Temporal Changes in Time Management Disposition among Mainland Chinese University Students: 1999–2020

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Abstract

According to Social Ecological Systems Theory, the diachronic system and macrosystem may play a significant role in the development of individual time management disposition. However, indirect evidence suggests that the developmental trend of Chinese college students' time management disposition remains unclear, and relevant research lacks a macrosocial perspective. To address this limitation, we employed cross-temporal meta-analysis to examine 215 studies using the Adolescent Time Management Disposition Inventory (ATMDI) between 1999 and 2020 (N = 103,876). The results indicated: (1) The overall level of Chinese college students' time management disposition exhibited a slow declining trend, with time value sense remaining stable while time monitoring view and time efficacy sense showed declining trends; (2) Seven social indicators from socioeconomic factors (GDP, household consumption level, urbanization rate), employment factors (urban registered unemployment rate, number of regular higher education graduates), and internet-related factors (internet penetration rate, weekly internet usage time per netizen) significantly predicted the decline in college students' time management disposition; (3) No significant differences were observed in Chinese college students' time management disposition across gender or university location. These findings provide empirical support for the temporal changes in Chinese college students' time management disposition and expand the influence mechanism model of college students' time management disposition from a social macrosystem perspective.

Full Text

Cross-temporal Changes in Time Management Disposition Among Mainland Chinese College Students: 1999–2020

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Abstract

Drawing on socio-ecological systems theory, both diachronic systems and macrosystems may play crucial roles in the development of individuals' time management disposition. However, indirect evidence suggests that the developmental trend of Chinese college students' time management disposition remains unclear, and existing research lacks a macro-social perspective. To address these limitations, this study employed cross-temporal meta-analysis to examine 215 studies (N = 103,876) using the Adolescence Time Management Disposition Inventory (ATMDI) published between 1999 and 2020. The results revealed: (1) Chinese college students' time management disposition has declined slowly overall, with time value remaining stable while time monitoring and time efficacy showed decreasing trends; (2) Seven social indicators—socioeconomic factors (GDP, household consumption level, urbanization rate), employment factors (urban registered unemployment rate, number of college graduates), and internet factors (internet penetration rate, weekly internet usage hours)—significantly predicted the decline in college students' time management disposition; (3) No significant gender or regional differences were found in Chinese college students' time management disposition. These findings provide evidence for temporal changes in Chinese college students' time management disposition and broaden the understanding of its influencing mechanisms from a macro-social perspective.

Keywords: time management disposition, college students, Adolescence Time Management Disposition Inventory, cross-temporal meta-analysis, social change

The Southern Song Dynasty general Yue Fei captured the relentless passage of time in his famous verse: "Do not idly waste your youth, lest you regret in vain when your hair turns white." Similarly, President Xi Jinping reminds young people to "seize the day and live up to their prime" in the swift current of time. Today, rapid growth in productivity and the economy has provided increasingly abundant resources, yet time remains the one resource that cannot be created or altered. The significance of time has become incomparable to monetary value, and the national-level construction of "time civilization" relies on the promotion of individual time management. Thus, time management is a timeless topic. Time management disposition refers to a relatively stable personality tendency formed through the process of managing time, encompassing psychological and behavioral characteristics in how individuals approach the function and value of time and how they utilize it. It comprises three dimensions: time value, time monitoring, and time efficacy (Huang & Zhang, 2001). Higher time management disposition indicates greater affirmation of time's value, stronger awareness and ability to monitor time in daily life, and greater confidence in one's time management capabilities.

College students are at a critical period of personal growth and development. However, during this moratorium period, they frequently face time management dilemmas, as evidenced by common laments such as "I'm busy every day but don't know what I'm busy with" and widespread procrastination. A social survey of Chinese college students revealed that 78.4% of respondents reported feeling they had been busy without purpose, mostly juggling between club activities, internships, and academic work (China Youth Daily, 2017). Time management disposition profoundly influences adolescents' psychological and social adaptation (Claessens et al., 2007; Yang et al., 2015). Research has shown that time management disposition positively correlates with college students' academic performance (Zhang et al., 2018), learning engagement (Huang et al., 2017), and subjective well-being (Fan et al., 2012), while negatively correlating with problematic behaviors such as academic procrastination (Zhao et al., 2021) and problematic mobile phone use (Li et al., 2020). Therefore, examining the development of time management disposition among college students holds significant practical importance.

1.1 Temporal Changes in Time Management Disposition Among Mainland Chinese College Students

Since World War II, global social environments and cultures have entered a period of accelerated transformation. The inherent nature of time and advances in communication technology have led to unprecedented levels of time pressure worldwide (Rosa, 2013). Against this backdrop of increasingly prominent time pressure, how has the time management disposition of Chinese college students changed? Since Huang and Zhang (2001) summarized the theoretical connotations of time management disposition and developed the Adolescence Time Management Disposition Inventory, research on this topic among Chinese college students has grown exponentially. Entering the new century, China has experienced unprecedented social changes, accompanied by transformations in Chinese culture and psychology (Cai et al., 2020). Previous studies have found that Chinese college students' personality traits change over time (Tian et al., 2017), and as time management disposition is also a personality characteristic (Chen & Zheng, 2011; Huang & Zhang, 2001), it may similarly be influenced by temporal changes. On one hand, research indicates that conscientiousness among Chinese college students has increased over time, with more meticulous behavior (Tian et al., 2017; Peng & Luo, 2021). College students with high conscientiousness possess strong self-control abilities and time allocation awareness, leading to higher time management disposition (Li et al., 2020). Additionally, China's time orientation has gradually shifted from a "static-past" to a "dynamic-future" orientation (Lu, 2009), and college students with future time orientation typically exhibit stronger delay of gratification and self-planning abilities, resulting in higher time management disposition (Wei & Yuan, 2021). From this perspective, with the enhancement of conscientiousness and future time orientation, Chinese college students' time management disposition should show an upward trend.

On the other hand, economic growth and its associated employment pressures and increasing involvement in the online world have intensified time pressure among contemporary college students (Chen, 2016), while perceived time pressure reduces individuals' sense of time control (Qi et al., 2014) and serves as a risk factor for college students' time management disposition (Deng & Chen, 2005). From this viewpoint, with rising time pressure, Chinese college students' time management disposition should show a downward trend.

Thus, the developmental trend of Chinese college students' time management disposition remains unclear. While enhanced individual internal qualities related to time management promote it, increasing external interference and time pressure weaken it. However, no research has examined temporal trends in time management disposition at the group level. This study therefore aims to clarify the changing trend of mainland Chinese college students' time management disposition from 1999 to 2020 from a meta-analytic perspective, providing preliminary answers to this question.

1.2 The Influence of Social Factors on Time Management Disposition Among Mainland Chinese College Students

Bronfenbrenner's (1979) ecological systems theory divides the ecosystem affecting individual psychological development into microsystems, mesosystems, exosystems, macrosystems, and chronosystems. However, existing research on Chinese adolescents' and college students' time management disposition has primarily focused on individual qualities and family systems from micro-level perspectives, lacking attention to social macro-systems and chronosystems. The macrosystem emphasizes the impact of social environmental factors such as economy and policy on psychological development, while the chronosystem focuses on how dynamic changes in various ecological systems over time shape psychology and behavior (Bronfenbrenner, 1979). Yu et al.'s (2018) social-ecological model similarly emphasizes that China's current social transformation first affects the chronosystem and macrosystem, which subsequently influence adolescent mental health. Group time concepts are also sensitive to social changes and evolve with socioeconomic, institutional, and cultural transformations (Yuan, 2021; Sircova et al., 2015; Trommsdorff, 1994), while time concepts constitute the cognitive component of time management disposition (Huang & Zhang, 2001).

Therefore, it is necessary and justified to examine the predictive role of macro-social factors on the development of Chinese college students' time management disposition. This study investigates three categories of social indicators: socioeconomic conditions, employment situations, and overall internet usage.

1.2.1 Economic Factors Modernization theory posits that in developing countries, economic growth is one of the most important indicators reflecting social transformation and plays a decisive role in social environmental changes affecting group psychological shifts (Bernstein, 1971). Research has found that college students in regions with faster economic growth experience greater per-

sonality changes, with GDP showing stronger predictive power for personality changes than other economic indicators (Peng & Luo, 2021). Since the new century, China's commodity economy has expanded at an unprecedented pace, social wealth has accumulated rapidly, and China has developed into the world's second-largest economy. However, while personal income has increased, discretionary time has decreased, leading to a sharp increase in time pressure (Li et al., 2015). Economic growth has also transformed group social consciousness, creating a self-expectation among youth that personal success should parallel economic development speed, while societal expectations for youth to shoulder the era's heavy responsibilities have become more urgent, profoundly impacting the time concepts of young groups and gradually spreading time anxiety (Chen, 2016). This unreasonable expectation and the resulting time anxiety likely affect the group's time management disposition. Second, the substantial increase in urbanization rate has made the clock a fundamental symbol of the urban world, compressing life time significantly. Concepts such as "efficiency first" and fast-paced lifestyles have become prevalent in China, and contemporary youth's work and life pace has been influenced by "urban speed," placing greater demands on their time management (Chen, 2016). Finally, economic growth has driven consumption level increases and consumption pattern transformations. Improved living conditions and the rise of online shopping have made it easier for college students, who live independently from parents and have semi-free consumption power, to be attracted by diverse commodity markets (Liu, 2019), which may induce time management difficulties for college students whose self-control is still developing. Empirical research also indicates that college students' living expenditure levels negatively correlate with time management disposition (Duan et al., 2020). In summary, this study selected GDP, urbanization rate, and household consumption level as socioeconomic indicators to examine their predictive effects on the development of college students' time management disposition.

1.2.2 Internet Factors With the arrival of the internet era, social media has invaded every domain of life. While self-media has improved information accessibility, it has also become a tool for "speed" worship, particularly in disseminating aging anxiety, wealth desires, and knowledge anxiety, which further intensifies time anxiety among youth groups (Wang, 2019). Meanwhile, as "digital natives" who grew up with the internet, post-95 college students' high involvement with the convenience and diverse content of self-media affects the smooth implementation of target tasks, leading to more fragmented time allocation and forming a fragmented time management model (Huang & Sang, 2018), reducing time management efficiency. The media use displacement hypothesis posits that people's time is limited, and time required for internet use often comes at the expense of other activities (Nie & Hillygus, 2002). Multiple individual-level studies have found that excessive internet use negatively correlates with college students' time management disposition (Peng & Jiang, 2011; Sun et al., 2015). Thus, college students in today's era of comprehensive internet 普及 may face more time management difficulties than earlier cohorts

for whom the internet was a "luxury." Therefore, this study selected internet penetration rate and average weekly internet usage hours as network indicators to predict college students' time management disposition.

1.2.3 Employment Factors For college students in the employment transition period, changes in the employment environment may constitute an important macro-level factor affecting their psychological development. China's college entrance examination admission rate increased from 55.56% in 1999 to 90.34% in 2020, with the number of college graduates correspondingly rising from 949,800 to 8.74 million. With the abolition of the college graduate job assignment system, China's college student employment market has undergone fundamental changes. As the number of graduates has increased annually, so has the postgraduate entrance examination rate. Employment challenges, coupled with time anxiety, have driven college students toward increasingly intense internal competition (Yuan & Xing, 2021). With undergraduate numbers nearly saturated, college students' employment competitiveness has greatly diminished, while employment competitiveness itself is a protective factor for time management disposition (Cheng, 2015). Therefore, the employment market environment may also influence the development of college students' time management disposition. The urban registered unemployment rate can preliminarily reflect overall social employment conditions and can be categorized as a social threat factor at the employment level, with previous research finding that such social threat factors affect group-level trait variables (e.g., Liu & Xin, 2015). The number of regular higher education graduates can reflect the state of national higher education and the severity of the employment situation (Zhang et al., 2019). Thus, this study selected the urban registered unemployment rate and the number of higher education graduates as employment indicators to predict the development of college students' time management disposition.

1.3 Cross-temporal Meta-analysis

Cross-temporal meta-analysis is a special meta-analytic method that differs from conventional meta-analysis by treating cohort effects as random error. It sequences multiple independent studies with common objectives chronologically to examine temporal trends in research variables (Hou et al., 2015; Twenge, 2000). This method has been widely used to explore socio-psychological trends across different groups (Chi & Xin, 2020). On one hand, previous methods using longitudinal designs to examine psychological changes in the same cohort across periods face challenges in obtaining large samples, and longer-term continuous tracking suffers from substantial sample attrition and increased costs. In contrast, examining cohort effects in psychological variables based on group-level data across larger time spans is a unique feature of cross-temporal meta-analysis (Hou et al., 2015). On the other hand, social construction theory posits that individual growth involves continuously internalizing existing social environmental rules to construct one's own psychological schemas and behavioral norms, while the social-ecological systems model also emphasizes the leading role of temporal

changes and social environmental changes on adolescent mental health development (Yu et al., 2018). Cross-temporal meta-analysis is precisely a method that can examine differences among individuals raised in different historical periods and social environments across various psychological variables. It can not only separate the influence of temporal changes from total variation but also identify the effects of different social change factors on individuals, integrating psychological and social variables to achieve a fusion of psychological and social sciences (Xin & Chi, 2008). Therefore, this method is uniquely advantageous for examining both the developmental trends in Chinese college students' time management disposition at the group level and the potential roles of social indicators.

Li and Bao (2014) conducted the first meta-analysis on adolescents' time management disposition, but the literature inclusion was limited and the time span was only four years, making it difficult to clarify cohort effects. Although Yang (2017) examined cohort differences in time management disposition and well-being using generational grouping, this approach lost information that could be provided by continuous variables and similarly suffered from a short time span. Additionally, previous conclusions about gender differences in Chinese college students' time management disposition have been inconsistent. Some studies found that females scored significantly higher than males (Ye, 2014), others found males scored higher (Du et al., 2012), and still others found no significant gender differences (Fan et al., 2012). Regarding regional differences, previous cross-temporal studies have revealed no hometown differences in college students' self-esteem (Sha & Zhang, 2016) but found differences in mental health (Xin et al., 2012). In the domain of time psychology, many studies suggest cultural differences in time concepts between East and West (e.g., Zeng & Liao, 2001), but whether time management disposition differs across regions within China remains unknown. In summary, this study focuses on using cross-temporal meta-analysis to examine the developmental trends of Chinese college students' time management disposition from the new century to the present and its relationships with socioeconomic, employment, and internet indicators, while simultaneously using conventional meta-analysis to clarify gender and regional differences in college students' time management disposition, providing direction and guidance for future research in time psychology.

2. Method

2.1 Research Instrument: The Adolescence Time Management Disposition Inventory

Domestic research on time management disposition specifically began after Huang and Zhang (2001) developed the Adolescence Time Management Disposition Inventory (ATMDI), and nearly all subsequent empirical studies on time management disposition have used this scale as the measurement tool. Therefore, this study selected literature using this scale as the analytical object.

The ATMDI was developed by referencing foreign time management scales and incorporating Chinese cultural contexts. It uses a 1 (completely uncharacteristic) to 5 (completely characteristic) rating scale, with higher total scores indicating higher time management disposition. The scale comprises 44 items across three dimensions: (1) Time Value, with 10 items measuring individuals' stable attitudes and concepts toward time's function and value, including attitudes toward time's significance for personal life and social development; (2) Time Monitoring, with 24 items measuring individuals' concepts and abilities to utilize and manage time, including explicit behaviors such as time allocation and planning, where higher scores indicate greater awareness and ability to monitor time; and (3) Time Efficacy, with 10 items measuring individuals' confidence in time management and subjective judgments of their time management behavioral abilities (Huang & Zhang, 2001). Multiple studies have demonstrated good reliability and validity of the ATMDI among Chinese college student populations (e.g., Huang et al., 2017; Luo et al., 2013).

2.2 Literature Collection and Coding

2.2.1 Literature Collection Criteria Literature was collected using the following criteria: (1) The measurement instrument must be the Adolescence Time Management Disposition Inventory (ATMDI) without any modifications to items or scoring methods; (2) Results must report quantitative indicators such as sample size and means; (3) Research participants must be current undergraduate students in mainland Chinese universities, excluding vocational college students, preparatory students, graduate students, and students from Hong Kong, Macau, and Taiwan; (4) Literature collection deadline was November 2021; (5) For different articles by the same author using the same sample, the earliest published and most complete data were selected; (6) For intervention studies, pre-intervention data were used.

2.2.2 Literature Collection Results Chinese literature was searched in CNKI, VIP Database, Wanfang Database, and Dissertation Full-text Database using terms including "college students," "time management," "Adolescence Time Management Disposition Inventory," and "ATMD." Foreign literature was searched in Web of Science, Elsevier, Springer, and ProQuest using terms including "college students," "time management disposition," "ATMD," "China," and "Chinese." Based on the above criteria, 212 Chinese articles and 3 foreign articles published between 2001 and 2021 were selected, with no eligible literature from 2002. The total sample size was 103,876, with male participants comprising 41.23% of samples reporting gender distribution. Detailed retrieval results are shown in Table 1.

Table 1. Literature Retrieval Results

Note: The "Gender" column indicates the number of articles reporting time management disposition scores for male and female subsamples.

2.2.3 Literature Coding and Organization Collected literature was coded according to publication type and university location, with university location strictly defined according to national administrative divisions. Coding details are shown in Table 2. For literature reporting only sub-study or sub-group values, total sample means and standard deviations were synthesized using formulas (1) and (2) (where represents the synthesized mean and standard deviation, and represents sub-sample means, standard deviations, and sample sizes). Data reporting gender subsamples were entered both as synthesized totals and separately. Regarding data collection year calculation, for literature specifying the sampling year, that year was used; for journal articles without specified sampling years, the year was calculated as publication year minus two, following previous practices (Xin & Zhang, 2009; Twenge, 2000). For master's theses, since most universities require a one-year work period for thesis completion and there is no publication cycle, the year was calculated as defense date minus one. The final data collection years ranged from 1999 to 2020. Coding was completed independently by two psychology graduate students. Inter-rater reliability was calculated for 10 indicators including data collection year, sample size, time management disposition total score means and standard deviations, with kappa values ranging from 0.84 to 0.96, indicating high coding consistency (McHugh, 2012). Discrepancies were discussed and resolved through mutual agreement. Final original literature information is provided in Appendix 1.

Formula (1): Synthesis formula for means

Formula (2): Synthesis formula for standard deviations

Table 2. Literature Coding Scheme

1 = Chinese core journal
2 = Regular journal
3 = Dissertation and conference proceedings
4 = Foreign journal
8 = Unreported or cross-regional
University location

2.3 Sources of Social Indicators

As previously described, this study selected Gross Domestic Product (GDP), household consumption level, and urbanization rate as socioeconomic indicators; urban registered unemployment rate (as official statistics for college student employment or unemployment rates are currently unavailable) and number of regular higher education graduates as employment indicators. Data for these two categories were obtained from the National Bureau of Statistics' annual *China Statistical Yearbook*. Additionally, internet penetration rate and average weekly internet usage hours per netizen were selected as internet usage indicators, with data sourced from the China Internet Network Information Center's

(CNNIC) annual *Statistical Report on Internet Development in China*, using the report released in January of the following year as the indicator for the current year.

3. Results

3.1 Overall Temporal Changes in College Students' Time Management Disposition

To clarify the changing trend of Chinese college students' time management disposition, a scatter plot was created with data collection year as the horizontal axis and total time management disposition score as the vertical axis (Figure 1), revealing a slowly declining trend. Curve estimation using SPSS 24.0 (subsequent statistical analyses used this software unless otherwise specified) showed that a linear model adequately fit the relationship between year and time management disposition ($F = 10.48$, $p = 0.001$, $R^2 = 0.05$). Additionally, scatter plots and curve estimation were conducted for the three dimensions of time value, time monitoring, and time efficacy. Results showed poor linear and curve model fit for time value, with no clear temporal trend observed in the scatter plot, while time monitoring and time efficacy showed gradually declining trends in scatter plots (time efficacy shown in Figure 2; time value and time monitoring shown in Appendices 1 and 2), with adequate linear model fit ($F = 9.37$, $p = 0.003$, $R^2 = 0.05$; $F = 20.10$, $p < 0.001$, $R^2 = 0.10$). Therefore, subsequent regression analyses used linear models.

Figure 1. Temporal Changes in Chinese College Students' Time Management Disposition (1999–2020)

Figure 2. Temporal Changes in Time Efficacy (1999–2020)

3.2 Magnitude of Temporal Changes in College Students' Time Management Disposition

To examine the predictive effect of cohort on college students' time management disposition, weighted regression analysis was conducted with data collection year as the independent variable, publication type and university location as control variables, and total time management disposition and its three dimensions as dependent variables. Stepwise analysis was employed: publication type and university location were entered in the first step, followed by data collection year in the second step. Weights were the inverse of sampling error for each study, calculated using formula (3) provided by Borenstein et al. (2009). For studies not reporting standard deviations, the mean of all studies was used for imputation following previous research practices (Wegman et al., 2018). Results showed that cohort significantly negatively predicted total time management disposition ($\beta = -0.18$, $t = -2.62$, $p = 0.01$, $\Delta R^2 = 0.03$), time monitoring ($\beta = -0.25$, $t = -3.39$, $p = 0.001$, $\Delta R^2 = 0.06$), and time efficacy ($\beta = -0.25$, $t = -3.40$, $p = 0.001$, $\Delta R^2 = 0.06$). Cohort did not significantly predict time value

(β = -0.10, t = -1.27, p = 0.21, ΔR^2 = 0.01), so its effect size was not examined further.

To further examine the magnitude of temporal changes, effect size d values were calculated following previous research practices (Xin & Zhang, 2009; Twenge & Im, 2007). Weighted regression equations were constructed with data collection year predicting total time management disposition and its three dimensions. The years 1999 and 2020 were then substituted into the regression equations to obtain means for these two years, and the difference between M_{1999} and M_{2020} was divided by the average standard deviation (MSD) across 22 years to obtain the d value for temporal change, using the formula $d = (M_{2020} - M_{1999}) / MSD$. Results are shown in Table 3. Over 22 years, time management disposition, time monitoring, and time efficacy declined by 0.28, 0.45, and 0.42 standard deviations, respectively. According to Cohen's (1992) criteria, a d value of 0.2 represents a small effect size, 0.5 a medium effect size, and 0.8 a large effect size. Therefore, the declines in overall time management disposition, time monitoring, and time efficacy between 1999 and 2020 fall between small and medium effect sizes.

Table 3. Magnitude of Change in College Students' Time Management Disposition Between 1999 and 2020

Variable	Regression Equation	M_{1999}	M_{2020}	d
Time Management Disposition	y = 681.64 - 0.265x			
Time Monitoring	y = 582.60 - 0.251x			
Time Efficacy	y = 248.56 - 0.106x			

3.3 Relationship Between College Students' Time Management Disposition and Social Indicators

Cross-temporal meta-analysis can reveal the impact of social changes on individual development, while individual psychological and behavioral development lags behind social changes—meaning the emergence of certain psychological characteristics may occur later than the social events causing them (Xin & Chi, 2008). Additionally, since national economic and social development typically follows five-year planning cycles, this study examined the lagged effects of social factors on college students' time management disposition starting five years before the time management disposition data, following previous research recommendations (Zhang et al., 2019). To accurately examine the dynamic effects of social factor changes on psychological variables, social indicator data from three years prior, one year prior, and the current year were also included, following recent research practices (Xin et al., 2021). Weighted regression analysis results are shown in Table 4. All social indicators except urban registered unemployment rate showed significant negative correlations with college students' time management disposition at five years prior, three years prior, one

year prior, and current year. For urban registered unemployment rate, only one-year prior and current year values showed significant positive correlations with time management disposition. Specifically, for the dimensions (see Appendices 2 and 3; time value showed no significant correlations with any social indicators and is omitted), all social indicators except urban registered unemployment rate showed significant negative correlations with time monitoring and time efficacy at five years prior, three years prior, one year prior, and current year. For urban registered unemployment rate, only one-year prior and current year values showed significant positive correlations with time monitoring and time efficacy.

Table 4. Effects of Social Indicators from Five Years Prior, Three Years Prior, One Year Prior, and Current Year on College Students' Time Management Disposition

Social Indicator	Five Years Prior	Three Years Prior	One Year Prior	Current Year
GDP	-0.19 (-2.85**)	-0.18 (-2.61**)	-0.19 (-2.86**)	-0.19 (-2.90**)
Household Consumption Level	-0.20 (-3.00**)	-0.19 (-2.82**)	-0.20 (-3.04**)	-0.19 (-2.83**)
Urbanization Rate	-0.17 (-2.53*)	-0.17 (-2.48*)	-0.17 (-2.56*)	-0.17 (-2.49*)
Urban Registered Unemployment Rate	-0.01 (-0.10)	-0.02 (-0.26)	0.20 (3.02**)	0.14 (2.08*)
Number of College Graduates	-0.17 (-2.49*)	-0.15 (-2.18*)	-0.14 (-2.06*)	-0.14 (-2.00*)
Internet Penetration Rate	-0.16 (-2.39*)	-0.14 (-2.05*)	-0.16 (-2.30*)	-0.16 (-2.41*)
Weekly Internet Usage Hours	-0.23 (-3.39***)	-0.18 (-2.62**)	-0.12 (-1.98*)	-0.14 (-2.13*)

Note: Values are β coefficients, with t-values in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The same applies below.

3.4 Gender and Regional Differences in College Students' Time Management Disposition

Using Comprehensive Meta-Analysis Version 3.0 (CMA 3.0) software, conventional meta-analysis was employed to examine gender and regional differences

in college students' time management disposition. Subgroup analysis was conducted on 97 articles reporting time management disposition and its three dimensions for both genders. Heterogeneity tests revealed no significant differences between male and female students in time management disposition or its three dimensions (QB = 0.24–1.18, ps = 0.28–0.63), indicating no significant heterogeneity between the two groups. Subgroup analysis was conducted on 176 articles reporting university location. Results showed no significant differences across regions in total time management disposition, time monitoring, or time efficacy (QB = 3.70–7.00, ps = 0.32–0.72), but significant differences were found in time value (QB = 12.98, p = 0.04), with students from universities in East China and Northwest China scoring slightly higher than other regions.

4. Discussion

4.1 Slow Decline in Time Management Disposition Among Mainland Chinese College Students Over 22 Years

The study found that mainland Chinese college students' time management disposition has shown a slow declining trend over the 22 years from 1999 to 2020, decreasing by 0.28 standard deviations. This magnitude of change is smaller than the increase in college students' Big Five personality traits (Tian et al., 2017) and the decline in self-esteem (Sha & Zhang, 2016), suggesting that while college students' time management disposition exhibits cohort effects, its stability may be higher than other trait psychological variables. Specifically, time value showed no clear temporal change, while time monitoring and time efficacy showed declining trends. This indicates that over 22 years, college students' judgments about time's function and value have remained relatively stable, but their abilities to plan and manage time and their confidence in time management have declined—a deviation between attitude and behavior.

The development of the commodity economy and substantial productivity improvements have gradually commodified time. From the "efficiency first, fairness considered" approach of the market economy period to the "striving to stay ahead of time" ethos of the comprehensive well-off society construction period, the value of "time is life" has remained enduring among youth after reform and opening-up (Xin, 2019). As this study's results show, macro-social factors did not significantly affect the value component of college students' time management disposition but significantly weakened the monitoring and efficacy components. In an era of sharply increasing time pressure, college students' time management has become increasingly difficult (Chen, 2016), resulting in a "more than willing but lacking the power" situation where "although time is considered important, excessive pressure and interference make effective time management difficult."

4.2 Relationship Between Temporal Changes in Time Management Disposition and Social Indicators

Economic Development Impacts. National wealth accumulation, accelerated urbanization, and increased consumption levels directly affect group time expectations and life rhythms. On one hand, as a late-developing country, China faces more arduous economic development tasks than developed countries, with modernization processes such as GDP growth and urbanization compressed into shorter timeframes. Economic competition among nations has spread to all social levels, leading to a group-level time perception model centered on speed (Xin, 2019). This catch-up lifestyle directly accelerates group work, study, and life rhythms, further interfering with group time management disposition. On the other hand, China's economic growth and urbanization speed have directly elevated youth groups' social expectations, creating an ultimate expectation of obtaining maximum benefits in minimum time. Research shows that college students expect to achieve career success earlier and retire later than other groups, exhibiting clear time anxiety (Chen, 2016). Time anxiety and excessive time pressure weaken time management disposition (Deng & Chen, 2005). Additionally, economic growth has driven increases in household consumption levels. Compared with past college students, current students have increasingly diversified consumption structures with growing hedonic consumption (Zeng et al., 2015), making them more likely to waver between academic and entertainment activities and experience time management difficulties. Thus, economic factors may influence time management disposition by affecting individuals' time expectations, work-life rhythms, and consumption structures.

Internet Interference. The internet has greatly facilitated our lives. Cyberspace, with its technical advantages of anonymity, hyper-temporality, and trans-temporality, has attracted numerous young people and made them the most active group in online life. However, online activities such as social networking, gaming, shopping, and self-media promotion constantly distract young people, weakening their time management abilities and confidence (Chen et al., 2021; Emine Öksüz et al., 2018). As the media use displacement theory states (Nie & Hillygus, 2002), time consumed by internet use substantially reduces time available for target tasks and offline life, disrupting time management patterns. More importantly, the emergence and popularization of smartphones have enabled fragmented internet use, making college students more likely to compromise before online temptations and reducing time management confidence (Jiang et al., 2017). As of June 2021, China's internet penetration rate reached 71.6%, with average weekly internet usage of 26.9 hours, and mobile phone internet usage reaching 99.6% (CNNIC, 2021), compared to only 3.5%, 8.5 hours, and 0.4% respectively 20 years ago (CNNIC, 2002). This shows that contemporary college students far exceed their early-century counterparts in both internet usage duration and accessibility, which may be one reason for their declining time management disposition.

Employment Environment Pressure. Today's talent market oversupply has

intensified "involution" among college students. From certificate examinations and internships to postgraduate entrance exams, 白热化的 internal competition drives individuals to squeeze remaining time for self-improvement. This career anxiety further reduces college students' time management disposition (Wang et al., 2021). As the number of college graduates climbs, the advantage of higher education credentials gradually declines, with college students increasingly participating in blind competition (Yuan & Xing, 2021). Intensifying employment pressure also weakens college students' time management disposition (Huang et al., 2009). As this study's results show, the number of college graduates negatively predicts time management disposition, likely through employment expectations, career emotions, and 催生内卷行为. Additionally, results showed that only the current year's urban registered unemployment rate positively correlated with time management disposition, contrary to expectations. This may be because urban registered unemployment rate, unlike the aforementioned rising social indicators, has remained stable at around 4% between 2002 and 2020. According to the work pressure-performance relationship moderation theory, moderate work time pressure constitutes 良性压力, conducive to individual psychological and social adaptation development (Feng et al., 2017), suggesting that low unemployment rates may help college students gradually improve their time management to enhance employment competitiveness. Alternatively, the urban registered unemployment rate indicator may not effectively reflect college students' employment conditions. Since 2018, when the National Bureau of Statistics began publishing monthly surveyed unemployment rates for 16-24-year-olds, this figure has fluctuated around 13%, far higher than other age groups and the overall urban registered unemployment rate.

4.3 Influence Mechanism Model of College Students' Time Management Disposition

Ecological systems theory posits that psychological development results from interactions between systems and individuals, and that individual psychological and behavioral development patterns should be explored across several environmental systems from direct to indirect environments (Bronfenbrenner, 1979). Existing research on college students' time management disposition has primarily focused on individual factors (e.g., future time perspective, personality) and microsystems (e.g., parental monitoring, parenting styles) as proximal factors, lacking a macrosystem perspective (e.g., culture, economy). This study is the first to examine the effects of three macro-social perspectives—economic factors, employment factors, and internet factors—on the temporal changes in Chinese college students' time management disposition, demonstrating that time management disposition as a personality trait is also influenced by social factors. However, distal social environmental factors not only directly affect group psychology but also exert influence through proximal environmental factors (Xin et al., 2021). Based on previous empirical research and the current results, and grounded in Bronfenbrenner's (1979) ecological systems theory and Yu et al.'s (2018) social-ecological systems theory, this study proposes an influence

mechanism model of college students' time management disposition (Figure 3). Changes in objective macrosystems composed of economic, employment, and internet factors trigger changes in subjective macrosystems such as social mentality, which simultaneously affect individual factors and microsystems, while individual factors and microsystems have bidirectional effects, ultimately influencing college students' time management disposition. Macrosystem changes can offset or even exceed the influence of individual factors and microsystems. For instance, the interfering effects of social factors may surpass the enhancing effects of individual internal qualities related to time management, causing the decline in college students' time management disposition. Furthermore, temporal changes or social transformations have overarching effects on the entire system, triggering changes in both objective and subjective macrosystems, affecting individual factors and microsystems, and subsequently influencing college students' time management disposition.

According to this model, the current results can be interpreted as follows. First, since entering the new century, China has experienced unprecedented social transformation. Economic growth and increased urbanization (objective macrosystem) have directly elevated social expectations, intensifying social 浮躁心态 (subjective macrosystem). This social mentality has influenced families and schools, creating expectations for rapid talent development among college students (microsystem). College students' own desires for quick success have also increased (individual factors), and time anxiety has gradually spread across society, schools, families, and individuals, affecting college students' time management disposition. Increased consumption levels have also changed college students' consumption preferences and values, with hedonic consumption severely squeezing work and study time, creating time pressure that interferes with time management. Second, the employment situation in higher education has intensified competitive patterns and time-centered speed concepts at the societal level (Xin, 2019), 催生不同程度的"内卷"行为 within schools. College students' time trade-offs between work, study, and entertainment face tremendous challenges, forming 浮躁性人格 that further affects their time management patterns. Finally, technological factors brought by temporal changes, such as internet 普及, not only spread time anxiety in society but may also directly affect individual factors by squeezing offline activity time, negatively impacting college students' time management disposition.

Figure 3. Influence Mechanism Model of College Students' Time Management Disposition (Specific variables under different factors are derived from previous empirical or theoretical research)

4.4 Non-significant Gender and Regional Differences in Chinese College Students' Time Management Disposition

This study examined gender differences in time management disposition from a cross-sectional perspective. Subgroup analysis results found no significant heterogeneity between male and female college students in time management dispo-

sition or its three dimensions, consistent with previous meta-analysis results (Li & Bao, 2014). This indicates that male and female students' time management disposition levels have been equivalent over these 22 years. These results clarify previous research controversies from a meta-analytic perspective with larger samples, yielding more reliable conclusions. This outcome may occur because the aforementioned social factors' influence on time management disposition is not gender-specific, and current educational gender equality has weakened gender differences in this learning-related personality trait. Additionally, results showed no significant differences in total time management disposition across university locations, with only slightly higher time value scores among students from universities in East China and Northwest China. However, this result should be interpreted cautiously. On one hand, university location as an independent variable may confound university level factors—research has found that time management levels among undergraduates from high-level universities (former 211 and 985 institutions) are significantly higher than those from regular institutions (Jing & Chen, 2015). On the other hand, for college students with high cross-regional mobility, the group effects of their hometown where they lived for many years may be stronger than those of their university location where they only study for 0-4 years.

4.5 Research Significance, Implications, and Limitations

This study examined the micro-psychological variable of college student group time management disposition from a macro perspective. Based on socio-ecological systems theory, it is the first to confirm the declining trend in mainland Chinese college students' time management disposition over time, identifying the predictive roles of three macro-social factors—economic, employment, and internet factors. It broadens the influence mechanism model of college students' time management disposition from chronosystem and macrosystem perspectives, deepening the macro significance of time management disposition as an individual psychological trait variable, and providing social-level theoretical implications for future time psychology research.

Based on these findings, future research should address two issues. First, results show that while college students' affirmation and identification of time value remain stable, their planning abilities and confidence in time management are declining. This suggests that higher education should emphasize college students' behavioral-level time management problems and implement corresponding interventions—research has found that time management training can significantly improve time management disposition among nursing undergraduates (Zhang et al., 2021). Second, this study found that as China's economic status rises, college students' time management disposition declines, contradicting research finding positive correlations between perceived family economic status and high school students' time management disposition (Zhang et al., 2020). This discrepancy may relate to different survey populations—middle school students have closer family ties than college students and are more influenced by

family economic status. More importantly, it suggests that future researchers studying individual time management disposition should also examine time management issues across the entire college student group, combining static and dynamic macro-historical developmental orientations to avoid committing the "reductionist fallacy" of generalizing individual research conclusions to groups and the "ecological fallacy" of generalizing group conclusions to individuals (Na et al., 2010). For instance, relatively high individual economic status can provide better educational resources for young college students and improve their time management disposition, but ignoring individual differences, rapid social-level economic growth may be the root cause of time anxiety, negatively affecting group-level time management disposition.

This study has several limitations. First, it examined distal factors including economic, employment, and internet factors, but beyond objective social factors, subjective social factors such as social attitudes and social emotions may also affect college student group psychological development (Huang et al., 2021; Li & Wang, 2018). The proposed subjective macrosystem involves some speculation, so future research could examine the role of social attitude changes on temporal changes in time management disposition. Second, the proposed influence mechanism model does not include mesosystems and exosystems due to a lack of relevant research, so future studies could more specifically explore relevant influence mechanisms. Third, this study examined temporal changes in college students' time management disposition, but for middle school students in the "storm and stress" period facing both academic pressure and external temptations, the importance of time management is equally self-evident. Currently, abundant literature exists on Chinese middle school students' time management disposition, and future research could further examine temporal patterns in this group. Fourth, some scholars have criticized cross-temporal meta-analysis for confounding age effects, period effects, and cohort effects (Rudolph et al., 2020). However, cross-temporal meta-analysis remains one of the optimal methods for revealing group psychological temporal changes, and this study's focus on the college student group can partially avoid age effect interference.

This study used cross-temporal meta-analysis to examine temporal changes in mainland Chinese college students' time management disposition between 1999 and 2020. Results found: (1) Chinese college students' time management disposition has shown a slow declining trend overall, with time value remaining stable while time monitoring and time efficacy declined; (2) Economic development, employment market conditions, and internet interference may be macro-social factors predicting the development of college students' time management disposition; (3) No significant gender or university location differences were found in Chinese college students' time management disposition.

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