity is called the conditional probability. Based on the conditional probability distribution of each individual’s different categories, the distribution probabilities of all respondents in different potential categories are called category probabilities (latent class probabilities). Therefore, based on Masyn’s (2013) research on potential profile analysis, the probability that an individual belongs to each potential leisure mode category is:

\[
Pr(C = 1) = \frac{e^{r_1}}{e^{r_1} + e^{r_2} + \ldots + e^{r_T}}
\]
The above formula satisfies the conditions:

\[ Pr(C = 1) + Pr(C = 2) + \cdots + Pr(C = T) = 1 \]  

**Descriptive Statistics**

Table 1 shows the descriptive statistical results of the main variables. The average SWB of the sample is 3.47, which is between "average" and "relatively happy". The descriptive statistics show that the proportions of respondents who answered "very unhappy", "relatively unhappy", "average", "relatively happy" and "very happy" were 3.69%, 6.91%, 44.07%, 29.67%, and 15.66%, respectively. There are certain differences in residents’ perception of well-being. Approximately 45% of people think that their life is happy, and approximately 44% of people’s perceive their life to be average; that is, they think that their life is neither very happy nor not very happy. Further analysis reveals that the reasons for people’s general life perception may be related to a current increase in work or life pressure with the continuous improvement in people’s living standards (Xu et al., 2016).

In terms of the basic characteristics of the sample, the proportion of males selected in the study is slightly higher than that of females, with an average age of approximately 35 years. Ninety-one percent of respondents have received secondary education, 68% of respondents have a spouse, 71% of respondents live in cities, and 30% of respondents have an annual personal income of approximately 30,000 to 50,000 yuan. While 9% of respondents are from the western region, the remaining 91% are basically evenly distributed across the east, middle, and northeast regions. In this area, average per capita GDP is 61,738 yuan, 45% of respondents are from prefecture-level cities, and the average daily leisure time of respondents is approximately 2.72 h.

**Empirical Analysis**

**Determination of Potential Categories of Leisure Time Allocation Modes**

Because different individuals have significant differences in their allocation of leisure time, analysing and summarizing the allocation of leisure time is the core issue of this research. Because studies have shown that individual’s leisure activity patterns are more stable (Bloom et al., 2018), it is more reliable to study the influence of the leisure time allocation mode on individuals’ subjective well-being. To this end, this paper applies MPLUS 7.0 to use the time allocation of leisure time in
### Table 1 Descriptive statistics

| Variable                  | Explanation                                                                 | Observation | Mean  | Standard deviation | Min | Max  |
|---------------------------|-----------------------------------------------------------------------------|-------------|-------|--------------------|-----|------|
| Well-being                | Categorical variables, very happy = 1, relatively happy = 2, in general = 3, relatively unhappy = 4, very unhappy = 5 | 47,419      | 3.47  | 0.96               | 1   | 5    |
| Gender                    | Dichotomous variables, male = 0, female = 1                                 | 61,714      | 1.38  | 0.49               | 1   | 2    |
| Age                       | The age of the survey respondents, a categorical variable                   | 52,211      | 2.65  | 0.96               | 1   | 5    |
| Education level           | Measured by the educational level of the samples                            | 64,984      | 2.60  | 0.90               | 1   | 6    |
| Marital status            | Divided into married, unmarried, divorced and widowed                       | 64,524      | 2.64  | 0.81               | 1   | 5    |
| Place of usual residence  | Dichotomous variables, rural = 0, urban = 1                                | 62,095      | 1.29  | 0.45               | 1   | 2    |
| Occupation                | The work that the survey respondents is engaged in                          | 64,131      | 3.86  | 2.49               | 1   | 10   |
| Personal annual income    | The annual salary and income level of the survey respondents               | 64,654      | 3.20  | 1.47               | 1   | 10   |
| Region                    | Divided into East, Central, West and Northeast regions                      | 69,444      | 2.25  | 1.23               | 1   | 4    |
| lnGDP                     | GDP per capita in the city where the survey respondents are located         | 66,524      | 1.88  | 0.57               | 0.39| 3.05 |
| City level                | Divided into municipalities, provinces and general cities                   | 69,444      | 2.98  | 0.92               | 1   | 4    |
| Leisure time              | Average daily leisure time of survey respondents                           | 69,444      | 2.69  | 1.28               | 0.5 | 4.5  |
| Squared leisure time      | The square of the average daily leisure time of the survey respondents      | 69,444      | 8.86  | 6.70               | 0.25| 20.25|

The data source is the 2019–2020 Chinese Residents’ Economic Life Survey.
various leisure activities as an obvious variable and then determines the number of potential categories of individual leisure time allocation modes. Table 2 analyses the evaluation results of the potential category model of leisure participation in this study.

It can be seen from the evaluation results in Table 2 that as the potential categories of leisure time allocation modes increase, the maximum likelihood estimation, AIC and BIC indices decrease, which indicates that as the heterogeneity in leisure participation increases, the degree of accuracy of classification in the potential categories continuously improves. In addition to the AIC and BIC, entropy is often used to evaluate the accuracy of classification. The calculation formula is as follows:

\[ E_k = 1 - \frac{\sum_i \sum_k (-p_{ik} \ln p_{ik})}{n \ln K} \]  

(16)

\( p_{ik} \) is the posterior probability of individual \( i \) falls in the class \( k \). Lubke and Muthén (2007) point out that when entropy > 0.8, classification accuracy exceeds 90%. Table 2 shows that the smallest AIC and BIC and largest entropy values are not consistent. When the adaptation indicators for different categories are inconsistent, the actual significance of the sample and the number of observations should be combined to determine the optimal number of potential categories, and the number of subjects in each category should be at least 50 to ensure accurate classification (Wang et al., 2017; Yang, 2006). Therefore, combined with various indicators, this study argues that the best potential number of categories for the leisure time allocation modes is four. To further compare the differences in leisure behaviour of groups with different leisure time allocation modes, this article lists the average leisure time allocation to each potential category of leisure activities in Table 3.

According to the scores for the four leisure time allocation modes for each leisure activity, this research labels the categories general leisure, stationary leisure, family–friendly leisure and sports/health care leisure; the proportions of each category are 16.84%, 41.84%, 15.91% and 25.41%. The leisure behaviour graphs of the four leisure time configuration modes can be visually described by the time allocation difference diagrams for various leisure activities, as shown in Fig. 1.

| Potential category | df | Log likelihood | AIC | BIC | Entropy |
|--------------------|----|----------------|-----|-----|---------|
| Class 1            | 19 | -958,047.8     | 1,916,134 | 1,916,314 | 0.921   |
| Class 2            | 37 | -937,496.2     | 1,875,066 | 1,875,417 | 0.871   |
| Class 3            | 58 | -926,031.2     | 1,852,142 | 1,852,692 | 0.835   |
| Class 4            | 72 | -919,171.7     | 1,838,487 | 1,839,170 | 0.812   |
| Class 5            | 97 | -910,456.6     | 1,841,107 | 1,842,027 | 0.794   |

Table 2 Determination of potential categories of leisure time configuration modes


Table 3  Comparison of the differences in leisure behaviours among the potential categories

| Leisure time allocation modes | Watching TV/Using phone | Spending time with family/Doing housework | Exercise | Reading and studying | Health and beauty care | Participating in social entertainment | Participating in art appreciation |
|------------------------------|-------------------------|------------------------------------------|----------|----------------------|------------------------|---------------------------------------|----------------------------------|
| General                      | 1.47                    | 1.21                                     | 0.39     | 0.27                 | 0.10                   | 1.38                                  | 0.92                             |
| Stationary                   | 1.63                    | 0.13                                     | 0.78     | 0.69                 | 0.08                   | 1.11                                  | 0.76                             |
| Family-Friendly              | 0.38                    | 1.43                                     | 0.84     | 0.70                 | 0.20                   | 0.49                                  | 0.95                             |
| Sports/Health Care           | 1.03                    | 0.99                                     | 1.52     | 0.47                 | 1.07                   | 0.47                                  | 0.21                             |

The values in the table are the average scores of the potential categories of the leisure time allocation mode in various leisure activities.
Based on latent class analysis, taking sports/health care leisure as the benchmark, subjective well-being function is subjected to OLS analysis and ordered probit estimation. The specific results are shown in Table 4. It can be seen from the results that the four modes of leisure time allocation, general, stationary, family–friendly and sports/health care leisure, all passed significance tests for their effect on subjective well-being. Among them, the sports/health care leisure mode of time allocation is the most helpful for improving individual subjective well-being, followed by the general, family–friendly and stationary leisure time allocation modes, which promote subjective well-being only relatively weakly (Wang & Wong, 2010). Compared with sports/health care-type individuals, general-type individuals have a weaker perception of subjective well-being by 5.4%, family–friendly-type individuals have a weaker perception of subjective well-being by 9.2%, and stationary-type individuals have the lowest perception of subjective well-being, which is significantly weaker by 13.2%. This result is consistent with the research of Passmore and French (2001) and Andreja et al. (2011): Achievement-related and social leisure activities are significantly more impactful than pure time-consuming leisure activities, while stationary leisure activities are not conducive to the improvement of individual subjective well-being. In other words, a reasonable and effective choice of leisure methods and an appropriate amount of daily exercise and fitness time are of great benefit in alleviating work and life pressure, maintaining physical and mental health, and enhancing individual well-being (Chen & Yu, 2015).

An increase in leisure time has a significant positive impact on subjective well-being. As Xu et al. (2017) state, an increase in leisure time can improve personal utility and make people’s lives happier. It is worth noting that the square of leisure time has a significant negative correlation with subjective well-being; that is, for individuals, longer leisure time does not imply that the individual is happier. As leisure time increases, its relationship with individual well-being changes to an

### Basic Regression Equation

| Activity                          | General | Family-Friendly | Stationary | Sports/Health Care |
|----------------------------------|---------|-----------------|------------|-------------------|
| Participating in art appreciation|         |                 |            |                   |
| Participating in social entertainment|     |                 |            |                   |
| Engaging in health and beauty care|        |                 |            |                   |
| Reading and studying             |         |                 |            |                   |
| Exercising                       |         |                 |            |                   |
| Spending time with family/doing housework|    |                 |            |                   |
| Watching TV/Using phone          |         |                 |            |                   |

Fig. 1 Comparison of leisure activities among the four leisure time allocation modes
Among the four leisure time allocation modes, sports/health care is the benchmark variable, and the coefficient of the other modes’ influence on subjective well-being is the difference between the improvement in subjective well-being for the benchmark equation and the specified mode. The results show that the improvement effect on individual subjective well-being is in the order of sports/health care > general > family-friendly > stationary. *** p < 0.01, ** p < 0.05, * p < 0.1; the same applies below.

In terms of individual socioeconomic characteristics, as an individual’s annual income increases, so does her level of subjective well-being (Krause, 2013). People with stable jobs, upper-middle incomes and relatively abundant leisure time, such as administrative staff and corporate managers, have more fun in life, thus enjoying more subjective well-being (Li & Chen, 2015). Those in unemployment or self-employment or with unstable income sources such as full-time mothers (or fathers) display weaker perceptions of subjective well-being and potentially experience negative emotions such as anxiety, depression, and low self-esteem (Xu et al., 2016).

In terms of the regional economy, the subjective well-being level of residents in the eastern and central regions is significantly higher than that of residents in the western and north-eastern regions. In the eastern and central regions, the level of economic development is relatively high, the annual income level of residents is high, and urban public infrastructure, material civilization, and leisure and entertainment resources are more abundant, which can meet people’s
diversified needs for a better life, and thus residents’ subjective well-being level could be higher (Li, 2008). However, further analysis of the regional per capita GDP level and city level reveals that the level of regional economic development is negatively correlated with residents’ well-being. As regional per capita GDP increases, residents’ well-being gradually decreases. The perception of subjective well-being of residents of municipalities and provincial capitals (cities separately listed in the plan) is significantly lower than that of residents of prefecture- and county-level cities (Liu, 2015). This is related to the rapid pace of work and life, high competitive pressures, and inadequate leisure time for rest and entertainment in economically developed cities (Ye & Feng, 2014).

In terms of sociodemographic factors, the subjective well-being level of urban residents is higher than that of rural residents, which may be related to the convenience of urban living facilities. Women’s subjective well-being level is significantly higher than that of men, which may be related to men’s heavier family responsibilities and work pressure (Luo, 2006). At higher levels of education, the level of subjective well-being decreases. From the perspective of marital status, unmarried residents are happier in life than married people, and those who are divorced or widowed are less happy (Mariah et al., 2020).

**Endogeneity Testing**

**Selection Bias**

To determine whether the sample size can fully reflect the impacts of different leisure allocation modes on subjective well-being and avoid bias caused by respondents’ self-selection bias and possible spillover effects between respondents, this study uses Heckman’s two-step method to analyse selection bias from the sample size.

The first step is to construct the OP model’s main equation for the influence of the leisure time allocation mode on individual subjective well-being.

\[
\text{Subjective Well-being} = \alpha + \beta_1 \times \text{Leisure Time Allocation Modes} + \beta_2 \times \text{Leisure Time} + C + \mu_i
\] (17)

where C represents control variables such as economic factors, regional factors and demographics.

The second step is to construct the OP model selection equation with a limited sample. The basic idea is that because individuals’ choice of different leisure activities is obviously restricted by the leisure facilities in their area, leisure facilities can be used as the basis for sample "self-selection". Therefore, the sample-restricted OP model selection equation constructed in this paper is:

\[
\text{Leisure Facilities} = \alpha + \beta_1 \times \text{Leisure Time} + C + \mu_i
\] (18)

where C represents control variables such as economic factors, regional factors and demographics.
Table 5 shows the results of Heckman’s two-step method. The results show that lambda is significantly negative at the 5% level in the calculation results, and the inverse Mills ratio $\lambda$ of 2.449 is significantly greater than zero, which indicates that there is indeed selection bias in the model. A further comparison between the Heckman two-step estimation result and the ordered probit estimation result shows that the three results are very close, indicating that the ordered probit estimation result is reliable.

**Propensity Score Matching**

Although the estimations above control for the effects of variables such as economic, regional, and demographic characteristics on subjective well-being, for individuals who choose different leisure time allocation modes, there may be significant differences in other aspects of subjective well-being. This kind of problem can be solved by obtaining the matching estimator through the propensity score matching (PSM) method (Rosenbaum & Rubin, 1983). To ensure the effectiveness of the method in the research, it is necessary to ensure that the interviewees have free time every day, that is, there is a balance between free and not free time. After the matching is conducted, beyond the difference in perceived subjective well-being between the treatment group and the control group, there should be no obvious differences along most sociodemographic, economic, and situational variables. The relevant variables are tested for balance, and the results are shown in Table 6. The test results show that after the matching procedure, the error proportions of most variables decrease to varying degrees, with the largest decrease rate reaching 98%. After matching, except for marital status, occupation, region, city level, and GDP per capita, the t-value and p-value of the differences between the two groups of other variables cannot reject the null hypothesis that the difference between the treatment group and the control group is zero, which shows that the PSM method effectively reduces the difference between the treatment group and the control group and passes the balance test.
| Variables               | Match type     | Treatment group | Control type | Error ratio | Ratio of error reduction | Difference t-statistic |
|-------------------------|----------------|-----------------|--------------|-------------|--------------------------|------------------------|
| Leisure time            | Before matching| 2.6993          | 2.6651       | 2.7         | 98.4                     | 2.94**                 |
|                         | After matching | 2.6993          | 2.6999       | −0.0        | 99.4                     | 0.05                   |
| Gender                  | Before matching| 1.3847          | 1.3853       | −0.1        | 998.0                    | 0.15                   |
|                         | After matching | 1.3847          | 1.3772       | 1.5         | 1.60                     | 0.11                   |
| Age                     | Before matching| 2.5792          | 2.6847       | −11.1       | 96.0                     | 12.01***               |
|                         | After matching | 2.5792          | 2.5835       | −0.4        | 96.0                     | 0.48                   |
| Education level         | Before matching| 2.6053          | 2.6793       | −8.3        | 98.7                     | 8.96***                |
|                         | After matching | 2.6053          | 2.6044       | 0.1         | 98.7                     | 0.11                   |
| Marital status          | Before matching| 2.6629          | 2.6551       | 1.0         | 198.2                    | 1.05                   |
|                         | After matching | 2.6629          | 2.686        | 2.9         | 198.2                    | 0.11                   |
| Permanent residence     | Before matching| 1.2786          | 1.281        | 0.5         | 141.1                    | 0.58                   |
|                         | After matching | 1.2786          | 1.2728       | 1.3         | 141.1                    | 0.13                   |
| Occupation              | Before matching| 3.8969          | 3.919        | 0.9         | 133.7                    | 0.96                   |
|                         | After matching | 3.8969          | 3.8453       | 2.1         | 133.7                    | 0.29                   |
| Personal annual income  | Before matching| 3.188           | 3.2846       | 6.8         | 93.4                     | 7.33***                |
|                         | After matching | 3.188           | 3.1944       | 0.4         | 93.4                     | 0.48                   |
| Region                  | Before matching| 2.2076          | 2.2455       | 3.1         | 47.8                     | 3.34***                |
|                         | After matching | 2.2076          | 2.1878       | 1.6         | 47.8                     | 1.66**                 |
| City level              | Before matching| 2.9652          | 3.0021       | 4.0         | 53.1                     | 4.31***                |
|                         | After matching | 2.9652          | 2.9825       | 1.9         | 53.1                     | 1.92**                 |
| GDP per capita          | Before matching| 1.9154          | 1.8673       | 8.3         | 58.9                     | 8.79***                |
|                         | After matching | 1.9154          | 1.8956       | 3.4         | 58.9                     | 3.45***                |
| Industrial structure    | Before matching| 1.6009          | 1.6099       | 0.9         | 65.6                     | 1.00                   |
|                         | After matching | 1.6009          | 1.6158       | 1.6         | 65.6                     | 0.18                   |

*** \( p < 0.01 \), ** \( p < 0.05 \), * \( p < 0.1 \)
To test the reliability of the regression results, based on the research ideas of Cheng (2020), this paper uses the nearest-neighbour matching method to test the reliability of the estimated results for the four leisure time allocation modes. Table 7 shows the estimated results of the procedure for the effects of different leisure time allocation models on individuals’ subjective well-being. The calculation results show that the estimated average treatment effect on the experimental group (ATT), average treatment effect on the control group (ATU) and overall average treatment effect (ATE) of the four leisure time allocation modes are similar and consistent. Although the values are different, they do not affect the relevant conclusions, so it can be stated that the conclusions of this paper are still robust after endogeneity caused by unobservable variables is addressed.

**Robustness Checks**

The subjective well-being item in the questionnaire survey is ordered and discrete data. The answer results differ according to respondents’ personal interpretation, and there could be different valuations for same thing (Xu et al., 2016). For example, consider two respondents, A and B, who have the same perception of their actual well-being, within the category of "relatively happy". Respondent A accurately understands the difference between the various levels in the questionnaire response options and selects the actually perceived level of “relatively happy”. Respondent B chooses “average” in the questionnaire because of ambiguity over the boundary between “relatively happy” and “average” and between “relatively happy” and “happy”. Thus, the “average” subjective well-being response in the questionnaire collection results does not capture true subjective well-being, as the average response should be “relatively happy”, which causes misclassification errors in the data results (Hausman et al., 1998). To avoid errors caused by ambiguities in the internal boundaries of the data, this study reclassifies the explained variables as dichotomous, trichotomous, and quadrant variables. Then, the reclassified sample is again subjected to ordered probit estimation. The specific approach is as follows.

| Table 7 | The processing effect of leisure time allocation model on individual subjective well-being |
|---------|-------------------------------------------------------------------------------------|
| Variables | General | Stationary | Family-Friendly | Sports/Health Care |
| ATT     | 0.038  | -0.060 | -0.012 | 0.028** |
| SD      | 0.013  | 0.014 | 0.014 | 0.013 |
| ATU     | 0.028  | -0.073 | -0.036 | 0.013 |
| SD      | 0.012  | 0.013 | 0.014 | 0.019 |
| ATE     | 0.032  | -0.070 | -0.030 | 0.014* |
| SD      | 0.010  | 0.012 | -0.012 | 0.010 |
| Characteristic variables | Yes | Yes | Yes | Yes |

The number of neighbours in the nearest-neighbour matching is set to 1; *** $p<0.01$, ** $p<0.05$, * $p<0.1$
First, we perform dichotomous variable processing. In model H1, those who answer "very unhappy", "relatively unhappy", and "general" are recorded as 0, and those who answer "very happy" and "relatively happy" are recorded as 1. In model H2, those who answer "very unhappy" or "relatively unhappy" are recorded as 0, and those who answer "fair", "very happy", and "relatively happy" are recorded as 1. Second, we carry out trichotomous variable processing. In model H3, those who answer "very unhappy" or "relatively unhappy" are recorded as 1, "average" is recorded as 2, and those who answer "very happy" and "relatively happy" are recorded as 3. In model H4, the answer "very unhappy" is coded as 1, "less happy" and "average" as 2 and "very happy" and "relatively happy" as 3. In model H5, those who answer "very unhappy" or "relatively unhappy" are recorded as 1, those who answer "average" and "relatively happy" are recorded as 2, and those who answer "very happy" are recorded as 3. Third, quadrant variable processing is performed. In model H6, the answer "very unhappy" is coded as 1, "relatively unhappy" and "average" as 2, "relatively happy" as 3, and "very happy" as 4. In model H7, those who answer "very unhappy" are coded as 1, those who answer "less happy" as 2, those who answer "average" and "relatively happily" as 3, and those who answer "very happy" as 4.

The estimation results are shown in Table 8. The estimation results of models H1, H3, H4, H5, H6, and H7 are consistent with the ordered probit results and are significant at 1%, indicating that there is no measurement error due to choices between two adjacent responses options. That is, when the individual’s true level is "relatively happy", there is no possibility of reporting the level of subjective well-being as "average" or "very unhappy". There is a large difference between the estimation results and the ordered probit results for model H2, which indicates that when the individual’s true level is "average", there is a possibility of reporting the general subjective well-being level as "relatively happy". Generally, there are few sample misclassification errors, and the sample estimation results are reliable.

Heterogeneity Analysis

Taking into account that individuals with different characteristics have differences in their leisure time preferences, their leisure time allocation modes may display significant differences in their impact on the perception of individual well-being. Therefore, this article further discusses effect heterogeneity in relation to individual well-being perception along six dimensions: gender, age, education level, marital status, income level, and region.

Gender and Age

Since the leisure time allocation modes of individuals of different genders and different age groups differently impact the perception of individual subjective well-being, individual respondents were separately analysed by gender and age. The results are shown in Table 9.
Table 8  Estimated results

| Well-being            | Dichotomous variable | Trichotomous variable | Quadrant variable |
|-----------------------|-----------------------|-----------------------|-------------------|
|                       | H1        | H2        | H3        | H4        | H5        | H6        | H7        |
| General               | −0.129*** (0.02)     | 0.099*** (0.028)     | −0.065*** (0.019) | −0.084*** (0.02) | −0.005 (0.02) | −0.075*** (0.018) | 0.001 (0.02) |
| Stationary            | −0.192*** (0.022)    | 0.013 (0.03)         | −0.135*** (0.021) | −0.151*** (0.022) | −0.096*** (0.022) | −0.151*** (0.02) | −0.09*** (0.022) |
| Family-friendly       | −0.12*** (0.022)     | 0.003 (0.03)         | −0.085*** (0.021) | −0.09*** (0.022) | −0.084*** (0.022) | −0.101*** (0.02) | −0.078*** (0.022) |
| Control variables     | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
| N                     | 45,558    | 45,558    | 45,558    | 45,558    | 45,558    | 45,558    | 45,558    |
| Prob > chi2           | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |

*** p < 0.01, ** p < 0.05, * p < 0.1
Compared with men, women are more sensitive and richer in emotional changes (Luo & He, 2014), and differences in the impact on their individual subjective well-being perception of different leisure time allocation modes are more significant than those of men. Regardless of gender, sports/health care-type leisure has the strongest impact on individual well-being, followed by general leisure, family-friendly-type leisure, and stationary-type leisure.

Individuals under the age of 35, who are either still studying or just entering society, are digital natives, with vigorous energy and strong demand for online social interaction (Zhang & Xia, 2014). At the same time, they are well received by the policies of public fitness, and the awareness of the need to maintain a healthy body is strong. Therefore, for this group, sports/health care leisure has the strongest impact on individual subjective well-being, followed by general leisure, family-friendly-type leisure, and stationary-type leisure.

Individuals aged 36–59 are relatively rich in social experience and have a certain social status. They are the mainstay of society and family. They are under tremendous pressure in their social life. In accomplishing their work well and realizing their personal value, they are deeply aware that the body is the mainstay. This group makes full use of every day’s spare time for sports, personal care and other activities. Therefore, the four modes of leisure time allocation have different effects on subjective well-being. Sports/health care leisure has the strongest impact on this group’s individual well-being, followed by general leisure, family-friendly leisure and stationary leisure (Zhang 2017). For individuals over 60 years old, whether they are healthy directly affects their perception of subjective well-being. Therefore, the sports/health care leisure mode significantly affects this group’s subjective well-being (Tao & Li, 2016).

### Table 9 Results of heterogeneity analysis by gender/age

| Well-being          | Male Coefficient | Female Coefficient | Age under 35 Coefficient | Age between 36 and 59 Coefficient | Age over 60 Coefficient |
|---------------------|------------------|--------------------|--------------------------|-----------------------------------|-------------------------|
| General             | −0.039* (0.023)  | −0.078*** (0.028) | 0.02 (0.029)             | −0.108*** (0.024)                 | 0.038 (0.112)           |
| Stationary          | −0.134*** (0.025) | −0.118*** (0.032) | −0.081*** (0.03)        | −0.158*** (0.027)                 | −0.036 (0.129)          |
| Family-friendly     | −0.094*** (0.025) | −0.084*** (0.03)  | −0.043 (0.032)           | −0.135*** (0.025)                 | 0.171 (0.116)           |
| Sports/Health care  |                  |                    |                          |                                   |                         |
| care (benchmark)    |                  |                    |                          |                                   |                         |
| Control variables   | Yes              | Yes                | Yes                      | Yes                               | Yes                     |
| N                   | 28,028           | 17,530             | 20,530                   | 24,220                            | 808                     |
| Prob > chi2         | 0.000            | 0.000              | 0.000                    | 0.000                             | 0.001                   |

*** p < 0.01, ** p < 0.05, * p < 0.1
Since the leisure time allocation modes of individuals with different education levels may display different effects on the perception of individual subjective well-being (Hu 2019; Li, 2020; Wang, 2020), this article divides individuals’ education levels into three groups and performs subsample estimations and analysis. The results are shown in Table 10. Compared with groups with higher education levels, individuals with an education level of junior college and below have obvious differences in the perception of subjective well-being brought about by different leisure time allocation patterns. This may be because the types of work available for them are limited, so their leisure time is sufficient, and there is a larger choice of ways to participate in leisure activities. For individuals with undergraduate and graduate education, the effects of the four modes of leisure time allocation display no significant differences in the improvement of subjective well-being. It is worth noting that the stationary leisure time allocation mode has a 30.6% weaker impact on the subjective well-being of individuals with postgraduate education than the sports/health care leisure mode. This may be due to this group’s busy daily work schedule and serious lack of leisure time (Wu, 2016), so they choose more time-saving stationary-type leisure activities than time-consuming types such as sports/health care and family-friendly-type leisure. The leisure mode can boost their well-being.

### Marital Status

Because there are certain differences in the perception of subjective well-being among individuals with different marital statuses (Mariah et al., 2020; Xu & Chen, 2020), we compare and analyse individuals along this dimension. The results are shown in Table 11. Unmarried people are less fettered by the family, and the freshness of the come-and-go lifestyle can stimulate their perception of well-being. Therefore, we may surmise that the greater their leisure time, the more their perception of
well-being is boosted. For this group, compared with the sports/health care mode, the general leisure mode has a weaker effect on well-being by 8.8%, while the stationary and family-friendly modes have no significant effects on well-being. This is because unmarried individuals have not yet formed their own families and therefore have a weaker perception of housework activities and accompanying family activities. Compared with the married group, the divorced and widowed groups display a significantly lower impact on individual well-being from the general, stationary and family-friendly modes of leisure time allocation.

### Personal Income Level

Because there are significant differences in the effects on perception of subjective well-being of the leisure time allocation modes of individuals with different income levels (Krause, 2013, Li & Chen, 2015), we divide respondents into three subsamples—low income (annual income below 50,000 yuan), middle income (with an annual income of between 50,000 and 120,000 yuan) and high income.
(with an annual income of more than 120,000 yuan)—and carry out a subsample estimation analysis. The results are shown in Table 12. For the low-income group, the sports/health care mode has the most significant impact on the individual’s perception of well-being, and the family-friendly and stationary modes have a weaker effect on the perception of well-being. For the middle-income group, there are significant differences in the impact of different leisure modes on their perceived well-being. Among them, the sports/health care mode is the most significant, and the effects of the family–friendly, general, and stationary modes gradually weaken. This may be related to the greater enjoyment of life after the realization of basic financial freedom (Li & Liao, 2018). For the high-income group, the family–friendly mode has the most significant impact on individual subjective well-being, followed by the sports/health care mode, which may be related to the high-income group having relatively little daily time and cherishing every minute spent with family members (Wang, 2020).

### Regions

Due to the different geographical environments and social cultures in different regions, there are significant differences in the allocation of leisure time and the perception of subjective well-being among individuals in different regions (Xiang et al., 2014). Therefore, following the classification method of the China National Bureau of Statistics, this paper conducts a subsample estimation for residents of the four major regions of China. The results are shown in Table 13. For individuals in the eastern, central and north-eastern regions, there are significant differences in the impact of different leisure time allocation modes on their well-being. The different modes display no obvious differences in impact on the well-being of residents of the western region. This may be due to the lower economic development of the western region and the limited choice of leisure activities for individuals (Jiang et al., 2020; Li, 2008).

| Well-being | East Coefficient | SD | Central Coefficient | SD | West Coefficient | SD | Northeast Coefficient | SD |
|------------|------------------|----|---------------------|----|------------------|----|-----------------------|----|
| General    | 0.064**          | 0.028 | 0.06*              | 0.034 | 0.009           | 0.069 | 0.051                | 0.036 |
| Stationary | 0.141***         | 0.031 | 0.109****          | 0.038 | 0.019           | 0.074 | 0.173***             | 0.039 |
| Family-friendly | 0.091***         | 0.03 | 0.1***              | 0.037 | -0.074          | 0.073 | -0.089**             | 0.039 |

Table 13 Results of heterogeneity analysis by region

| Control variables | East | Central | West | Northeast |
|-------------------|------|---------|------|-----------|
| Control variables | Yes  | Yes     | Yes  | Yes       |
| N                 | 18,713 | 11,191  | 3667 | 11,987    |
| Prob > chi2       | 0.000 | 0.000   | 0.000 | 0.000     |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Conclusions and Recommendations

Conclusions

The development of the social economy has made leisure an indispensable part of daily life in human settlements, and leisure participation has also become a major factor in the subjective well-being of urban residents. In this context, this article studies the impact of leisure time allocation patterns on individuals’ subjective well-being based on statistical data from the 2019 to 2020 Chinese Residents’ Economic Life Survey conducted by the China National Bureau of Statistics, the China Post and China Central Television in 2019. The study findings are as follows.

First, through latent class analysis, it is found that individuals’ allocation of leisure time can be divided among four types of leisure activities: general, stationary, family-friendly and sports/health care-related leisure activities. Second, after we consider endogeneity problems caused by sample selection bias and omitted variables, the empirical analysis shows that there are significant differences in the impact of different leisure time allocation modes on individual subjective well-being. Among them, the effect of the sports/health care mode is the most significant; it helps to improve individual subjective well-being, followed by the general, family-friendly, and stationary modes, which have relatively weak effects on subjective well-being. Third, we introduce the idea of misclassification probability to test the robustness of the results, and the findings remain robust and reliable. Fourth, there are significant differences in the effects on the perception of subjective well-being from the leisure time allocation modes along different dimensions. The analysis of effect heterogeneity by gender, age, education level, marital status, income level and region shows significant differences in the impact of leisure time allocation patterns on the subjective well-being of residents with different socioeconomic and regional characteristics.

Recommendations

First, residents’ daily leisure time should be increased, and residents’ leisure awareness should be enhanced. The number of public days off in China has reached an average of 115 days per year, which is a relatively high level of leisure days in the world. However, the daily leisure time of Chinese residents is only 2.76 h per day, which is in general inadequate. Under the influence of the traditional “work hard and get rich” culture, Chinese residents are keen on work but have little interest in leisure. Therefore, residents’ awareness of the benefits of leisure should be enhanced, and leisure time in daily life should be appropriately increased. The government should strengthen the implementation of the paid leave system, guide and urge state-owned enterprises and large institutions to take the lead in implementing paid leave. Through tax incentives and supervision and punishment, we can effectively promote the thorough implementation of paid leisure. The government should set up a supervision department to strengthen punishment. Increasing the illegal cost of enterprises so that the punishment is greater than the sum of the benefits of enterprises
avoiding vacation and the cost of government supervision. In addition, the government should effectively curb the work overtime culture by formulating laws and other means, implement the eight hour working system, and fully protect employees' leisure rights on working days.

Second, residents should be guided to allocate their leisure time and choose leisure activities rationally. Compared with stationary leisure activities, sports/health care and family–friendly activities can improve individual subjective well-being. Therefore, residents should be encouraged to choose more outdoor leisure activities, participate more in dynamic leisure activities such as sports and fitness activities and outdoor leisure and reduce the time allocated to stationary leisure activities such as watching TV, surfing the Internet, playing on mobile phones, and using WeChat. At the same time, it is advisable to spend more time with family and do more housework. In fact, China is a country where the concept of family is very important, and family well-being affects personal subjective well-being to a large extent (Siu & Shek, 2005). In addition, a good leisure environment should be established in the workplace. Leisure facilities shall be set in the office area, and leisure facilities such as sports and fitness, drinking coffee and listening to music shall be set in the public space of the enterprise to provide a leisure environment for relieving employees' work pressure and improving their physical and mental health.

Third, the government should increase the supply of leisure facilities and arrange them logically based on demographic characteristics. Leisure facilities are necessary for the public to participate in leisure activities. The government should take active measures to increase the numbers of public and commercial leisure facilities in residential areas. Because people with different socioeconomic characteristics display differences in the improvement of subjective well-being brought about by their leisure time allocation, it is necessary to organize leisure facilities in line with people's different characteristics. In urban planning public cultural service places, we should increase financial allocation to build science and technology museums, libraries, public activity centres and sports venues and other public leisure facilities. Around the young residents' communities, tax incentives are adopted to encourage and guide businesses to develop commercial leisure facilities such as movie theatres, opera houses, gyms, natatoriums and entertainment venues. In communities with more elderly residents, public leisure places such as leisure square, fitness square and elderly activity venues should be added.

Fourth, implementing flexible working system and creating a relaxed working environment. Flexible work system can not only effectively improve employee satisfaction and reduce turnover intention, but also effectively improve the market competitiveness of enterprises. Therefore, the government should encourage enterprises to actively explore the implementation of flexible work system. The government should select pilot enterprises in modern service industries such as finance, tourism and culture to explore the implementation of flexible work system. On the basis of ensuring the completion of work tasks, the enterprises carry out flexible work systems such as "4 + 3" or home office according to post characteristics, so as to provide more leisure time options for national peak shifting vacation. At the same time, enterprises should implement family friendly policies. Internally, enterprises can create a harmonious family work environment, and introduce friendly policies such
as off peak commuting, taking care of children’s interests and expanding women’s rights, so as to promote family work balance.

**Strengths and Limitations**

The academic contribution of this research is summarized in the following three points. First, the research paradigm is innovative. This article abandons the traditional method of univariate analysis of leisure behaviour and applies the latent class analysis (LCA) method to conduct a joint analysis of all leisure behaviours of individuals. It then studies the influence of leisure behaviour patterns on individual subjective well-being. Second, we aim to overcome endogeneity bias in the research results, using not only the Heckman two-step method to alleviate sample selection bias but also the propensity score matching method to alleviate inverse causality between subjective well-being and individual leisure behaviour. In addition, reporting errors caused by the subjective attributes of the subjective well-being measure are also taken into account to further eliminate bias in the estimation results. Third, national-level survey data on residents’ leisure behaviour are used. The data come from the 2019–2020 Chinese Residents’ Economic Life Survey jointly led by the China National Bureau of Statistics, the China Post Group and China Central Television (CCTV). The survey covers rich details such as residents’ daily leisure time, leisure behaviour, economic life quality evaluation and demographics. Moreover, the database has more than 100,000 survey respondents, and the survey covers 31 provinces (including municipalities and autonomous regions) and more than 100 prefecture-level cities across China. The number of questionnaires in each survey site was determined by the population density of the place. Each survey questionnaire was administered by two employees of the China National Postal Service and survey staff, fully guaranteeing the validity and accuracy of the questionnaire.

However, some further limitations not discussed above have to be mentioned. First, the sample data used in the research is limited to 2019–2020, so the results of this article can only reflect the recent leisure behavior patterns of Chinese residents and their impact on individual subjective well-being, and there is not enough data to support comparisons in different years. Therefore, it is difficult to derive the dynamic change process of Chinese residents’ leisure behavior patterns and their influence mechanism on residents’ well-being. Secondly, there are no surveys on leisure time of residents with the same or similar survey time, survey caliber, and survey classification standards around the world. Therefore, the survey results in this article cannot be compared with international standards to draw more general and targeted conclusions.

**Acknowledgements** His study was conducted as a part of the Project “Program for the China Post Doctoral Science Foundation (Number: 2020M672216) and Program for General topics in the 13th five year plan of Educational Science in Henan Province (Number: 2020YB0182)” The authors thank the editor and reviewer for insightful comments and suggestions.

**Funding** This research received no external funding.
Declarations

Conflict of Interest  The author declares no conflict of interest.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

References

Andreja, B., Marina, M., & Iva, S. (2011). Quality of life and leisure activities: How do leisure activities contribute to subjective well-being? Social Indicators Research, 102(1), 81–91.
Argyle, M. (1996). Subjective well-being. In A. Offer (Ed.), In pursuit of the quality of life (pp. 18–45). Oxford University Press.
Becker, G. S. (1965). A theory of the allocation of time. The Economic Journal, 75(299), 493–517. https://doi.org/10.2307/2228949
Bergman, L. R. and Lundh, L. G., Introduction: The person-oriented approach: Roots and roads to the future. Journal for Person-Oriented Research, 2015,1(1–2): 1–6. https://doi.org/10.17505/jpor.2015.01.
Bloom, J. D., Rantanen, J., Tement, S., et al. (2018). Longitudinal leisure activity profiles and their associations with recovery experiences and job performance. Leisure Sciences, 4(3), 151–173.
Brajša-žganec A, Merkaš M, Sverko I. (2011). Quality of life and leisure activities: How do leisure activities contribute to subjective well-being? Social Indicators Research.102(1): 81-91. https://doi.org/10.1007/s11205-010-9724-2
Cai, Y. Q.(2015). "Freelancers” topped the list of "The Happiest Occupations". World of Labor and Social Security,(34),45–46.
Chen, Z. Y., & Yu, P.(2015). The effect of physical exercise on the subjective well-being of college students: the mediating effect of peer relationships. Journal of Capital Institute of Physical Education, 27(02),165–171.
Cheng, Z. Q. (2020). Can exercise habits bring higher income? Southern Economy, 7, 121–140.
Covan, E. K. (2017). Gender, mental health, and subjective well-being. Health Care for Women International, 38(2), 73–74.
Csikszentmihalyi, M., & Hunter, J. (2003). Subjective well-being in everyday life: The uses of experience sampling. Journal of Subjective Well-Being Studies, 4(2), 185–199. https://doi.org/10.1007/978-94-017-9088-8_6
Deleire, T., & Kalil, A.(2010). Does consumption buy subjective well-being? Evidence from the United States. International Review of Economics, 57(2),163–176. https://doi.org/10.1007/s12323-010-0093-6.
Dolan, P., & Peasgood, T. (2008). White M . Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. Journal of Economic Psychology,29(1),94–122. https://doi.org/10.1016/j.joep.2007.09.001.
Dunn, A. L., Andersen, R. E., & Jakicic, J. M. (1998). Lifestyle physical activity interventions. American Journal of Preventive Medicine, 15(4), 398–412.
Fan, E. (2015). Freelancers have reached the “peak” of subjective well-being. Xiaokang, 21, 56.
Frey, B. S., & Alois, S. . (2010). Happiness, economy and institutions. Economic Journal.(466), 918-938. https://doi.org/10.1111/j.1468-0297.2007.00570
Gronau, R.(1980). HomEconomics and Statistics,62(3),408–416. https://doi.org/10.2307/1927108.
Grossi, E., Sacco, P. L., Blessi, G. T., et al. (2011). The impact of culture on the individual subjective well-being of the Italian population: an exploratory study. *Applied Research in Quality of Life, 6*(4), 387–410. https://doi.org/10.1007/s11482-010-9135-1

Hausman, J. A., Abrevaya, J., & Scott-Morton, FM. (1998). Misclassification of a dependent variable in a discrete response setting. *Journal of Econometrics, 87*(2), 239–269. http://www.archive.org/details/misclassificatio

Henderson, K. A., Hodges, S., & Kivel, B. D. (2002). Context and dialogue in research on women and leisure. *Journal of Leisure Research, 34*(3), 253–271. https://doi.org/10.1080/00222216.2002.1194971

Hils, P., & Argyle, M. (1998). Positive moods derived from leisure and their relationship to subjective well-being and personality. *Personality and Individual Differences, 25*, 523–535. https://doi.org/10.1016/S0191-8869(98)00082-8

Hu, H., & bing., & Gao, N. N. (2019). Educational level and residents’ well-being: Direct effect and mediating effect. *Educational Research, 40*(11), 111–123.

Hu, X., Barber, L.K., & Santuzzi, A.M. (2021). Does active leisure improve worker well-being? An experimental daily diary approach. *Journal of Happiness Studies, 22*, 2003–2029. https://doi.org/10.1007/s10902-020-00305-w

Jackson, E. L. (2000). Will research on leisure constraints still be relevant in the Twenty-first Century? *Journal of Leisure Research, 32*(1), 62–68.

Jiang, M. Y., Gao, C., & Liu, S. (2020). A Study on the Impact of In-depth Leisure on Subjective Well-being—A Case Study of Urban Residents in Southern Jiangsu. *Jiangsu Business Forum,(04)*, 56–60. https://doi.org/10.13395/j.cnki.1009-0061.2020.04.017

Jiang, J., Qin, M., Ke, Y. N., et al. (2011). Leisure activities and subjective well-being. *Tourism Tribune, 09*, 74–78.

Kim, Byungook. (2009). A Conceptual Framework for Leisure and Subjective Well-being, PhD dissertation, Indiana University. https://doi.org/10.1080/15980634.2010.11434627

Korpela, K., & Kinnunen, U. (2010). How is leisure time interacting with nature related to the need for recovery from work demands? testing multiple mediators. *Leisure Sciences, 33*(1), 1–14. https://doi.org/10.1080/01490400.2011.533103

Krause, A. (2013). Don’t worry, be happy? Subjective well-being and reemployment. *Journal of Economic Behavior & Organization, 96*(12), 1–20.

Kuykendall, L., Tay, L., & Ng, V. (2015). Leisure engagement and subjective well-being: A meta-analysis. *Psychological Bulletin, 141*(2), 364–403. https://doi.org/10.1037/a0038508

Lee, K. J., Cho, S., & Kim, E. K. (2020). Do more leisure time and leisure repertoire make us happier? An investigation of the curvilinear relationships. *Journal of Subjective Well-Being Studies, 21*, 1727–1747.

Leuty, M. E., Hansen, J. I. C., & Speaks, S. Z. (2015). Vocational and leisure interests: a profile-level approach to examining interests. *Journal of Career Assessment, 24*(2), 1–25.

Li, M. W. (2020). The Subjective Well-being of College Students and the Effectiveness of Moral Education. *Education Teaching Forum, (43)*, 56–57.

Li, M. Z. (2009). Leisure and tourism in the changing China. *World Leisure Journal, 51*(4), 229–236.

Li, Z. Y. (2008). Inter-provincial differences in the subjective well-being index of urban residents—An empirical analysis of urban residents’ statistical data in 12 provinces (regions, cities) in coastal areas. *Social Science Research,(03)*, 41–48.

Li, S., & Chen, G. (2015). The employment effect of subjective well-being: An empirical study on subjective well-being, employment and hidden reemployment. *Economic Research,(3)*.

Li, F., & Liao, H. J. (2018). Leisure, Income and Urban Residents’ Well-being: Evidence from the Tracking Survey of Chinese Households. *Population and Economy, 226*(01), 103–115.

Liu, L. P. (2015). Research on the influence of regional economic differences on the subjective well-being of rural labor force. *Journal of Anhui University of Technology (social Science Edition), 32*(03), 3–7.

Liu, H. M., & Jia, S. Z. (2020). Why does leisure define oneself? ——Leisure and Individual, Social and Cultural Identity. *Journal of Zhejiang University (Humanities and Social Sciences Edition), 50*(1), 194–203.

Ljunge, M. (2016). Migrants, health, and subjective well-being: Evidence that health assessments travel with migrants and predict well-being. *Economics and Human Biology, 22*(9), 35–46.
Lloyd, K., & Auld, C. (2002). The Role of Leisure in Determining Quality of Life: Issues of Content and Measurement. *Social Indicators Research: An International and Interdisciplinary Journal for Quality-of-Life Measurement*, 57(1), 43–71.

Long, J. Z., & Wang, S. (2013). In-depth leisure and subjective well-being: Based on the localization of the Chinese elderly population. *Tourism Tribune*, 28(2), 77–85.

Lu, M., Wang, Y. L., & Pan, H., et al. (2008). Government Intervention and Entrepreneur Satisfaction: An Empirical Study Based on Liuzhou, Guangxi. *Management World*, (7), 116–125. https://doi.org/10.19744/j.cnki.11-1235/f.2008.07.013.

Lubke, G., & Muthén, B. O. (2007). Performance of factor mixture models as a function of model size, covariate effects, and class-specific parameters. *Structural Equation Modeling: A Multidisciplinary Journal*, 14(1), 26–47. https://doi.org/10.1080/10705510709336735.

Luo, C. L. (2006). Urban-rural division, employment status and subjective well-being difference. *Science of Social Science, (1)*, 67–72.

Luo, Z. H. (2020). The effect and mechanism analysis of education level on residents' subjective well-being. *Shandong University*. https://doi.org/10.27272/d.cnki.gshdu.2020.001735.

Luo, X., & He, T. (2014). Research on the relationship between subjective well-being and self-identity of college students. *Journal of Southwest Jiaotong University (social Science Edition)*, 15(04), 67–72.

Mariah, F., Purol, Victor, N., & Keller (2020). Loved and lost or never loved at all? Lifelong marital histories and their links with subjective well-being. *The Journal of Positive Psychology*. https://doi.org/10.1080/17439760.2020.1791946.

Masyn, K. E. (2013). Latent class analysis and finite mixture modeling. In T. D. Little, ed., *Oxford Handbooks of Quantitative Methods*, vol. 2, 551–610. New York: Oxford University Press.

Matallana, M., López-Martínez, M., & Riquelme, P. (2020). Measurement of quality of life in spanish regions. *Applied Research in Quality of Life*. https://doi.org/10.1007/s11482-020-09870-x.

Newman, D. B., Tay, L., & Diener, E. (2014). Leisure and Subjective Well-Being: A Model of Psychological Mechanisms as Mediating Factors. *Journal of Subjective well-being Studies*, 15(3), 555–578. https://doi.org/10.1007/s10902-013-9435-x.

Noll, H. H., & Weick, S. (2015). Consumption expenditures and subjective well-being: empirical evidence from Germany. *International Review of Economics*, 62(2), 101–119. https://doi.org/10.1007/s12232-014-0219-3.

Oh, C. O., Lyu, S. O., & Hammitt, W. E. (2012). Predictive linkages between recreation specialization and place attachment. *Journal of Leisure Research*, 44(1), 70–87. https://doi.org/10.1080/00222216.2012.11950255.

Passmore, A., & French, D. (2001). Development and administration of a measure to assess adolescents’ participation in leisure activities. *Adolescence*, 36(141), 67–75.

Paul, R., Rosenbaum, D., & B. (1983). RUBIN The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41–55.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55. https://doi.org/10.1093/biomet/70.1.41.

Sabatini, F. (2014). The relationship between subjective well-being and health: Evidence from Italy. *Social Science & Medicine*, 114(4), 178–187.

Schmiedeburg, C., & Schröder, J. (2017). Leisure activities and life satisfaction: An analysis with German panel data. *Applied Research in Quality of Life*, 12, 137–151. https://doi.org/10.1007/s11482-016-9458-7.

Schulz, P., Schulte, J., Raube, S., Disouky, H., & Kandler, C. (2018). The role of leisure interest and engagement for subjective well-being. *Journal of Subjective Well-Being Studies*, 19(4), 1135–1150. https://doi.org/10.1007/s11482-016-9458-7.

Scott, D., & Willits, & Fern, K. (1998). Adolescent and adult leisure patterns: A reassessment. *Journal of Leisure Research*, 30(3), 319–330. https://doi.org/10.1080/00222216.1998.11949835.

Siu, A., & Shek, D. (2005). Relations between social problem solving and indicators of interpersonal and family well-being among Chinese adolescents in Hong Kong. *Social Indicators Research*, 71(1–3), 517–539. https://doi.org/10.1007/s11205-004-8034-y.

Song, R. (2014). Time, income, leisure and life satisfaction: An empirical study based on structural equation model. *Finance and Trade Economics*, 35(6), 100–110.

Song, R. (2018). Leisure is the source of subjective well-being—how is it possible? *Finance Think Tank*, 14(02), 95–107+145.
Song, R., & Jin, Z. (2015). Leisure and Subjective Well-being: A Review of Western Studies. Journal of Hangzhou Normal University: Social Sciences Edition, 6, 112–118.

Staempfli, M. B. (2007). Adolescent playfulness, stress perception, coping and well-being. Journal of Leisure Research, 39(3), 393–412. https://doi.org/10.1080/00222216.2007.11950114.

Steepe, A., & Bolton, J. (1988). The short-term influence of high and low intensity physical exercise on mood. Psychology & Health, 2(2), 91–106. https://doi.org/10.1080/08870448808400346

Stock, W. A., Okun, M. A., & Benin, M. (1986). Structure of subjective well-being among the elderly. Psychology and Aging, 1(1), 91–102.

Tao, T., & Li, L. (2016). The leisure time arrangement of the urban elderly and its impact on health. Journal of Demography, 58(03), 58–66.

Todd, K. R., Lawrason, S., Shaw, R. B., Wirtz, D., & Ginis, K. (2020). Physical activity interventions, chronic pain, and subjective well-being among persons with spinal cord injury: A systematic scoping review. Spinal Cord, 59(2), 93–104. https://doi.org/10.1038/s41393-020-00550-z

Wang, H. (2020). Analysis of the impact of education level and income level on residents’ well-being——An empirical study based on CGSS2015 data. Classics of Taste, 07, 32–33.

Wang, J., & Stringer, L. (2000). Impact of Taoism on Chinese leisure. World Leisure, 3, 33–41. https://doi.org/10.1080/04419057.2000.9674194

Wang, M., & Wong, M. C. S. (2010). Leisure and subjective well-being in the United States: evidence from survey data. Applied Economics Letters, 18(18), 1813–1816.

Wang, M. C., Deng, Q. W., & Bi, X. Y. (2017). The performance of classification accuracy index Entropy in latent profile analysis: A Monte Carlo simulation study. Acta Psychology, 11, 121–130.

Wang, Y. (2000). Informatization and the Age of Civilization and Leisure. Learning and Exploration, 06, 74–78.

Wei, X., & Fan, H. (2013). Survey of Chinese Family Leisure Time Utilization and Social Problems. Leisure Philosophy Professional Committee of Chinese Society of Dialectics of Nature (Preparation), 59–72. https://kns.cnki.net/kcms/detail/detail.aspx?FileName=ZRBZ2013080010077&DdbName=CFPD2014

Wei, X., Huang, S., Stodolska, M., & Yu, Y. (2015). Leisure time, leisure activities, and subjective well-being in China: Evidence from a national survey. Journal of Leisure Research, 47(5), 556–576.

Wei, X., & Pang, S. M. (2012). Leisure effect and endogenous growth: an analysis based on data from China and Sweden. Quantitative and Technical Economic Research, 1, 34–49.

Wei, X., Wang, P. F., & Ruan, Y. H. (2014). A large sample comparative study of national leisure behavior in Beijing, Shanghai and Guangzhou. Beijing, China Leisure Research, 75–94.

Wu, W. J. (2016). The impact of working hours on professional well-being: An empirical analysis based on three typical occupations. China Industrial Economics, 3, 130–145.

Xia, J. C., Xu, Z. Y., & Wang, P. F. (2021). The influence mechanism of leisure time allocation on individual creativity and the policy suggestions. China Business and Market., 35(8), 93–102.

Xu, F. Z., & Chen, J. W. (2020). Research on the influence of marital status on subjective well-being. Northwest Population, 41(01), 53–62.

Xu, L. L., Gong, G., & Ai, C. R. (2016). Subjective well-being, make money or spend money? Financial Research, 42(6), 17–26.

Xu, L. L., Zhou, Y. H., & Xu, L. L. (2017). Did you choose the right way of leisure?——Based on the research of subjective well-being. Journal of Shanghai University of Finance and Economics: Philosophy and Social Sciences Edition, 6, 46–59.

Yang, C. C. (2006). Evaluating latent class analysis models in qualitative phenotype identification. Computational Statistics & Data Analysis, 50(4), 1090–1104. https://doi.org/10.1016/j.csda.2004.11.004

Ye, C. S., & Feng, H. X. (2014). Are cities a happy "besieged city"? An explanation based on CGSS data for the paradox of Chinese urban and rural subjective well-being. China Population-Resources and Environment, 24(6), 16–21.

Yoshida, Y., Iwasa, H., Ishioka, Y., & Suzukamo, Y. (2021). Leisure activity moderates the relationship between living alone and mental health among Japanese older adults. Geriatrics and Gerontology International. https://doi.org/10.1111/ggi.14151

GB Yu MJ Sirgy M Bosnjak 2020 The effects of holiday leisure travel on subjective well-being: The moderating role of experience sharing Journal of Travel Research

Zhang, T. J., & Wan, G. H. (2020). Unequal opportunity, social capital and farmers’ subjective well-being: An empirical analysis based on CGSS data. Journal of Shanghai University of Finance and Economics, 22(5), 94–108.

Zhang, Y. X., & Xia, J. (2014). The mobile digital life of post-90s. People’s Daily, 14th edition, June 05.
Zhang, Q. L., & Zhou, Y. M. (2017). The relationship between work and well-being of the young retired elderly in urban China. *Chinese Journal of Psychology, 49*(4), 472–481.

Zhou, H. F., Li, Z. S., Xue, D. Q., et al. (2012). Time use patterns between maintenance, subsistence and leisure activities: a case study in China. *Social Indicators Research, 105*(1), 121–136. https://doi.org/10.1007/s11205-010-9768-3

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Authors and Affiliations**

Pengfei Wang¹,² · Xiang Wei³,⁴ · Xu Yingwei⁵ · Cao Xiaodan¹

Pengfei Wang
wangpengfeigscass@126.com

Xu Yingwei
ywxu@ucass.edu.cn

Cao Xiaodan
1158395246@qq.com

¹ Luoyang Normal University, 6# of Jiqing Road, Yibin District, Luoyang 471934, China

² Henan University, North section of Jinming Avenue, Longting District, Kaifeng 475004, China

³ National Academy of Economic Strategy, Chinese Academy of Social Sciences, 1# Dongchang Hutong, Wangfujing Street, Dongcheng District, Beijing 100006, China

⁴ National School of Development, Peking University, Beijing, China

⁵ Department of Recreation, Park & Tourism Sciences, Texas A&M University, TAMU 2261, College Station, TX 77843, USA