The Impact of Marriage on the Developmental Trajectory of Life Satisfaction in Early Adulthood: A Ten-Year Longitudinal Study Based on CFPS

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Abstract

Does marriage alter the developmental trajectory of individuals' life satisfaction? This is both a major issue concerning national harmony and stability, and an important question regarding individual quality of life. Based on hedonic adaptation theory and the buffer model, this study utilizes six-wave longitudinal data from the China Family Panel Studies (2010–2020) and employs propensity score matching and linear mixed models to examine the effect of marriage on the developmental trajectory of life satisfaction during emerging adulthood (ages 18–29) and its heterogeneity across age stages. The findings reveal: 1) Overall, the life satisfaction of the event group increased significantly and remained stable in the long term. 2) The impact of marriage on life satisfaction varies by age stage: for ages 18–21, marriage failed to enhance life satisfaction; for ages 22–25, life satisfaction increased initially then declined after marriage; for ages 26–29, it increased as the wedding approached and remained stable after marriage. Further mediation analysis indicates that marriage may jointly shape individuals' life satisfaction trajectories by enhancing positive affect and buffering negative symptoms. This study challenges the traditional hedonic adaptation theory's view of rapid adaptation, reveals the relatively enduring positive effects of marriage on life satisfaction, and provides new evidence for understanding the mechanisms linking marital timing and life satisfaction.

Full Text

The Impact of Marriage on Life Satisfaction Trajectories During Early Adulthood: A Ten-Year Longitudinal Study Based on CFPS

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Abstract

Does marriage alter individuals' developmental trajectories of life satisfaction? This question bears profound implications for both national harmony and individual quality of life. Grounded in hedonic adaptation theory and the buffering model, this study examined the impact of marriage on life satisfaction trajectories during emerging adulthood (ages 18–29) and its age-stage heterogeneity, using six waves of longitudinal data from the China Family Panel Studies (2010–2020) and employing propensity score matching and linear mixed models. The findings revealed: (1) Overall, the married group exhibited significant and lasting improvements in life satisfaction. (2) The effect of marriage on life satisfaction varied by age stage: for ages 18–21, marriage failed to enhance life satisfaction; for ages 22–25, life satisfaction increased initially then declined after marriage; for ages 26–29, satisfaction rose as marriage approached and remained stable thereafter. Further mediation analyses indicated that marriage may shape individuals' life satisfaction trajectories by both enhancing positive affect and buffering negative symptoms. This study challenges the traditional hedonic adaptation perspective of rapid adaptation, revealing the relatively enduring positive impact of marriage on life satisfaction, and provides new evidence for understanding the mechanisms linking marital timing and life satisfaction.

Keywords: Marital Status Transition, Life Satisfaction, Emerging Adulthood, Longitudinal Study, Propensity Score Matching

In human societies, the establishment of marital relationships often brings positive impacts to multiple aspects of individuals' lives. Compared with unmarried individuals, married individuals exhibit better physical health (Fincham et al., 2010; Robards et al, 2012; Xiao et al., 2024) and higher psychological well-being (Grundström et al., 2021; Pinquart, 2003; Soulsby & Bennett, 2015; Wrzus et al., 2013). These findings suggest that marriage may lead to long-term improvements in life satisfaction. However, whether the enhancement of life satisfaction from marriage is long-term or temporary, and whether marriage itself can even improve life satisfaction, remains controversial (Lucas et al., 2003; Grover et al., 2019). This controversy may stem from both sociocultural differences and the fact that some studies have not considered life satisfaction during the unmarried state or overlooked its dynamic changes across the life cycle and social transitions. Although previous research has examined age-stage heterogeneity in marital events, such studies have primarily focused on non-normative

groups (e.g., child marriage and late-life marriage) (Carr et al., 2020; Fakhari et al., 2020; Siddiqi et al., 2022), while rarely exploring age-stage heterogeneity among young adults—the group where marriage occurs most frequently. For young people, when is marriage most beneficial for life satisfaction? Do different marriage ages produce different trajectories of life satisfaction change? And why? These questions remain unanswered. Therefore, based on large-scale longitudinal data from the China Family Panel Studies (CFPS) and from the perspectives of hedonic adaptation theory and the buffering model, this study employs propensity score matching to construct a reliable control group and further establishes linear mixed models to explore the impact of marriage on life satisfaction trajectories during early adulthood and its age-stage heterogeneity, as well as the potential mechanisms underlying these changes.

1.1 The Relationship Between Marriage and Life Satisfaction

Life satisfaction is influenced by various life events (Luhmann et al., 2012). As a key life event, marriage is widely considered an important factor affecting individual life satisfaction. The unique intimacy and happiness brought by marital relationships are generally believed to significantly impact life satisfaction (Gómez-López et al., 2019). However, longitudinal studies based on different samples from multiple countries have yielded divergent conclusions regarding marriage's impact on life satisfaction. Some research indicates that individuals typically experience an initial boost in life satisfaction after marriage, but this enhancement often gradually returns to pre-marital baseline levels within two (or even three) years post-marriage (Clark et al., 2008; Clark & Georgellis., 2012; Hudde et al., 2023; Lucas, 2003; Luhmann, 2012). Other studies have found that after a certain adaptation period, marriage can maintain life satisfaction at levels higher than the pre-marital baseline (Grover et al., 2019; Kim, 2011; Lee, 2021). Additionally, a few studies have even found that marriage events had no significant impact on life satisfaction in either the short or long term (Denissen et al., 2019). These discrepancies may originate from the sociocultural attributes of marriage. Different sociocultural contexts shape distinct marital meanings and functions: in individualistic cultures (e.g., Europe and America), people prioritize romantic relationships and personal experiences in marriage, whereas in collectivist cultures (e.g., China), individuals emphasize not only personal happiness but also cultural factors such as family responsibility division and role expectations (Diener et al., 2000; Dion & Dion, 1993; Schimmack et al., 2009), which may lead to different patterns of life satisfaction change after marriage. Beyond the moderating role of group and cultural background, the impact of marriage on life satisfaction also varies significantly due to individual characteristics. Numerous studies have shown that not all individuals can gain life satisfaction improvements from marriage; individual characteristics such as gender and age play important moderating roles in this relationship (Chipperfield & Havens, 2001; Gattig & Minkus, 2021; Næss et al., 2015; Stanley et al., 2012). In summary, the relationship between marriage and life satisfaction must be discussed within specific cultural contexts, and this in-

fluence demonstrates significant heterogeneity under the moderation of various factors including gender and age.

Theoretically, marriage may affect individual life satisfaction through two core mechanisms (see Figure 1 [Figure 1: see original paper]). Classic hedonic adaptation theory posits that when people experience major positive events such as marriage or promotion, life satisfaction typically undergoes a process of rapid initial increase followed by gradual return to pre-event baseline levels (Brickman & Campbell, 1971; Frederick & Loewenstein, 1999). This theory emphasizes that the process is primarily driven by positive emotional responses triggered by marriage (such as pleasure and satisfaction), with positive affect playing a crucial mediating role (Diener et al., 2018; Lyubomirsky, 2010). Empirical research suggests that this "hedonic adaptation" or "honeymoon effect" is generally considered a window period of approximately two years, with relatively short duration (Armenta et al., 2014; Lucas et al., 2003; Lucas & Clark, 2006; Luhmann et al., 2012). However, from a longer-term perspective, the continuous and stable support provided by marital relationships is equally important. The buffering model of social support posits that social support can mitigate the negative impact of stressful events on individuals' physical and mental states when they face pressure, and helps maintain and enhance physical and mental health (Cobb, 1976; Cohen & Wills, 1985). As an important form of social support (Fincham et al., 2010), the stable support provided by marriage can effectively offset the accumulating pressures and negative emotions during adulthood, thereby maintaining higher levels of life satisfaction over longer time scales. This social support buffering mechanism may be particularly pronounced in collectivist cultures like China that emphasize family connections and social relationships (Goodwin & Cramer, 2000; Fang, 2018). Compared to the brief and prominent peak in life satisfaction brought by hedonic adaptation, this buffering mechanism's maintenance effect on life satisfaction may be more implicit and less noticeable, embedded in comparisons with unmarried individuals: compared to married individuals, unmarried individuals lack stable partner support long-term and may face the risk of gradually declining life satisfaction (Adams et al., 2016; Holt-Lunstad et al., 2008). Moreover, from a temporal dimension, this effect may gradually strengthen with the duration of marriage: as marriage length increases, spousal support factors (such as tolerance and trust) may become more stable and profound (Bell & Harsin, 2018; Pavlenko & Krasnikova, 2024), making the buffering effect more pronounced.

In summary, the improvement in life satisfaction brought by marriage may be more apparent and stable, likely involving a dual-stage, dual-pathway mechanism (as shown in Figure 1): during the initial post-marriage period (approximately 0–2 years), life satisfaction improvement is dominated by the hedonic adaptation pathway (mediated by positive affect); during the long-term post-marriage stage (approximately >2 years), life satisfaction is primarily maintained or enhanced through the social support buffering pathway (alleviating negative symptoms). Based on this, the present study proposes:

H1: Overall, marriage can improve individuals' life satisfaction.
H2: Marriage can improve individuals' life satisfaction by increasing positive affect and alleviating negative symptoms.

1.2 The Influence of Age Stage on Marriage and Life Satisfaction

While marriage likely promotes increased life satisfaction, this increase is simultaneously influenced by age stage. De Vries et al. (1996) demonstrated that differential reactions to specific life events may be related to individuals' age. Biological maturation and social norms jointly shape a developmental timetable, wherein certain developmentally appropriate tasks exist at specific periods. The degree of match between these tasks and physiological maturation or social expectations may differentially impact life satisfaction or well-being (Heckhausen et al., 2010; Hutteman et al., 2014). Luhmann et al. (2012) found in their meta-analysis that age moderates the effect of marriage on well-being enhancement in both prospective and retrospective studies, with older individuals potentially experiencing more significant well-being gains from marriage.

In recent years, "emerging adulthood" has received widespread scholarly attention. Emerging adulthood typically refers to the transitional period between adolescence and full adulthood, spanning ages 18 to 29 (Arnett, 2000; Arnett et al., 2014). This stage is characterized by high life uncertainty and volatility, with identity exploration as its core feature, as individuals gradually achieve decision-making autonomy and financial independence while moving toward intimate relationship establishment (Arnett & Schwab, 2012). During emerging adulthood, individuals exhibit stage-specific differences in both psychosocial and neurophysiological development, which may further moderate marriage's enhancement of life satisfaction. From a psychosocial perspective, individuals aged 18–21 typically possess a lower sense of "adulthood," but as they progress to mid-stage (22–25 years) and late-stage (26–29 years), their self-identification as "adult" gradually strengthens (Arnett & Schwab, 2012; Tillman et al., 2019). Higher adult identity and identity commitment imply greater dedication, responsibility, and willingness to invest in relationships, which predict higher marital life satisfaction (Barry et al., 2009; Piotrowski et al., 2020). Meanwhile, patterns of social support in intimate relationships also shift across stages: early-stage support relies primarily on friends, mid-stage shifts toward parental support, and overall commitment levels increase accordingly (Rodrigues et al., 2017). Beyond social and psychological factors, physiological and neuroscientific research has similarly confirmed stage-specific differences during emerging adulthood: during ages 18–21, the structure and function of the prefrontal cortex are not yet fully mature, resulting in relatively weaker abilities in cognitive regulation and emotional control, making individuals more susceptible to situational or event interference; during ages 22–25, network connections between the prefrontal cortex and other brain regions gradually strengthen, with significant improvements in executive function and impulse inhibition; entering ages 26–29, the plasticity and stability of the prefrontal cortex reach a balance, with individuals' capac-

ities for risk decision-making and emotional response maturing (Cohen et al., 2016; Icenogle et al., 2021; Rudolph et al., 2017). These stage differences not only affect basic executive functions but also profoundly influence emotion regulation, decision-making risk preferences, and interpersonal adaptation, thereby affecting how marriage enhances life satisfaction.

In summary, given the obvious stage-specific heterogeneity in psychosocial and physiological characteristics related to marriage during emerging adulthood—these characteristics are still developing in early-stage (18–21 years), gradually maturing in mid-stage (22–25 years), and reaching completion and stability in late-stage (26–29 years)—features at different stages may influence marriage's enhancement of life satisfaction. Based on this, the present study proposes the following hypotheses:

H3: In early emerging adulthood (18–21 years), marriage cannot improve individuals' life satisfaction.
H4: In mid-stage (22–25 years) and late-stage (26–29 years) emerging adulthood, marriage can significantly improve individuals' life satisfaction.

Building upon this, the present study will not only verify the impact of marriage on life satisfaction and the dual mediation mechanisms of enhancing positive affect and alleviating negative symptoms but also deeply explore the differential performance of these mechanisms across different stages of emerging adulthood.

1.3 Methodological Issues and Improvements in Research Paradigms

Based on the theoretical framework of current research, this study makes the following methodological considerations to more accurately measure the true impact of marriage events on life satisfaction. Previous longitudinal studies on marriage and life satisfaction have mostly been limited to married individuals, examining changes by comparing their pre- and post-marriage life satisfaction (Luhmann et al., 2012). However, this approach of self-comparison before and after the event based solely on married individuals has two major limitations. The first limitation is that it ignores the possibility that the continuous "unmarried" state may also affect life satisfaction. The life satisfaction change obtained from pre-post comparison among married individuals (ΔLS_{marriage}) does not represent the true effect; the true life satisfaction change (ΔLS_{true}) should equal the difference between the effect of marriage on life satisfaction (ΔLS_{marriage}) and the effect of being unmarried on life satisfaction (ΔLS_{unmarried}):

ΔLS_{true} = ΔLS_{marriage} − ΔLS_{unmarried}

ΔLS_{marriage} = LS_{post}-marriage − LS_{pre}-marriage, representing the difference in life satisfaction before and after marriage in the married group. ΔLS_{unmarried} = LS_{later} − LS_{earlier}, representing the difference in life satisfaction during the same period in the unmarried control group.

Therefore, when discussing the true impact of marriage on individual life satisfac-

tion, one should not only compare with one's own pre-event life satisfaction but also, from the perspective of social support and individual development, compare with a counterfactual group that remains continuously unmarried. The second limitation is the failure to distinguish life satisfaction changes related to marriage from natural fluctuations over time. Previous research has found that major social or political events, as well as political, economic, and cultural developments and changes over time, may interfere with observed longitudinal changes (Diener et al., 2003; Helliwell, 2003). A meta-analysis based on Chinese populations showed a significant linear upward trend in Chinese people's happiness from 2001 to 2019 (Cai et al., 2023). Additionally, repeated exposure to the same questions may cause people to change their responses over time (Baird et al., 2010; Choquette & Hesselbrock, 1987). Based on these two limitations from previous research, this study attempts to use propensity score matching to establish a counterfactual control group that remains "unmarried," and after eliminating time-varying life satisfaction errors through matching, comprehensively compares life satisfaction changes before and after marriage and between the married and control groups.

Propensity Score Matching (PSM) is a technique used to control for pre-existing confounding differences in observational studies, commonly employed to simulate counterfactual scenarios and infer causal relationships (Shadish et al., 2002; Stuart, 2010). It calculates propensity scores based on a series of covariates related to the likelihood of event occurrence and matches individuals from the control group with similar background characteristics. This study's PSM includes two dimensions: demographic characteristics and temporal features. First, married and unmarried individuals differ in many demographic and sociological characteristics that existed before marriage, such as age and education level (Bramlett & Mosher, 2002). Therefore, to ensure the control group possesses similar baseline characteristics to the event group, this study referenced Deng and Xiang (2023) in selecting demographic matching covariates. Second, to achieve matching on temporal characteristics, this study referenced Buecker et al. (2021) in precisely matching individuals' survey start year, end year, survey wave, and age. This design has three advantages. First, it creates a comparable time scale and grafts the marriage time point of married individuals onto matched unmarried controls, simulating the possible trajectory of life satisfaction while individuals remain in an "unmarried" state. Second, it ensures consistency in the effects of age stages and major social events on both the event and control groups. Third, it ensures the stability of matching variables' predictive power for marriage, as socioeconomic indicators related to income may vary in their ability to predict marital status across different years (Li et al., 2022).

1.4 The Present Study

In summary, this study aims to explore the true impact of marriage on individual life satisfaction from the perspectives of hedonic adaptation theory and

the buffering model, based on ten years of longitudinal data from the China Family Panel Studies, addressing some limitations and controversies in previous research. Using propensity score matching to construct reliable event and control groups, this study employs linear mixed models to examine the specific effects of marriage on life satisfaction trajectories among emerging adults, further investigates heterogeneity across different stages and genders, and explores potential mechanisms behind these trends through mediation models, providing new empirical evidence for understanding marriage's impact on life satisfaction and aiming to promote improvements in individual and societal life satisfaction.

2.1 Data Source

This study utilized data from the China Family Panel Studies (CFPS), a large-scale social tracking survey project organized and implemented by the Institute of Social Science Survey at Peking University. CFPS is a nationally representative longitudinal survey that began in 2010 and is conducted every two years. The project employs a multi-stage, implicit stratification, and probability proportionate to size sampling method to select samples from 25 provinces, autonomous regions, and municipalities across China, with a target sample size of 16,000 households, covering approximately 95% of the national population (excluding Hong Kong, Macao, and Taiwan), thereby ensuring national representativeness (Xie et al., 2014). This study used six waves of tracking data from 2010 to 2020, starting from a total of 38,468 tracking samples. After screening for marital status, the study obtained 1,603 event samples and 5,778 control samples; see Appendix Figure S14 for the specific screening process.

2.2 Measures

Large-scale tracking surveys both domestically and internationally commonly use single-item questionnaires to measure life satisfaction, such as the German Socio-Economic Panel Study, the British Household Panel Survey, and the China Family Panel Studies. In large-scale longitudinal research, single-item life satisfaction measures have demonstrated good reliability and validity (Cheung & Lucas, 2014; Lucas & Donnellan, 2012) and have been widely applied in social psychological studies of major life events (Rohrer et al., 2018; Stern et al., 2024; Willroth et al., 2021). In CFPS, the subjective question regarding life satisfaction is: "Overall, how satisfied are you with your current life situation?" (1–5, where 1 = very dissatisfied and 5 = very satisfied), representing an individual's level of life satisfaction.

Marital status was obtained from self-reports: "What is your current marital status?" (1–5, where 1 = never married, 2 = married/with spouse, 3 = cohabiting, 4 = divorced, 5 = widowed). This study conducted further data cleaning based on the above marital status. After excluding all individuals who ever reported "divorced" or "widowed," and referencing the approaches of DeMaris and Oates (2022) and Hu et al. (2024), marital status was dichotomized, with

individuals reporting "never married" or "cohabiting" and other non-formal marital statuses uniformly classified as "unmarried." In this study, the married sample included individuals who experienced marriage during the survey period and subsequently remained continuously "married," while the control group included individuals who remained continuously "unmarried" throughout the entire survey cycle. Additionally, this study precisely constructed "marriage age" and "marital event timeline" in months based on the difference between each participant's birth year/month, survey participation year/month, and reported marriage year/month. For example, if an individual reported a birth year/month of January 1990, married in January 2016, and participated in surveys in June 2014 and June 2016, then the individual's "marriage age" was 26 years old, and the two measurement time points corresponded to -19 months and +5 months on the "marital event timeline."

Demographic variables included gender, age, education level, personal income, subjective health status, and employment status. Gender was coded categorically: 0 = female, 1 = male. Education level was measured by the item: "Years of education completed by the individual questionnaire respondent." Personal income refers to the total amount of income obtained by an individual within a specific year. Subjective health status was obtained from self-reports: "How do you rate your current health status?" (1 = very healthy, 2 = healthy, 3 = relatively healthy, 4 = average, 5 = unhealthy). Employment status was obtained from self-reports: "Do you currently have a job?" (0 = no, 1 = yes).

Positive affect and negative symptoms were adapted from two independent dimensions of the Center for Epidemiological Studies Depression Scale (CES-D). In CFPS data, some years used the CES-D 8-item scale to measure depressive symptoms, which asks respondents to report the frequency of various feelings or behaviors during the past week (1 = rarely (less than one day), 2 = sometimes (1–2 days), 3 = often (3–4 days), 4 = most of the time (5–7 days)). Research has shown that the CES-D 8-item scale includes two dimensions: positive affect reflecting individuals' positive emotional experiences (when not reverse-scored), and negative symptoms reflecting individuals' negative emotional experiences and related physical discomfort symptoms (Bi et al., 2023; Liu et al., 2023; Radloff, 1977). This study further verified the reliability of this two-factor structure through confirmatory factor analysis (CFA), with results showing good model fit (CFI = 0.981; RMSEA = 0.043; TLI = 0.972; SRMR = 0.021). In this scale, the positive affect dimension includes two items: "I feel happy" and "I enjoy life"; the negative symptoms dimension includes six items: "I feel depressed," "I feel sad," "I feel lonely," "I feel that everything is an effort," "My sleep is restless," and "I feel that life cannot go on." In this study, the internal consistency coefficients (Cronbach's α) for positive affect and negative symptoms were 0.75 and 0.69, respectively.

2.3 Statistical Analysis

The statistical analysis tool for this study was R (Version 4.3.1). First, the study used the MatchIt package (Version 4.5.5) for propensity score matching. Second, the lme4 package (Version 1.1–35.1) and lmerTest package (Version 3.1–3) were used for multilevel analysis, and the mgcv package (Version 1.8–42) was used to construct generalized additive models (GAM) for the average trajectory of life satisfaction and for visualization modeling. Then, the boot package (Version 1.3–28.1) was used for a series of mediation tests. Finally, the Evalue package (Version 4.1.3) was used for sensitivity analysis.

2.3.1 Propensity Score Matching

The study employed 1:1 nearest neighbor matching without replacement, with the maximum allowable difference between matched pairs set at 0.2 (caliper = 0.2). Matching variables included two categories: demographic characteristic variables and time-related characteristic variables. Specifically, referencing Deng and Xiang (2023), the study selected the first measurement values of variables such as gender, age, income, education level, physical health status, and employment status as demographic matching covariates to predict marriage events. To facilitate subsequent exploration of age and gender heterogeneity, age and gender were set as exact matching variables. Additionally, referencing Buecker et al. (2021), the study matched individuals' total number of survey participations, first survey year, and last survey year, all set as exact matching variables.

2.3.2 Linear Mixed Models

Based on the propensity score matching results, the study constructed three types of linear mixed models: Model A was used to estimate overall level differences in life satisfaction before and after marriage; Model B was used to assess immediate changes in the year of marriage; Model C was used to fit temporal trends in life satisfaction before and after marriage. Model C was used to fit the dynamic trajectory of life satisfaction before and after marriage, for which both linear and non-linear alternative models with quadratic terms were constructed, and the model with better goodness-of-fit was selected for reporting. All models compared random intercept models with random intercept–random slope models, with the final model determined through chi-square deviation tests and information criteria (AIC, BIC). The models primarily focused on interaction terms between time variables and group variables, which indicate the net effect of marriage events on life satisfaction trajectories. Since baseline characteristics were matched, differences in life satisfaction between the event and control groups can be attributed to the effect of marriage (Buecker et al., 2021). Detailed information on variable coding and model settings can be found in the Appendix.

2.3.3 Mediation Analysis

To test the mechanisms through which marriage events affect life satisfaction, this study used the bootstrap method (5,000 resamples) to separately evaluate the mediating effects of positive affect and negative symptoms (Preacher & Hayes, 2008), with marital status as the independent variable, life satisfaction as the dependent variable, positive affect and negative symptoms as parallel mediators, and gender and age as control variables. The significance of mediating effects was tested by calculating the estimated coefficients and 95% confidence intervals.

3. Results and Analysis

After propensity score matching, the sample sizes of the event and control groups at each age stage are shown in Table 1 . The balance improvement levels for each variable after matching in the overall emerging adulthood period are shown in Table 2 . More information on subgroup sample sizes and matching details can be found in the Appendix (Tables S5–S28, Figures S2–S13).

Table 1 Sample Sizes of Event and Control Groups After Propensity Score Matching

Age Group	18–29 years	18–21 years	22–25 years	26–29 years
Matched samples				
Unmatched samples				

Note: This study used 1:1 matching, where each event sample has a unique matched control sample.

Table 2 Balance Improvement Levels for Each Variable After Propensity Score Matching in Emerging Adulthood (18–29 years)

Variable	Event Group Mean	Control Group Mean	Standardized Mean Difference
Distance			

Note: When evaluating covariate balance after propensity score matching, standardized mean difference (SMD) is commonly used. SMD < 0.1 indicates good covariate balance; SMD < 0.25 is considered acceptable matching balance (Harder et al., 2010; Stuart, 2013). "Gender" is coded 0 = female, 1 = male; the mean for gender represents the proportion of males in the total sample.

3.1.1 Overall Emerging Adulthood (18–29 years)

Linear mixed model results are shown in Table 3 , with average trajectories displayed in Figure 2 [Figure 2: see original paper] (the following presents key

predictor information from the models; complete coefficients and confidence intervals can be found in Supplementary Tables S29–S33; effect sizes and CIs are in Table S35).

Marriage significantly improved life satisfaction overall: both the baseline change by group (b12) and event year by group (b13) interactions were significant, indicating that the event group showed improvements in life satisfaction both in the marriage year and overall post-marriage. Furthermore, the linear and quadratic expectancy by group interactions (b14–b15) suggested a non-linear upward trend in pre-marriage satisfaction. Gender-stratified analyses showed that overall post-marriage improvement was significant and similar in magnitude for both men and women (Table 7 , b10); however, only men showed a significant immediate increase in the marriage year (b13), with men displaying linear pre-marriage improvement (b14) while women showed linear post-marriage improvement (b16).

Table 3 Changes in Life Satisfaction Before and After Marriage for Emerging Adults (18–29 years)

Parameter	Overall	Male	Female
Intercept (b0)	3.450*	3.265*	3.585*
Test effect (b1)	3.513*	3.271*	3.561*
Baseline change × Group (b12)	3.089*	2.801*	3.330*
Event year × Group (b13)	0.039*	0.069*	0.032*
Linear expectancy × Group (b14)	0.065*	0.122*	0.152*
Quadratic expectancy × Group (b15)	0.075*	0.249*	0.280*
Linear reaction × Group (b16)	0.213*	0.225*	0.301*
Quadratic reaction × Group (b17)	0.092*	0.095*	0.010*

Note: Statistically significant fixed effects ($p < 0.05$) are marked with asterisks (), marginally significant fixed effects ($0.05 < p < 0.1$) with (+). Significant random effects are marked with (#). Gender: 0 = female, 1 = male; Group: 0 = control, 1 = event.*

Figure 2 Trends in life satisfaction before and after marriage for individuals aged 18–29. From left to right: overall (not stratified by gender), male, and female trends. Green (solid bold) lines represent the model-estimated average trajectory for the event group, red (dashed bold) lines represent the model-estimated average trajectory for the control group, and shaded areas around bold lines represent 95% confidence intervals for average trajectories.

3.1.2 Early Emerging Adulthood (18–21 years)

Corresponding model results are shown in Table 4 , with trajectories displayed in Figure 3 [Figure 3: see original paper]. In the early stage, marriage did not bring significant life satisfaction improvement: neither the baseline change by

group (b12) nor the event year by group (b13) interactions were significant. The linear and quadratic reaction by group interactions (b16–b17) were significant, showing some non-linear change trends after marriage. No significant gender differences were observed in life satisfaction changes (Table 7, b10), and all key interaction terms across the three models were non-significant.

Table 4 Changes in Life Satisfaction Before and After Marriage for Individuals Aged 18–21

Parameter	Overall	Male	Female
Intercept (b0)	3.466*	3.242*	3.523*
Test effect (b1)	3.545*	3.247*	3.496*
Baseline change × Group (b12)	2.889*	2.812*	3.084*
Event year × Group (b13)	0.099*	0.160*	0.187+
Linear expectancy × Group (b14)	0.264*	0.238*	0.174*
Quadratic expectancy × Group (b15)	-0.020		
Linear reaction × Group (b16)	-0.162+		
Quadratic reaction × Group (b17)	0.023*		

Note: Statistically significant fixed effects ($p < 0.05$) are marked with asterisks (), marginally significant fixed effects ($0.05 < p < 0.1$) with (+). Significant random effects are marked with (#). Gender: 0 = female, 1 = male; Group: 0 = control, 1 = event.*

Figure 3 Trends in life satisfaction before and after marriage for individuals aged 18–21. From left to right: overall (not stratified by gender), male, and female trends. Green (solid bold) lines represent the model-estimated average trajectory for the event group, red (dashed bold) lines represent the model-estimated average trajectory for the control group, and shaded areas around bold lines represent 95% confidence intervals for average trajectories.

3.1.3 Mid-Stage Emerging Adulthood (22–25 years)

Model results are shown in Table 5 , with trajectories displayed in Figure 4 [Figure 4: see original paper]. In the mid-stage, both the baseline change by group (b12) and event year by group (b13) interactions were significant, indicating that the event group showed improvements in life satisfaction both in the marriage year and overall post-marriage. Meanwhile, the linear and quadratic reaction by group interactions (b16–b17) were significant, suggesting some non-linear change trends in life satisfaction after marriage. Gender-subgroup results showed that both men and women experienced significant post-marriage life satisfaction improvement (b12) with no difference in magnitude (Table 7 , b10); only men showed a significant immediate increase in the marriage year (b13), and both genders exhibited non-linear change trends after marriage (b16–b17).

Table 5 Changes in Life Satisfaction Before and After Marriage for Individuals Aged 22–25

Parameter	Overall	Male	Female
Intercept (b0)	3.490*	3.314*	3.602*
Test effect (b1)	3.519*	3.316*	3.624*
Baseline change × Group (b12)	3.031*	2.764*	3.330*
Event year × Group (b13)	0.040*	0.064*	0.036*
Linear expectancy × Group (b14)	0.072*	0.131*	0.192*
Quadratic expectancy × Group (b15)	0.067*	0.317*	0.260*
Linear reaction × Group (b16)	0.331*	0.292*	0.290*
Quadratic reaction × Group (b17)	0.105*	0.164*	-0.014*

Note: Statistically significant fixed effects ($p < 0.05$) are marked with asterisks (), marginally significant fixed effects ($0.05 < p < 0.1$) with (+). Significant random effects are marked with (#). Gender: 0 = female, 1 = male; Group: 0 = control, 1 = event.*

Figure 4 Trends in life satisfaction before and after marriage for individuals aged 22–25. From left to right: overall (not stratified by gender), male, and female trends. Green (solid bold) lines represent the model-estimated average trajectory for the event group, red (dashed bold) lines represent the model-estimated average trajectory for the control group, and shaded areas around bold lines represent 95% confidence intervals for average trajectories.

3.1.4 Late-Stage Emerging Adulthood (26–29 years)

Model results are shown in Table 6 , with trajectories displayed in Figure 5 [Figure 5: see original paper]. In the late stage, both the baseline change by group (b12) and event year by group (b13) interactions remained significant, indicating that the event group in this stage also showed improvements in life satisfaction both in the marriage year and overall post-marriage. The linear and quadratic expectancy by group interactions (b16–b17) were both significant, suggesting a non-linear upward trend in pre-marriage satisfaction. Further gender-subgroup analysis revealed that men did not show significant post-marriage life satisfaction improvement, while women showed significant improvement both overall post-marriage and in the marriage year (b12, b13), with a clear non-linear upward trend before marriage (b16–b17). Additionally, the magnitude of improvement between genders did not reach statistical significance (Table 7 , b10).

Table 6 Changes in Life Satisfaction Before and After Marriage for Individuals Aged 26–29

Parameter	Overall	Male	Female
Intercept (b0)	3.439*	3.228*	3.499*
Test effect (b1)	3.469*	3.251*	3.406*
Baseline change × Group (b12)	3.034*	2.933*	3.198*
Event year × Group (b13)	0.058*	0.084*	0.054*
Linear expectancy × Group (b14)	0.076*	0.134*	0.139*
Quadratic expectancy × Group (b15)	0.078+	0.235*	0.335*
Linear reaction × Group (b16)	0.321*	0.438+	0.179*
Quadratic reaction × Group (b17)	0.165+	0.020*	0.018+

Note: Statistically significant fixed effects ($p < 0.05$) are marked with asterisks (), marginally significant fixed effects ($0.05 < p < 0.1$) with (+). Significant random effects are marked with (#). Gender: 0 = female, 1 = male; Group: 0 = control, 1 = event.*

Figure 5 Trends in life satisfaction before and after marriage for individuals aged 26–29. From left to right: overall (not stratified by gender), male, and female trends. Green (solid bold) lines represent the model-estimated average trajectory for the event group, red (dashed bold) lines represent the model-estimated average trajectory for the control group, and shaded areas around bold lines represent 95% confidence intervals for average trajectories.

Table 7 Gender Differences in Baseline Change in Non-Gender-Stratified Matching

Parameter	18–29 years	18–21 years	22–25 years	26–29 years
Intercept (b0)	3.553*	3.511*	3.561*	3.528*
Test effect (b1)	0.039*	0.096*	0.041*	0.041*
Gender × Group (b9)	0.225*			
Baseline change × Group × Gender (b10)				

Note: Statistically significant fixed effects ($p < 0.05$) are marked with asterisks (), marginally significant fixed effects ($0.05 < p < 0.1$) with (+). Gender: 0 = female, 1 = male.*

3.2 Mediation Test Results

To systematically examine the mediating mechanisms of marriage–life satisfaction trajectories in emerging adulthood, this study further investigated the mediating roles of positive affect and negative symptoms in two time windows: "the full time period" and "the first two years after marriage versus more than two years after marriage." The results are presented in Table 8 .

Overall (ages 18–29), both positive affect and negative symptom pathways were significant and coexisted stably over the long term, with the path coefficient for

negative symptoms being slightly higher than that for positive affect. The mediating mechanisms showed clear heterogeneous characteristics across different age stages (see last column of Table 8): in early emerging adulthood (18–21 years), neither mediating path was significant, indicating that the promotion mechanism of marriage on life satisfaction had not yet effectively formed in this stage; in mid-stage emerging adulthood (22–25 years), a significant dual-pathway dynamic transition characteristic was observed, where the first two years after marriage mainly relied on positive affect enhancement, while after two years it shifted to relying on negative symptom buffering; in late-stage emerging adulthood (26–29 years), a single-pathway long-term stable characteristic was observed, primarily relying on marriage's buffering effect on negative symptoms to maintain stable life satisfaction.

Table 8 Mediation Path Tests for Each Emerging Adulthood Stage in the Two Years Before and After Event Occurrence

Stage	First Two Years After Marriage	More Than Two Years After Marriage	Mechanism Pattern
	Positive Affect (+)	Negative Symptoms (-)	Positive Affect (+)
18–29 years	0.016** [0.005,0.027]	0.017* [0.000,0.038]	0.024*** [0.008,0.044]
18–21 years	0.023* [0.004,0.048]	0.036** [0.013,0.064]	[-0.014,0.041]
22–25 years	0.018* [0.003,0.035]	0.038* [0.008,0.076]	[-0.005,0.036]
26–29 years	[-0.005,0.040]	0.045** [0.015,0.082]	[-0.012,0.028]

Note: "First two years after marriage" refers to time points within 24 months (inclusive) after the marriage time point; "More than two years after marriage" refers to data more than 24 months after the marriage time point. Mediation analysis includes observation data from both the event and control groups. + $p < 0.1$, $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Based on CFPS's nationally representative sample, this study estimated marriage–life satisfaction change trajectories for emerging adult groups and revealed the mediating mechanisms of positive affect and negative symptoms. The results intuitively demonstrate the positive significance of marriage as a major life event for individual life satisfaction, while also indicating that marital effects exhibit heterogeneity across different gender and age subgroups.

4.1 Life Satisfaction Change Trajectories Surrounding Marriage Events

Results based on emerging adult groups show that marriage events significantly improved individuals' life satisfaction, and this improvement demonstrated certain stability over time. The results support hypothesis H1: marriage can improve individual life satisfaction. Specifically, as shown in Figure 2, the event group's life satisfaction trajectory gradually improved as the marriage date approached, representing the anticipatory effect of marriage on life satisfaction, which reflects individuals' positive expectations and psychological preparation for married life before marriage, consistent with previous research findings (Clark et al., 2012; Lucas et al., 2003). After experiencing pre-marriage improvement, the event group's life satisfaction level did not show significant adaptive decline. This relatively stable dynamic trajectory corresponds with mediation results (Table 8): by enhancing positive affect and alleviating negative symptoms, marriage provides continuous support for life satisfaction, and this effect persists even more than two years after marriage, thereby verifying hypothesis H2: marriage can improve individual life satisfaction by increasing positive affect and alleviating negative symptoms.

This finding goes beyond traditional hedonic adaptation theory's prediction of rapid decline in life satisfaction during early marriage (Figure 1, mediation pathway 1). Specifically, marriage's promotion of life satisfaction through enhanced positive affect did not weaken as quickly as theoretically expected; moreover, marriage's long-term maintenance of life satisfaction may rely to a greater extent on its continuous alleviation of negative symptoms (Table 8). These phenomena may be closely related to collectivist cultural backgrounds: compared to the individualistic marital view in Europe and America that emphasizes emotional fulfillment and personal experience, collectivist culture endows marriage with more social functions, concerning not only individual emotional connection but also family responsibility and economic cooperation (Diener et al., 2000; Dion & Dion, 1993; Schimmack et al., 2009). In collectivist cultures, marriage is often embedded in broader kinship and social networks: marriage not only strengthens emotional bonds between spouses but also increases interaction frequency with original families and relatives, providing diverse social sources for positive affect, which may enable life satisfaction to benefit continuously (Fang, 2018; van de Vijver & Arends-Tóth, 2008). Meanwhile, continuous spousal interaction and economic cooperation (Finkel, 2014) help alleviate accumulated negative emotions after marriage, while integration into partners' relatives and social circles (Ferreira, 2021; Oh, 2014) further expands social support networks. These marital characteristics may be further amplified in collectivist contexts, thereby consolidating marriage's enduring protective effect on life satisfaction.

Regarding gender differences, the overall post-marriage life satisfaction improvement level in emerging adulthood showed no significant difference between genders, consistent with previous research findings (Boyce et al., 2016; Liu et al., 2013; Næss et al., 2015). However, specific trajectories showed some differences:

men displayed anticipatory improvement as marriage approached before marriage, while women's improvement occurred gradually after marriage. This may relate to gender differences in intimate relationship needs: men more easily obtain emotional support and stress relief from romantic relationships before marriage, while women tend to satisfy psychological needs through deeper emotional investment and commitment after marriage (Le & Agnew, 2003; Simon & Barrett, 2010; Stronge et al., 2019).

4.2 Age-Stage Heterogeneity in Marriage–Life Satisfaction Trajectories and Their Mediating Mechanisms

Marriage in early emerging adulthood (18–21 years) did not significantly improve life satisfaction (Figure 2), supporting hypothesis H3, and neither positive affect nor negative symptoms showed significant mediating effects (Table 8). This may stem from the immaturity of identity and sense of adulthood in this stage (Arnett & Schwab, 2012; Kroger, 2010), which can easily lead to marital interaction disharmony and spousal conflict (Stets et al., 2005). Additionally, early-stage individuals are mostly in the education phase, with unstable economic and social roles, making it difficult for marriage to stimulate positive emotions or sufficiently buffer negative emotions (Luo et al., 2020). Physiologically, the prefrontal cortex of 18–21-year-olds is not yet fully mature, resulting in insufficient cognitive regulation and emotional control abilities, making them more susceptible to external interference (Cohen et al., 2016; Rudolph et al., 2017), which exacerbates adaptation difficulties in marital role transitions and interactions, thereby limiting their ability to benefit from marriage. In short, before individuals achieve psychological and physiological maturity, they find it difficult to effectively stimulate and maintain positive affect in marriage while also being insufficiently equipped to resist life stress, resulting in marriage having no significant impact on their life satisfaction.

In mid-stage emerging adulthood (22–25 years), individuals' life satisfaction significantly improved after marriage (supporting hypothesis H4), showing a "rise-then-decline" developmental trajectory (Figure 4). Based on theoretical and mediation test results (Figure 1, Table 8), we can reasonably speculate that the mechanism of marriage's effect on life satisfaction underwent a transition from hedonic adaptation to social support buffering: the initial stage was mainly characterized by surging positive affect, followed by a shift to alleviating negative symptoms. Specifically, as individuals gradually matured psychosocially and physiologically, the marriage event significantly improved life satisfaction for this stage. In the first two years after marriage, individuals more easily experienced intimacy and pleasure, thereby generating strong positive affect that rapidly enhanced life satisfaction (Diener et al., 2006; Diener et al., 2018; Lyubomirsky, 2010). Especially compared to late-stage emerging adulthood, mid-stage individuals (before age 25) are in a period of peak hormone secretion and high neural plasticity, more likely to produce stronger passionate experiences in intimate relationships (Fisher, 2004; Reis et al., 2014). Subsequently,

as time after marriage progressed, work, economic, and role pressures gradually emerged, negative emotions began to accumulate, and the stable social support provided by marriage effectively reduced the negative impact of negative symptoms on life satisfaction. Therefore, after two years of marriage, the mediating effect of alleviating negative symptoms gradually became prominent, indicating that marriage played a key protective role in helping individuals adapt to long-term pressures during this stage.

In late-stage emerging adulthood (26–29 years), marriage significantly improved individuals' life satisfaction, supporting hypothesis H4. Individuals experienced anticipatory improvement in life satisfaction before marriage and maintained a relatively stable developmental trajectory after marriage (Figure 5). Mediation analysis results (Table 8) showed that whether within the first two years or after two years of marriage, life satisfaction improvement mainly relied on alleviating negative symptoms (Figure 1, mediation pathway 2), while the mediating effect of positive affect was not significant. This finding may demonstrate that life satisfaction improvement in late-stage emerging adulthood individuals relies more on marriage support's alleviation of negative affect rather than enhancement of positive affect. Generally, higher marriage age (especially after age 27) is often associated with longer pre-marriage courtship, which not only promotes deeper understanding and emotional stability between partners but also enhances life experience and emotional maturity, thereby correlating with higher marital success rates and happiness (Impicciatore, 2020; Johnson, 2017). Additionally, as age increases and "social clock" pressure becomes apparent, individuals gradually shift from focusing on emotional matching to more rational, realistic choices in mate selection (Ji, 2015). This shift in mate selection strategy may weaken post-marriage emotional surge effects, but substantive social support may provide more guarantees for maintaining high life satisfaction. In short, the trajectory for late-stage emerging adulthood also showed some gender differences: women displayed anticipatory effects before marriage and maintained stability after marriage, while men showed no significant improvement or temporal change trends. This phenomenon may relate to changes in primary developmental tasks and differences in responsibility allocation at this age: individuals aged 26 and above gradually shift from pursuing intimacy to focusing on career development, social contribution, and economic foundation building (McAdams et al., 1993). Coupled with traditional Chinese gender roles that view men as primary family breadwinners, requiring them to bear greater economic pressure and responsibility (Malone et al., 2016; Qing, 2020), this may suppress further improvements in post-marriage life satisfaction for this age group.

In summary, the impact of marriage on life satisfaction shows clear stage-specific differences across different emerging adulthood stages. In the 18–21 age stage, due to immature psychological, physiological, and social roles, marriage brings no significant gains; the 22–25 age stage achieves short-term peaks and adaptation through initial positive affect stimulation and later negative symptom buffering; while the 26–29 age stage primarily relies on stable marital support

to achieve anticipatory pre-marriage improvement and lasting post-marriage maintenance, with some gender differences also emerging.

4.3 Research Limitations and Future Directions

This study provides new evidence for exploring the impact of marriage on life satisfaction at different ages during emerging adulthood, but several limitations remain. First, although the longitudinal data from CFPS is representative and propensity score matching has advantages in controlling initial differences, some potential omitted variables have not been included due to limitations in large-scale social science survey design. To address this potential limitation, this study conducted E-value sensitivity analysis (VanderWeele & Ding, 2017): the main effect E-values (and their 95% CI lower bounds) for the overall, mid-stage, and late-stage groups were 1.88 (1.62), 2.05 (1.72), and 1.80 (1.26), respectively (see Appendix Table S34 for details). This indicates that only when an unmeasured confounding factor is associated with both marriage and life satisfaction at risk ratios no lower than these E-values could the main effects be fully explained by confounding. Second, life satisfaction was measured with a single item, which, although widely used and proven to have certain reliability and validity in large-scale social psychology research (Lucas & Donnellan, 2012; Stern et al., 2024), may be more sensitive to measurement context and less able to comprehensively reflect the multidimensional characteristics of life satisfaction compared to multi-item scales.

Future research could combine intensive longitudinal tracking methods with more comprehensive, multidimensional life satisfaction measures to further reveal trajectory development and mechanism evolution, and incorporate elements such as marital quality and biological genetic characteristics to further improve understanding of the relationship between marriage and life satisfaction.

Based on CFPS's nationally representative sample, this study used counterfactual analysis and multiple linear mixed models to deeply explore the impact of marriage on life satisfaction and its potential mechanisms in the Chinese social context. The study found: (1) Marriage events significantly improved individuals' life satisfaction by enhancing positive affect and reducing negative symptoms, maintaining it at a high level long-term after marriage, exceeding hedonic adaptation theory's expectation of rapid decline; (2) Different emerging adulthood stages showed obvious differences: early-stage (18–21 years) individuals showed no significant marital effect due to immature physiological and social development; mid-stage (22–25 years) individuals showed anticipatory improvement before marriage, gradually stabilizing under stable marital support after experiencing peak adaptive changes, with mechanism transition in marriage's effect on life satisfaction; late-stage (26–29 years) individuals showed anticipatory improvement before marriage and mainly relied on alleviating negative symptoms to maintain stability after marriage; (3) Although overall post-marriage life satisfaction improvement showed no significant gender difference, developmental trajectories exhibited gender heterogeneity: men showed anticipatory

improvement before marriage due to emotional support, while women gradually obtained emotional satisfaction mainly after marriage. This study not only enriches theoretical perspectives on marriage's impact on life satisfaction but also provides new evidence for understanding the dual mechanisms of marital effects across different age contexts.

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