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Santa Barbara

When Time is of the Essence: Culture and the Social Clock—Subjective vs. Intersubjective
Perceptions

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Psychological and Brain Sciences

by

Lu Zang

Committee in charge:

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Professor Karen Nylund-Gibson

June 2026

The dissertation of Lu Zang is approved.

David Sherman

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Karen Nylund-Gibson

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April 2026

When Time is of the Essence: Culture and the Social Clock—Subjective vs. Intersubjective
Perceptions

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by

Lu Zang

VITA OF LU ZANG

April 2026

EDUCATION

Ph.D. in Social Psychology with an emphasis on Quantitative Methods in the Social Sciences (QMSS)

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2021 – 2026

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Dissertation: “*When Time is of the Essence: Culture and the Social Clock – Subjective vs. Intersubjective Perceptions*”

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University of California, Santa Barbara

2021 – 2024

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Committee members: Dr. David Sherman, Dr. Hongbo Yu

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B.A. in English Language and Literature

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2017 – 2021

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Faculty Advisor: Dr. Heejung Kim

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Zang, L., & Kim, H. S. (2025). Culture and the social clock: Cultural differences in the optimal timing of life. *Personality and Social Psychology Bulletin*. <https://doi.org/10.1177/01461672251362514>

Zang, L., Li, D., & Zhao, X. (2023). Preference matters: Knowledge of beneficiary’s preference influences children’s evaluations of the act of leaving a choice for others. *Journal of Experimental Child Psychology*, 228, 105605. <https://doi.org/10.1016/j.jecp.2022.105605>

Wei, T., **Zang, L.**, Deng, J., & Chen, L. (2019). Comparative studies of space narratology through scopes of Heterotopia: on the construction of female ghost figures. *Fudan*

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Zang, L., & Kim, H. S. (under review). Do people think I'm late in life? An intersubjective approach to culture and the optimal timing of life.

Zang, L., & Kim, H. S. (in preparation-a). A cultural analysis of implicit thinking on rights and responsibilities in social relationships.

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Zang, L., & Kim, H. S. (2026, February). *Do People Think I'm Late in Life? An Intersubjective Approach to Culture and the Optimal Timing of Life*. Data blitz presented at the Happiness & Well-being Pre-conference at the Society for Personality and Social Psychology (SPSP), Chicago, IL.

Zang, L., & Kim, H. S. (2026, February). *Do People Think I'm Late in Life? Shifting Intersubjective Norms to Reduce Emotional Costs of Social Clock Deviations across Cultures*. Poster presented at the Cultural Psychology Pre-Conference at the Society for Personality and Social Psychology (SPSP), Chicago, IL.

Gaceta, A. *, **Zang, L., & Kim, H. S.** (2025, February) *Setting the Beauty Standard: The Cultural Dimensions of Body Size Preferences*. Poster session presented at Denver, CO, at the annual meeting of the Society for Personality and Social Psychology (SPSP).

Zang, L., & Kim, H. S. (2024, October). *Culture and Judgment of Social Clock Deviation* [Poster presentation]. Association for Psychological Science (APS) Global Psychological Science Summit. Online.

Gaceta, A. *, **Zang, L., & Kim, H. S.** (2024, May) *Setting the Beauty Standard: The Cultural Dimensions of Body Size Preferences*. Poster to be presented at the UCSB Undergraduate Research and Creative Activities (URCA) poster colloquium.

Zang, L. & Kim, H. S. (2024, February) *Culture and The Social Clock: Cultural Differences in The Optimal Timing of Life*. Symposium at the Annual Meeting of the Society for Personality and Social Psychology (SPSP), San Diego, CA.

- Ouyang, J. *, **Zang, L.**, & Kim, H. S. (2023, May) *Cultural Identity and Online Self-presentation: Social Media Profile Pictures*. Poster presented at the UCSB Undergraduate Research and Creative Activities (URCA) poster colloquium.
- Li, D., **Zang, L.**, & Zhao, X. (2023, March) *Children Consider the Beneficiary's Preference in Evaluations of Socially Mindful Actions*. Poster session presented at Salt Lake City, UT, at the biennial meeting of Society for Research in Child Development (SRCD).
- Zang, L.** & Kim, H. S. (2023, February) *Cultural time perspective and construal-level: Role of long-term orientation*. Poster session presented at Atlanta, GA, at the annual meeting of the Society for Personality and Social Psychology (SPSP).
- Immel, B., **Zang, L.** & Woods, V. (2022, October) *A new tool for assessing components of students' mastery of research development and communication in the psychological and brain sciences department*. Talk presented at the UCSB CITRAL Engaging Teaching Symposium.
- Zang, L.**, Zhou, Y., & Kim, H. S. (2021, February) *Threat and perception of fairness: the moderating effect of socio-economic crisis on people's hypothetical management decisions*. Poster session presented online at the 21st annual meeting of the Society for Personality and Social Psychology (SPSP).
- Zhou, Y., **Zang, L.**, & Kim, H. S. (2020, December) *Culture and risk perception: the effect of risk framing on financial deception*. Poster session presented online at the 41st annual meeting of the Society for Judgement and Decision Making (SJDM).
- Zang, L.**, Zhou, Y., & Kim, H. S. (2020, May). *Gender and emoji: cultural differences in social impression of emoji use*. Poster session presented online at the 29th UCLA Psychology Undergraduate Research Conference.
- Zhou, Y., **Zang, L.**, & Kim, H. S. (2020, May). *Culture and risk perception: the effect of risk framing on financial deception*. Poster session presented online at the 29th UCLA Psychology Undergraduate Research Conference.

RESEARCH EXPERIENCE

Graduate Student Researcher

UCSB Cultural Psychology Lab, UC Santa Barbara

2021 – present

Faculty Advisor: Dr. Heejung Kim

- Conducted research in cultural psychology at UC Santa Barbara, exploring cultural influences on the social clock and its impact on well-being
- Analyzed data to understand how culture shapes perceptions of optimal life timing
- Presented findings at academic conferences to contribute to the field of cultural psychology
- Authored and co-authored academic manuscripts and prepared additional

- manuscripts for submission
- Published peer-reviewed article(s) on cultural and the social clock (*PSPB*)

Research Assistant

Culture and Child Development Lab, East China Normal University **2020 – 2021**

Principal Investigator: Dr. Xin (Alice) Zhao

- Translated research materials and children's transcripts from Chinese to English
- Recruited participants and conducted research interviews with children via Tencent Meeting
- Composed and published a brief report on CCD Lab's WeChat Official Platform
- Presented papers discussing infants' abilities to discern and evaluate people's anti-social behaviors in a group meeting
- Analyzing data on social-networking projects among pre-school children (3- to 5- year-olds) on R and Gephi
- Published peer-reviewed article(s) on how knowledge of beneficiary's preference influences children's evaluations socially mindful actions

Independent Undergraduate Researcher

UCSB Cultural Psychology Lab, UC Santa Barbara

2019 – 2021

Faculty Advisor: Dr. Heejung Kim

- Developed research ideas for investigating 1) people's management decisions under economic crisis and 2) the cross-cultural differences in the social impression of Emoji-using males; composed two research proposals and two IRB protocols
- Collaborated on the study of the influence of risk-framing on individual likelihood of engaging in financial deception between Asian and American cultures (in idea formation, Qualtrics design, participant recruitment, and data analysis)
- Created an online memory-span test in Qualtrics with features such as the automatic-played recordings of number series and recruited 600+ participants from China and the U.S.
- Analyzed data using SPSS and R (statistics methods include repeated measures ANOVA, etc.)

Independent Undergraduate Researcher

Comparative Literature Studies, Fudan University

2018 – 2019

Faculty Advisor: Dr. Liang Chen

- Co-developed the research idea of analyzing the space narratologies and its correlation with cross-cultural differences of female ghost figures
- Conducted literature review of global ghost stories from the 19th century
- Co-authored the paper "Comparative studies of space narratology through scopes of Heterotopia: on the construction of female ghost figures"

TEACHING

Instructor of Record

UC Santa Barbara

Statistical Methods in Psychological & Brain Sciences **Summer 2024**

- Designed and delivered 16 lectures to 106 students; supervised 5 TAs

Huangzhu Central Elementary School

Elementary Math

Winter 2019

Psychology and Life

Winter 2019

Fudan Tengfei English Training Camp

English Vocabulary

Fall 2018

English Speaking

Fall 2017

Guest Lecturer

UC Santa Barbara

Social Psychology

Summer 2023

Lab Session Instructor

UC Santa Barbara

Laboratory in Psychological & Brain Sciences

Spring 2025, Fall 2024

- 20 students, 9 lab sessions

Statistical Methods in Psychological & Brain Sciences

Spring 2026, 2024, 2023 & 2022, Summer 2025, Fall 2023

- 25 students, 8 lab sessions

Research Methods in Psychological & Brain Sciences

Summer 2023 & 2022, Fall 2021

- 25 students, 8 lab sessions

Laboratory in Social Psychology

Fall 2025 & 2022

- 17 students, 7 lab sessions

Teaching Assistant

UC Santa Barbara

Cultural Psychology

Winter 2026 & 2022, Summer 2025

Developmental Psychology

Summer 2025

Adult Development & Aging

Winter 2025

Special Topics by Dr. Stan Klein

Winter 2024 & 2023

Social Psychology

Summer 2023

Introduction to Psychology

Summer 2022

MENTORING

Supervising

UC Santa Barbara

Supervised 6 undergraduate research assistants; 3 successfully completed Honors Theses under my supervision. All 3 mentees received Undergraduate Research and Creative Activities (URCA) grants.

Tianna Lopresti	Fall 2025
Megan Woo	Fall 2025
Junyu (Jenny) Zhang	Fall 2024
Audrey Gaceta	Fall 2022 – 2024 (Honors Thesis completed)
Gary Yin	Spring 2022 – Spring 2023 (Honors Thesis completed)
Weinuo (Jeff) Ouyang	Fall 2021 – Spring 2023 (Honors Thesis completed)

Mentoring

UC Santa Barbara

Xinyi Zhang (Access Grad Mentee)	Fall 2024 – Winter 2025
Yuyue Jiang (Access Grad Mentee)	Fall 2022 – Spring 2023
Audrey Gaceta (Access Grad Mentee)	Fall 2022 – Spring 2023
Janeth Quintero (Access Grad Mentee)	Fall 2021 – Fall 2022
Minami Akaishi (Access Grad Mentee)	Fall 2021 – Fall 2022

Fudan University

Mentored 4 Fudan undergraduate students in their English learning
2017 – 2019

PROFESSIONAL ACTIVITIES

Assessment Plan Committee

Dept. of Psychological and Brain Sciences, UC Santa Barbara, CA
Apr 2022 – Dec 2023
Served as committee member for the PBS undergraduate assessment plan;
developed and implemented a rubric-based tool to evaluate students' research
and communication skills; presented findings at UCSB CITRAL Symposium.

Editor (Internship)

Oxford University Press, Shanghai, China
Apr 2021 – Jun 2021
Responsible for editing and proofreading English textbooks, video clips, and
essay collections;
Responsible for composing paragraphs in high school English textbooks'
reading sections.

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Grants and Funding

UCSB GSA Travel Grant (\$400)	2026
UCSB PBS Graduate Student Travel Award (\$1500)	2025
UCSB PBS Dissertation Fellowship (\$6,252.25)	2025
UCSB PBS Assessment Grant (for 2022 Undergraduate Assessment Plan)	2022
UC Santa Barbara Undergraduate Research and Creative Activities (URCA) Grant (\$750)	2019
Fudan Student Academic Innovation Action Grants	2019

Scholarships

Fudan Outstanding Graduate Scholarship, First-Class	2021
Fudan Second-Class Scholarship	2019
Fudan Xu Zeng-Shou Scholarship	2018

Academic Contests

Fudan General Education Outstanding Papers, 2 nd prize	2019
Fudan English Research Institute Cup English Reading Contest, 3 rd Prize	2018
Fudan English Research Institute Cup English Writing Contest, 2 nd Prize	2018
Fudan 21st Century Sino-Australia Cup English Speech Contest, 3 rd Prize	2017

Awards

UCSB PBS Richard E. Mayer Award	2023
Fudan University Outstanding Graduate (Class of 2021)	2021
Dean's List at UC Santa Barbara	2019
Fudan Outstanding Student's Award	2019
Member of Fudan Top-Ten Winter Social Activities	2019
Fudan Excellent Psychology Commissioner's Award	2018
Fudan Teng-Fei English Training Camp Excellent English Teacher's Award	2017

PROFESSIONAL AFFILIATIONS

Society for Personality and Social Psychology (SPSP)	2020 – present
American Psychological Association (APA)	2024, 2021

PROFESSIONAL SERVICE

Ad Hoc Reviewer	
<i>Social Cognition</i>	2026

COMMUNITY INVOLVEMENT

Mentor

Access Grads Program, UC Santa Barbara, CA	2021 – 2023
Give undergraduate mentees insights into research in psychology; help them navigate the graduate school application process; help them with career explorations.	

Intern Advisor

Fudan University, Shanghai, China	2020 – 2021
Responsible for helping with providing academic advice to freshmen studying English and Spanish at Fudan University;	
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English Interpreter

Children's Hospital affiliated with Fudan University, Online **2020**
Responsible for helping compose the Multilingual Pocket Book for health checks (for airports, streets, and customs) during the COVID-19 pandemic; Provided an online translation service for doctors and nurses (served 5 hours/week).

Psychology Committee

Fudan University, Shanghai, China **2017 – 2021**
Contributed articles to the Class of 2021 Fudan English Department's "Enffindor" official WeChat platform;
Received the Fudan University Excellent Psychology Commissioner's Award.

Bilingual Tour Guide and Interpreter

Shanghai Jewish Refugees Museum, Shanghai, China **2017 – 2020**
Gave English tour guides and acted as an interpreter (served more than 400 hours).

ABSTRACT

When Time is of the Essence: Culture and the Social Clock—Subjective vs. Intersubjective Perceptions

By

Lu Zang

The social clock shapes our lives by prescribing the “right” ages for milestones like starting college, getting married, or having children. The present research examines cultural differences in the social clock’s rigidity and how intersubjective perceptions of the social clock implicate subjective perception and social judgment. In Chapter 1, I investigate how and why the rigidity of the social clock may vary across cultures. In three studies (two preregistered), participants from China and the U.S. were asked to provide the earliest and the latest ages they think appropriate for engaging in several life events. The social clock’s rigidity was operationalized as the width of the time windows for these life events. I found notable cultural differences: the social clock was more rigid in China than in the U.S., and filial piety beliefs are likely explanation for these differences. I further assessed anticipated negative self-conscious emotions of deviation from the social clocks. In Chapter 2, across three preregistered studies, I investigated the causal relationship between cultural values and the social clock and tested the generalizability of the core findings. I found initial evidence of the causal influence of the cultural value of filial piety. However, the U.S.-South Korea comparison did not consistently mirror the China-U.S. pattern. In Chapter 3, in four

preregistered studies, I found emerging evidence that intersubjective social clocks were more rigid in China than in the U.S., and Chinese participants aligned their subjective and intersubjective perceptions of the social clock more closely than American participants did. Notably, filial piety beliefs are a likely explanation for cultural differences in alignments. I further assessed anticipated negative self-conscious emotions (Study 6) and negative social judgments (Study 7) in response to deviations from the upper-bound of the intersubjective social clock and from its lower-bound (Study 8). Further, Study 9 experimentally manipulated intersubjective norms to test whether framing the intersubjective social clock as more flexible could mitigate anticipated emotional costs. Taken together, the present research provides a thorough understanding of culture and the social clock to inform efforts to foster individual and collective well-being across diverse cultures.

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WHEN TIME IS OF THE ESSENCE: CULTURE AND THE SOCIAL CLOCK— SUBJECTIVE VS. INTERSUBJECTIVE PERCEPTIONS

INTRODUCTION

“Life really does begin at forty. Up until then, you are just doing research.”
—Attributed to Carl Jung (n.d.)

“At fifteen, I had my mind bent on learning / At thirty, I stood firm / At forty, I had no doubts...”
—from *The Analects of Confucius* (206 BC-220 AD), translated by Legge (1815-1897)

Time treats everyone equally. Without noticing, old age might creep in, as “a flight of small cheeping birds skimming bare trees above a snow glaze” (Williams, 1986); however, along the way, the intensity of age-related pressure people experience varies across cultures. In China, being single at age 24 can already bring family pressure to marry, sometimes accompanied by the stigma of being called a “leftover woman” (Spencer, 2016). By contrast, Americans are more likely to see a woman of that age as still very young and encourage her to continue studying, develop her career, travel, or enjoy life, with marriage viewed as optional or something that can occur later (Zang & Kim, 2025). In social psychology, these age-related social expectations have been termed the social clock (Neugarten, 1976). Although the term dates back more than half a century, it has remained relatively understudied. Thus, this dissertation aims to fill gaps in prior research and to provide a more thorough understanding of culture and the social clock.

The present dissertation is organized around three overarching research questions about cultural variations in the social clock. First, do perceptions of the social clock differ across cultures, and how does it affect well-being? Second, can these cultural differences be replicated across a broader range of cultures, and is there a causal influence of cultural

values? Third, beyond individuals' subjective perceptions, what role do intersubjective perceptions of the social clock—that is, individuals' beliefs about what most other people in their society think about it (e.g., Chiu et al., 2010)—play, and how do they vary across cultures? Each chapter addresses one of these overarching questions while advancing a distinct component of the broader theoretical framework.

Chapter 1 is designated to answer the first research question about the cultural differences in the social clock's rigidity and its impact on anticipated well-being. For this purpose, Chapter 1 (Studies 1a, 1b, and 2) examines how individuals in different cultures (the U.S. vs. China) construe the social clock and how they would anticipate feeling if they failed to abide by the social clock. It also explores whether filial piety beliefs, a social obligation important for the Chinese (e.g., Chan & Tan, 2008), explain these cultural differences.

Chapter 2 (Studies 3, 4, and 5) addresses the second research question by investigating the causal effect of cultural values on perceptions of the social clock's rigidity (Studies 3 and 4) and testing the generalizability of the findings across cultural contexts (Study 5). Specifically, it employs cultural priming among bicultural participants to examine whether activating filial piety beliefs influences perceptions of the rigidity of the social clock and anticipated emotional outcomes of social clock deviation. In addition, it assesses whether the core findings generalize beyond the China-U.S. comparison by examining the social clock in the U.S. and South Korea.

In addition, Chapter 3 (Studies 6, 7, 8, and 9) focuses on the third research question by investigating cultural differences in people's intersubjective perceptions of the social clock and how intersubjective perceptions implicate subjective perception and social judgments. It further investigates the alignment between individuals' subjective and

intersubjective perceptions of the social clock across cultures and examines cultural values, such as filial piety, that explain cultural differences in the alignment. Moreover, it examines whether deviations from the intersubjective social clock are associated with anticipated negative emotional outcomes (Studies 6 and 8) and negative social judgments (Studies 7 and 8) across cultures. Lastly, it tests whether framing intersubjective norms regarding the social clock as more flexible can mitigate the anticipated emotional costs of social clock deviations across cultures (Study 9).

Across these questions, the dissertation examines both the lower and upper bounds of the social clock, as well as anticipated responses to deviations from both bounds. This distinction is important because deviations from the two bounds may carry different psychological meanings. In particular, upper-bound deviation may be more closely tied to concerns about failing to fulfill family duties and obligations, i.e., filial piety, whereas lower-bound deviation may be construed more as a violation of social norms but still fulfills the duties to the family by achieving milestones (Zang & Kim, 2025).

CHAPTER I: CULTURE AND THE SOCIAL CLOCK: CULTURAL DIFFERENCES IN THE OPTIMAL TIMING OF LIFE¹

The Master said: “At fifteen, I had my mind bent on learning.
At thirty, I stood firm.
At forty, I had no doubts.
At fifty, I know the decrees of Heaven.
At sixty, my ear was an obedient organ for the reception of truth.
At seventy, I could follow what my heart desired, without transgressing what was right.”

—from *The Analects of Confucius* (206 BC-220 AD)

Two thousand five hundred years ago, Confucius, at the sunset of his life, gathered his disciples and shared with them his timing of life, and his teachings still resonate among East Asians (Huang & Charter, 1996). Beyond the laudable goals, what is notable about this teaching is its emphasis on the prescribed age by which one should achieve the goals. Such emphasis is also reflected in current East Asian culture. Terms such as “leftover women”—women who remain unmarried in their late twenties and beyond—are commonly used in China (Spencer, 2016). Despite the changing demographics (e.g., decreasing birthrate) in Korea, Koreans perceive strong pressure to conform to social expectations about life milestones (Cho & LoCascio, 2018). This particular view on age-related expectations may contrast with the view prevalent in most Western cultures. In these cultures, age-based expectations about life milestones do not seem as strong. It may be deeply ingrained in people’s thinking in Western cultures that it is never too early or too late to pursue your dreams, pick up new skills, and fall in love. For instance, it is not uncommon to encounter “non-traditional” students (e.g., undergraduate students older than age 25) enrolling in

¹ This research is published at *Personality and Social Psychology Bulletin*.
Zang, L., & Kim, H. (2025). Culture and the Social Clock: Cultural Differences in the Optimal Timing of Life. *Personality and Social Psychology Bulletin*, 0(0). <https://doi.org/10.1177/01461672251362514>

schools—cases that have become more prevalent in the West over the past decades (e.g., Casselman, 2013).

These sentiments illustrate that people hold divergent views in different cultures regarding not only the appropriate ages for significant life events, such as beginning college, getting a full-time job, getting married, or becoming a parent, but also the relative importance of age as a marker of success for these life milestones. In psychology, these age-related social expectations have been termed the *social clock* (Neugarten, 1976). However, although the term was introduced half a century ago, it has received relatively scant attention.

This relative absence of empirical attention to the topic of the social clock is perhaps because over ninety percent of psychological research was conducted in predominantly individualistic cultures (Dan, 2010) with more relaxed age expectations. We propose that the social clock may be an important concept that has significant implications for individual psychological well-being in more collectivistic nations like China. Thus, the present research examines whether the social clock's rigidity differs across cultures and, if so, what psychological factors explain the cultural difference. We do so by comparing individuals' expectations of the social clock in two countries that represent individualistic and collectivistic cultures (i.e., the U.S. vs. China) and considering filial piety beliefs as an underlying reason for the difference. In addition, the current research examines how the social clock's rigidity is linked to self-conscious emotions in these cultures, highlighting the psychological consequences of deviating from the social clock.

The Social Clock

The social clock is a culturally defined timeline for life milestones, such as marriage, childbirth, and starting the first job (Neugarten, 1976). As one of the socially prescribed age

norms, the social clock influences consecutive changes in behavior and self-perceptions across time in deciding whether people have made good progress in achieving life milestones (Helson & McCabe, 1994).

Previous studies showed that the social clock exists in many cultures (e.g., Lee & Payne, 2010; Byrd & Breuss, 1992; Gee, 1990; Peterson, 1996). For example, studies in New Zealand and Australia revealed that people have considerable agreement regarding the “correct” age at which people are expected to attain various life milestones (Byrd & Breuss, 1992; Peterson, 1996). Also, the social clock tends to vary among different types of life events. In a study conducted in two British Columbia cities (Gee, 1990), proportionately more women provided “right ages” for family events (e.g., getting married) than for non-family events.

Studies have also examined psychological factors affecting adherence to the social clock and the consequences of non-adherence to it. For example, women with higher scores on achievement via conformance (i.e., the desire to do well) and intellectual efficiency are more likely to conform to the feminine social clock (Helson et al., 1984). Studies conducted in the U.S. show that although being late in achieving desirable life events based on the statistical age norms is associated with increased psychological distress, such greater distress was not caused by a lack of social resources or negative social sanctions (Rook et al., 1989). In addition, being on time with life transitions does not invariably offer psychological advantages (Rook et al., 1989), the patterns of which may occur in more individualistic (compared to more collectivistic) cultures with a presumably more flexible social clock. However, it remains unknown how the social clock’s rigidity differs across cultures and how

deviation from the social clock is associated with the anticipated emotional well-being across cultures.

Role of Filial Piety

We reason that the cultural dimension of individualism-collectivism, in particular, the sense of social duty associated with this cultural dimension, leads to variations in the social clock's rigidity. In the present research, we focused on two national cultures, the U.S. and China, which differ in the individualism-collectivism cultural dimension (Hofstede, 2011; Pelham et al., 2022).

China, with its long history of imperial rule, agrarian economy, and Confucian tradition, has historically placed a strong emphasis on group harmony and collective goals (e.g., Triandis, 1999). Confucianism, in particular, has deeply influenced Chinese society by promoting respect for authority, familial loyalty, and social order, fostering a collectivistic mindset that emphasizes collective goals (e.g., Triandis et al., 1988). These traditions continue to have a noticeable effect on Modern China. The U.S., on the other hand, is a relatively newly settled country founded on principles of liberty, individual rights, and the Puritan idea of self-reliance. Rooted in its history of a "frontier spirit" (Kitayama et al., 2009), the U.S. emerged as a highly individualistic society where individual rights and freedoms are paramount.

Consequently, people from the two national cultures view interpersonal duties differently. Specifically, people from the U.S. are more inclined to prioritize self-expression, uniqueness, and personal choice, whereas people from China are more likely to place a stronger emphasis on social obligation and interpersonal responsibilities (e.g. Kim & Markus, 1999; Markus & Kitayama, 1991, Triandis et al., 1985). That is, in more collectivistic

cultures such as China, relative to more individualistic cultures such as the U.S., people tend to consider the desires and needs of those in their social group, adopt a more rigorous view of social responsibilities, and judge failure to assist another in moral terms (Cross et al., 2000; Miller et al., 1990).

While the cultural importance of social duties and responsibilities is found in many collectivistic cultural contexts, the manifestation of the concept varies in specific cultural regions (Campos & Kim, 2017). For example, the concept may take the form of familismo in Latin American cultures (e.g., Ayón et al., 2010) or filial piety in East Asian cultures (e.g., Ho, 1996). In the current study, as we compare the U.S. with China, we chose a social obligation—*filial piety*—that is especially important for the Chinese as a potential psychological factor explaining the cultural differences. Originated in ancient Chinese culture, filial piety is a virtue shared in Confucianism, Chinese Buddhism, and Daoist ethics that highlights beliefs and behaviors of fulfilling the duties of the younger generation of respecting and taking care of their parents and elders (e.g., Ho, 1996; Chan & Tan, 2008). In Chinese culture, which values filial piety, individuals are responsible for bestowing honor upon their families and carrying out their parents’ desires and dreams even after their deaths (Yeh & Bedford, 2004; Kohn, 2004).

For thousands of years, filial piety has been a crucial cultural attribute in China and its neighboring countries (Chan & Tan, 2008) and prevails even among Americans of Asian descent (Yeh & Bedford, 2003). Researchers have claimed that filial piety, communalism, and familism are “birds of a collectivist feather” that cluster into a single latent construct referred to as *family or relationship primacy* that emphasizes interdependence and

interpersonal obligations, which is central to Chinese culture (Schwartz, 2007; Schwartz et al., 2010).

In Chinese culture that cherishes the virtue of filial piety, life events such as getting married and having children are vital to continuing the family line and producing descendants in defense against existential threats such as mortality (Qi, 2022). Besides, life events such as attending college and acquiring a full-time job can bring honor and secure resources for the family. As such, in China, the social clock is likely to be more rigid to better serve as a guideline for individuals to fulfill their social obligations. By contrast, in the U.S., where independence and uniqueness are cherished (Kim & Markus, 1999; Markus & Kitayama, 1991), and filial piety, or more broadly, individuals' sense of duties, is less commended, the timings to essential life milestones may have less to do with the societal expectations. Therefore, we reason that cultural differences in the social clock's rigidity are explained by respective cultural differences in filial piety.

Social Clock and Emotional Well-being

Given that filial piety is a key manifestation of collectivism in Chinese culture, filial piety practice could matter for emotional well-being, as people who adhere closely to it are inclined to feel guilty and shameful if they go against the principles (see Bedford, 2004; Bedford & Hwang, 2003). Consequently, in China, those whose personal life timing deviates from the social clock may experience more *self-conscious emotions*, such as shame and guilt (e.g., Tracy et al., 2009), because failing to achieve life milestones indicates failing to uphold filial piety. We focus on self-conscious emotions because deviation from the social clock may contribute to a discrepancy between one's actual self and ought self, which can produce specifically anxiety-related emotions instead of broad negative affect (Higgins, 1987). Taken

together, we reason that the link between fitting in the social clock and emotional well-being would be stronger in China than in the U.S. due to their differences in filial piety.

The Present Research

The present research examines whether and how the social clock's rigidity (or flexibility) differs across cultures. To our knowledge, no prior work has shed light on these inquiries. By examining aspects of the social clock, our research presents a cultural perspective on an important yet often overlooked factor that influences individuals' emotional well-being.

We measure the social clock's rigidity using the width of "time windows" for specific life events. We ask participants to provide the earliest and latest age they think is appropriate for accomplishing various life milestones. The time window for each life event is calculated by subtracting the earliest age from the latest age. The narrower (vs. wider) the time windows for life events, the more rigid (vs. flexible) the social clock is.

In three studies, we compared the time windows for several life events in the U.S. and China to examine whether and how their social clock's rigidity differs. We also measured how deviation from the social clock, both from the upper-bound (Studies 1a and 1b) and from the lower-bound (Study 2), would impact anticipated emotional well-being. Across all studies, we hypothesized that the social clock would be more rigid in China than in the U.S. We also hypothesized that deviation from the social clock would be associated with more anticipated negative emotional outcomes in China than in the U.S. Further, we explored the role that filial piety plays in these cultural differences.

Study 1a was exploratory. The hypotheses, analysis plans, and sampling method (and exclusion rules) for Study 1b were preregistered (https://aspredicted.org/7R8_GXN), as were

those for Study 2 (<https://doi.org/10.17605/OSF.IO/45BUW>). Materials and de-identified data, along with their codebooks and data analysis scripts, are made publicly available at <https://doi.org/10.17605/OSF.IO/QN23K>. Additional measures and results can be found in our supplementary materials at <https://drive.google.com/file/d/1euMNudGN1vIjW7O3WTaWRiOzIF9c1MPZ/view?usp=sharing>.

Study 1a

In Study 1a, we compared the variations in the widths of the time windows suitable for engaging in four life events (career- or family-related) between the U.S. and China to test the hypothesis that the social clocks are more rigid in China than in the U.S. and to explore the role of filial piety beliefs in explaining such cultural differences. Moreover, we examined how deviation from the upper-bound of the social clock would impact individuals' emotional well-being across cultures. We hypothesized that deviation from the upper-bound of the social clock would be more distressing for the Chinese than Americans.

Participants

Informed by studies on comparable topics (e.g., Peterson, 1996; Helson et al., 1984), we set our sample size for Study 1 at 600 (300 per culture)². We recruited 478 participants in the U.S. via the Prolific platform ($N = 167$) or an introductory psychology subject pool ($N = 311$) and 574 participants in China via WeChat, a Chinese social media. Participants who failed to complete the survey or declined to share anonymous data were excluded from the analyses. Participants who listed a lower value for the upper limit than the value for the

² These previous studies had a sample size of 130-141 per study. We over-sampled in this exploratory study to increase reliability and thus doubled the sample size per culture.

lower limit were also excluded. Our final sample ($N = 640$) contains 343 American participants and 297 Chinese participants (Table 1)³.

Table 1

Breakdown of demographics in the U.S. and China in Study 1a.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. ($N = 343$)	21.73 (4.35)	Male: 37.9 Female: 58.9 Non-binary/Other: 3.2	European American: 43.1 Hispanic/Latino: 28.6 Asian American/Pacific Islander: 12.8 Multiracial/Biracial: 9.3 Black/African American: 3.2 Other: 2.6 Native American/Alaskan: 0.3	24.2
China ($N = 297$)	24.20 (5.19)	Male: 43.4 Female: 56.2 Non-binary/Other: 0.3	Han Chinese: 96.0 Ethnic Minorities: 4.0	94.3

Measures

After consenting, participants completed an online survey with items following the subsequent order. The English version was translated into simplified Chinese for Chinese participants using the back-translation method. The content of the Chinese version is identical to that of the English version, except for some demographic questions, given national differences in these measures (e.g., in education systems).

Time Window Blocks

Perceptions of the Social Clock. Participants were presented with six time-window blocks. In each block, we first measured participants' perceptions of the social clock by asking them to provide the earliest and the latest ages they thought appropriate for engaging

³ See the supplementary materials (p. 6) for the post-hoc power analyses using the G*Power software (Erdfelder et al., 1996).

in a particular event (Table 2). For example, participants read the description: “Assuming a person wants to attend a college. Please provide a range of ages that you think is appropriate for the person to start attending a college.” Then, participants were instructed to scroll two sliders (ranging from 10 to 90) to indicate the earliest (or the lower-bound) and the latest (or the upper-bound) ages they thought appropriate for the person to start attending college, respectively.

As family-related life events may be gender-dependent, we measured participants’ perceptions of the earliest and the latest ages appropriate for a male or a female to participate in each life event. The structure and phrasing of questions were similar to those for career-related life events. The time window for each life event is calculated by deducting the earliest age (or lower-bound age) from the latest age (or upper-bound age).

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound). We measured the anticipated negative self-conscious emotions resulting from deviation from the upper-bound of the social clock. For instance, participants read: “Assuming you want to attend a college—Imagine you didn’t start attending college by the time you are reaching *this upper-bound* of the appropriate age for attending college (i.e., by age [quoting the numeric value of the upper-bound age they entered previously]). Please indicate how much you would feel the following emotions if you are not fulfilling the age-appropriate expectation.” Participants were presented with four emotional states, i.e., “regretful,” “ashamed,” “anxious,” and “guilty,” and reported how much they would feel each emotion on a 5-point Likert-type scale (1 = *not at all* to 5 = *a great deal*). The structure and phrasing of questions were comparable in all blocks. As the reliabilities of ratings of the

four anticipated negative emotions were high ($\alpha > 0.85$), we averaged them into one composite score in each block.

Table 2

Sequences of the questions measuring time windows in Study 1a.

	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
Life event subcategories	Career-related life events		Family-related life events			
Specific life event	Starting college	Getting a full-time job	Getting married (male)	Getting married (female)	Having a first child (male)	Having a first child (female)

Filial Piety Beliefs

The 12-item filial piety scale (Fu et al., 2020) was used to assess the extent to which one endorses filial piety beliefs. Example items include “Children should ask after their parents’ well-being” and “Children should try their best to honor their parents.” Participants reported their agreement or disagreement with each statement on a 5-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*). Item scores were averaged to create a composite score ($\alpha_{US} = 0.85$; $\alpha_{CH} = 0.87$). Higher scores indicated a higher endorsement of filial piety.

Additional Measures

The study included a few measures to examine potential alternative psychological explanations. Analyses examining the roles of these additional factors are reported in the supplementary materials (pp. 4-5). In addition, the study included measures of the intersubjective perceptions of the social clock (i.e., participants’ perceptions of what a typical person in their country would consider appropriate for engaging in each life event) and anticipated negative emotional outcomes of deviation from the intersubjective social clock

(i.e., the anticipated negative self-conscious emotions resulting from deviation from the upper-bound of the intersubjective social clock). Their associated results will be outlined in a separate research paper (Zang & Kim, in preparation). Unless otherwise specified, the “social clock” in this paper refers to the subjective, not intersubjective, social clock. See the supplementary materials (pp. 1-2).

Demographic Covariates

Basic demographic information, including age, gender, education, and subjective socioeconomic status (SES; Adler et al., 2000), were measured as potential covariates.

Results

Correlations between Variables

We first calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and China (Table 3).

Table 3

Descriptive statistics of the variables and bivariate correlations in the U.S. and China in Study 1a.

	The U.S. (<i>N</i> = 343)							China (<i>N</i> = 297)								
	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7
1. Time window for career-related life events	39.36 (19.09)	-							17.69 (16.79)	-						
2. Time window for family-related life events	29.79 (14.16)	.60 ***	-						15.77 (12.44)	.69 ***	-					
3. Filial piety beliefs	3.13 (.60)	-.24 ***	-.29 ***	-					3.66 (.67)	-.42 ***	-.41 ***	-				
4. Anticipated negative emotional outcomes of deviation from the career-related social clock (upper bound)	3.13 (1.03)	-.15 **	-.19 ***	.11 *	-				3.07 (.99)	-.38 ***	-.28 ***	.21 ***	-			
5. Anticipated negative emotional outcomes of deviation from the family-related social clock (upper bound)	2.60 (1.06)	-.11 *	-.17 **	.26 ***	.52 ***	-			2.54 (1.04)	-.31 ***	-.31 ***	.46 ***	.58 ***	-		
6. Age	21.73 (4.35)	.14 *	.13 *	-.11 *	-.22 ***	-.23 ***	-		24.20 (5.19)	-.03	-.01	-.01	-.11	.02	-	
7. SES	5.65 (1.78)	-.06	-.06	.24 ***	.12 *	.19 ***	-.31 ***	-	5.64 (1.61)	-.01	.05	-.01	-.04	-.07	.10	-

*** $p < .001$, ** $p < .01$, * $p < .05$.

Cultural Differences in the Time Windows

To test our key hypothesis, we examined whether culture affects the social clock's rigidity by looking at the time windows for career-related and family-related life events (Figure 1). See Figure 2 for an additional visualization. In all analyses, we included age, gender, SES, and education as covariates.

Figure 1

The widths of the time windows for career-related and family-related life events in the U.S. and China in Study 1a.

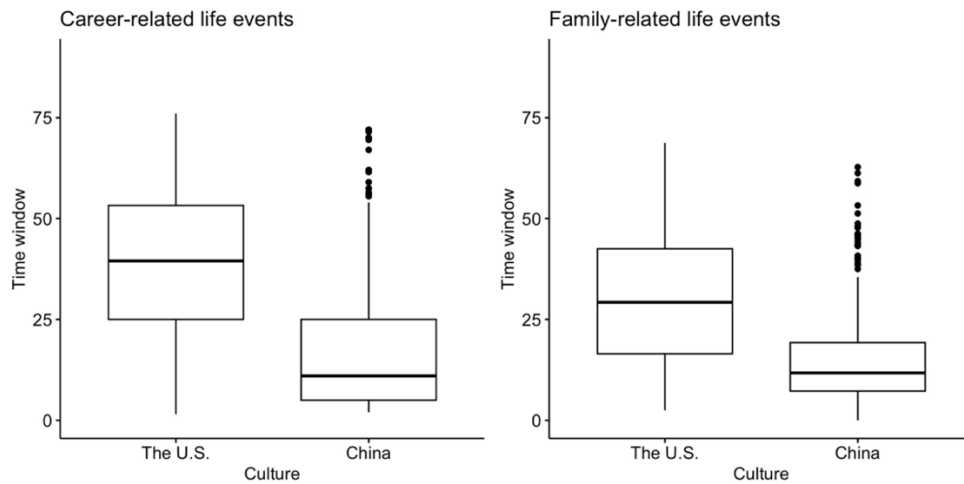
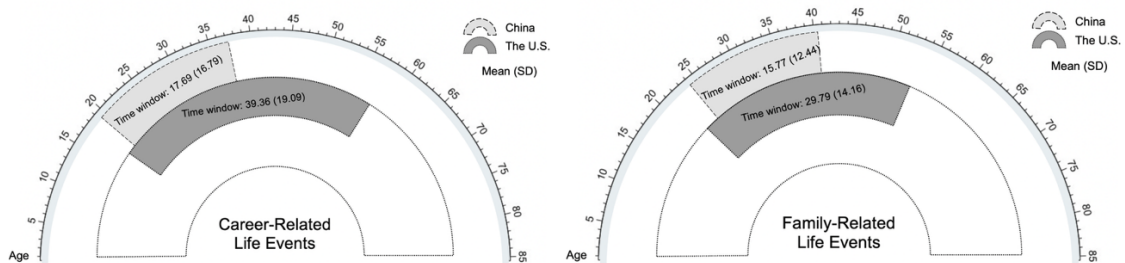


Figure 2

Additional visualization of the finding that culture influences people's perceptions of the social clock's rigidity in Study 1a.



We first examined the cultural differences in the time window for career-related life events. A generalized estimating equation (GEE) with robust standard errors (SEs) on the

time window for career-related life events with culture (the U.S. vs. China) as a predictor with the covariates revealed a significant main effect of culture⁴, Wald $\chi^2(1, N = 640) = 182.33, p < .001$. The time window for career-related life events was narrower in China ($M = 16.02$, robust SE = 1.11, 95% Wald CI [13.84, 18.20]) than in the U.S. ($M = 40.80$, robust SE = 1.78, 95% Wald CI [38.49, 43.11]), $B = 24.78$, robust SE = 1.84, 95% Wald CI [21.18, 28.38].

We then ran the same analysis for the cultural differences in the time window for family-related life events. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 640) = 117.94, p < .001$. The time window for family-related life events was narrower in China ($M = 15.03$, robust SE = .84, 95% Wald CI [13.39, 16.67]) than in the U.S. ($M = 30.43$, robust SE = .91, 95% Wald CI [28.65, 32.21]), $B = 15.40$, robust SE = 1.42, 95% Wald CI [12.62, 18.18]. When we examined lower- and upper-bound ages separately, we found significant cultural differences in most of the upper- and lower-bound ages, although the time windows are mainly driven by the differences in the upper-bound ages (Table 4)⁵.

Table 4

Descriptive statistics and cultural differences in the time window for each life event, as well as in the lower and upper-bound age in Study 1a (controlled for demographic covariates).

⁴ We ran GEEs with robust SEs for all analyses (except for regression analyses) in Study 1a to maintain consistency and account for violations of key statistical assumptions (e.g., homogeneity of variance) in the outcome variables. The significance patterns of all reported results in Study 1a remain consistent with or without demographic covariates and will not be discussed further.

⁵ We controlled for the lower-bound ages in examining the cultural differences in the time windows, and the main effect of culture remained significant. Specifically, we first examined the cultural differences in the time window for career-related life events. A generalized estimating equation (GEE) with robust standard errors (SEs) on the time window for career-related life events with culture (the U.S. vs. China) as a predictor, controlling for demographic covariates and the lower-bound age for career-related life events revealed a significant main effect of culture, Wald $\chi^2(1, N = 640) = 118.20, p < .001$. We then ran the same analysis for the cultural differences in the time window for family-related life events, controlling for demographic covariates and the lower-bound age for family-related life events. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 640) = 59.79, p < .001$. We are unable to control for the upper-bound ages due to high correlations between time windows and upper-bound ages, which would result in problematic multicollinearity (with $r_s > 0.98$) if both were included in the same generalized estimating equation (GEE) model.

Specific life event	Culture	Lower bound age Mean (SD) Median	Wald $\chi^2(1, N = 640)$ and B for the effect of culture on the lower bound age	Upper bound age Mean (SD) Median	Wald $\chi^2(1, N = 640)$ and B for the effect of culture on the upper bound age	Time window Mean (SD) Median	Wald $\chi^2(1, N = 640)$ and B for the effect of culture on the time window
Starting college	The U.S.	17.35 (2.91) 17.00	Wald $\chi^2 = .02$, B = -.05	60.26 (23.78) 60.00	Wald $\chi^2 = 143.77$, B = 26.91 ***	42.91 (24.29) 42.00	Wald $\chi^2 = 137.67$, B = 26.96 ***
	China	17.43 (2.16) 18.00		37.72 (21.89) 28.00		20.29 (22.36) 11.00	
Getting a full-time job	The U.S.	18.45 (2.41) 18.00	Wald $\chi^2 = 150.95$, B = -3.58 ***	54.27 (20.91) 60.00	Wald $\chi^2 = 95.11$, B = 19.02 ***	35.81 (21.42) 40.00	Wald $\chi^2 = 126.04$, B = 22.60 ***
	China	21.74 (3.28) 22.00		36.82 (14.96) 30.00		15.08 (15.85) 9.00	
Getting married (male)	The U.S.	22.70 (4.02) 22.00	Wald $\chi^2 = 7.36$, B = -1.92 **	64.87 (21.65) 61.00	Wald $\chi^2 = 121.89$, B = 22.26 ***	42.17 (22.85) 40.00	Wald $\chi^2 = 136.77$, B = 24.19 ***
	China	24.10 (5.00) 24.00		43.33 (18.31) 36.00		19.23 (18.95) 12.00	
Getting married (female)	The U.S.	21.80 (3.43) 22.00	Wald $\chi^2 = 10.77$, B = -1.18 **	61.10 (22.84) 60.00	Wald $\chi^2 = 78.42$, B = 18.85 ***	39.30 (23.48) 35.00	Wald $\chi^2 = 83.71$, B = 20.03 ***
	China	22.82 (3.23) 22.00		41.96 (19.90) 35.00		19.14 (20.08) 12.00	
Having a first child (male)	The U.S.	24.19 (3.90) 25.00	Wald $\chi^2 = 32.12$, B = -2.11 ***	44.41 (9.94) 44.00	Wald $\chi^2 = 36.74$, B = 6.99 ***	20.23 (11.06) 19.00	Wald $\chi^2 = 50.75$, B = 9.11 ***
	China	26.13 (3.52) 26.00		39.94 (10.33) 40.00		13.80 (10.80) 11.00	
Having a first child (female)	The U.S.	23.01 (3.54) 23.00	Wald $\chi^2 = 27.84$, B = -1.88 ***	40.48 (8.98) 40.00	Wald $\chi^2 = 33.67$, B = 6.39 ***	17.47 (9.19) 17.00	Wald $\chi^2 = 55.00$, B = 8.27 ***
	China	24.55 (3.23) 25.00		35.45 (7.57) 35.00		10.90 (7.42) 10.00	

*** $p < .001$, ** $p < .01$.

The Role of Filial Piety

Then, we examined if the cultural differences in the widths of the time windows could be explained by beliefs in filial piety as exploratory analyses. To do so, we conducted a series of regression analyses, controlling for the same covariates.

When the outcome variable was the time window for career-related life events, culture predicted the time window ($\beta = -.59$, $b = -24.78$ [-28.43, -21.13], $p < .001$) and filial piety beliefs ($\beta = .45$, $b = .62$ [.50, .74], $p < .001$). When culture and filial piety beliefs were entered simultaneously as predictors, beliefs in filial piety predicted a narrower time window for career-related life events ($\beta = -.26$, $b = -7.83$ [-10.10, -5.56], $p < .001$).

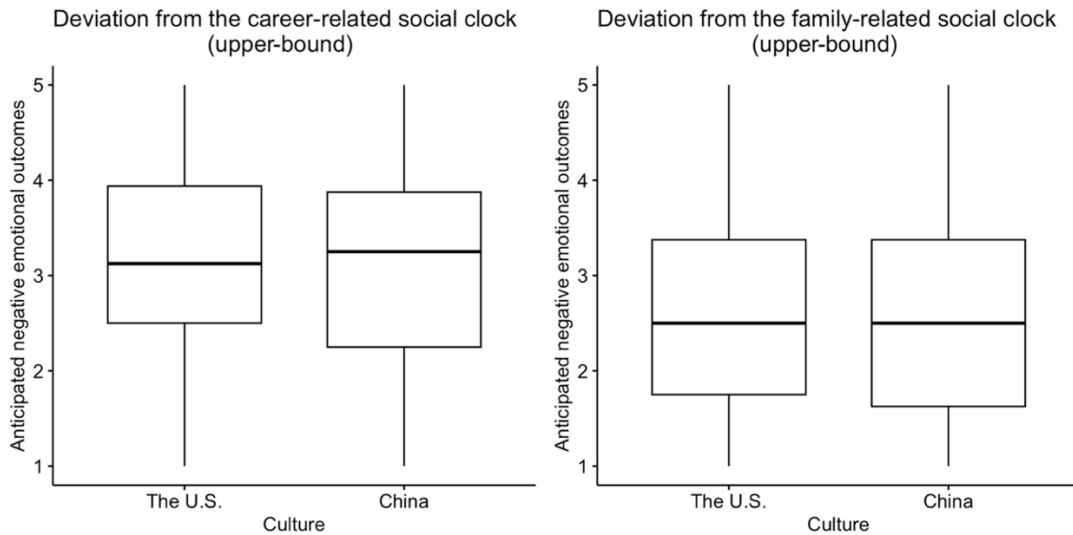
When the outcome variable was the time window for family-related life events, culture predicted the time window ($\beta = -.51$, $b = -15.40$ [-18.12, -12.68], $p < .001$) and filial piety beliefs ($\beta = .45$, $b = .62$ [.50, .74], $p < .001$). When culture and filial piety beliefs were entered simultaneously as predictors, beliefs in filial piety predicted a narrower time window for family-related life events ($\beta = -.30$, $b = -6.60$ [-8.27, -4.92], $p < .001$). Taken together, these analyses show that filial piety is positively associated with the social clock's rigidity, and supports the idea that cultural differences in the social clock's rigidity are due to cultural differences in endorsement of filial piety beliefs.

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

In addition, we examined whether there are cultural differences in anticipated emotional outcomes resulting from deviation from the upper-bound of the social clock (Figure 3). The analyses showed no cultural differences. See full results in the supplementary materials (p. 6).

Figure 3

Anticipated negative emotional outcomes of deviation from the social clock (upper-bound) in the U.S. vs. China (Study 1a).



Discussion

Study 1a provided the initial evidence about how the social clock's rigidity differs between the two national cultures. Consistent with our hypothesis, the social clock was more flexible in the U.S. than in China, as the Chinese social clock has significantly higher lower-bound and lower upper-bound ages compared to the American social clock. Not surprisingly, the cultural differences in the social clock were primarily driven by the differences in the upper-bound age, perhaps reflecting the fact that lower-bound ages are more narrowly restricted by biological and structural (e.g., length of typical formal schooling) factors. We also found initial support that such differences were explained by cultural differences in endorsement of filial piety beliefs. However, contrary to our hypothesis, deviation from the upper-bound of the social clock resulted in comparable anticipated negative emotional outcomes in both cultures. We reason that this is perhaps because the participants were mostly young adults (M age = 22.88, $S.D.$ age = 4.91) who may not necessarily have real-life experiences regarding failure to achieve specific life milestones within the appropriate time

windows. In addition, the American participants were more ethnically diverse than the national demographics, which may dilute the cultural main effect. Therefore, in Study 1b, we recruited participants of a wider range of ages who also more accurately reflect the national ethnic breakdown.

Study 1b

Study 1b (preregistered at https://aspredicted.org/7R8_GXN) aimed to replicate the findings of Study 1a and to increase the external validity with participants from a wider age range.

Participants

Based on power analysis⁶, we set our sample size at $N = 100$ per culture. We recruited 107 participants in the U.S. via the Prolific platform and 102 participants in China via the Credamo platform (comparable to the Prolific platform). The data exclusion rules were the same as in Study 1a. Our final sample ($N = 198$) contains 98 American participants and 100 Chinese participants (Table 5).

Table 5

Breakdown of demographics in the U.S. and China in Study 1b⁷.

⁶ Based on Study 1a results (cultural differences on time windows), the medium $R = .52$, we calculated the effect size $f^2 = .38$. We ran the power analysis using the G*Power software (Erdfelder et al., 1996) using an F test, A Priori, where $f^2 = .38$, $\alpha = .05$, Power $(1 - \beta) = .95$, number of predictors = 3. It yields a total sample size of 50. We over-sampled to increase statistical power and double the minimum sample size needed per culture. See the supplementary materials (p. 7) for the corrected details and post-hoc power analyses.

⁷ Education was considered a potential confound because the Chinese sample was, on average, more highly educated than the U.S. sample. To address this confound, we conducted additional analyses in the U.S. sample, where there was sufficient variability in education. Education was recoded as 0 = below college and 1 = college and above, and was entered as a fixed factor in a series of univariate analyses predicting career- ($F(1, 93) = .01$, $p = .91$, $\eta^2_p < .001$) and family-related ($F(1, 93) = .07$, $p = .80$, $\eta^2_p = .001$) time windows as well as anticipated emotional outcomes to deviations from the upper-bound of the career- ($F(1, 93) = .44$, $p = .51$, $\eta^2_p = .005$) and family-related ($F(1, 93) = 3.00$, $p = .09$, $\eta^2_p = .03$) social clock, controlling for age, gender, and SES. No significant effects of education were observed. Given that education was also controlled for in the primary analyses, it is unlikely to pose a major concern for the interpretation of the present findings or those of the other studies. These additional analyses were not conducted for Study 1a because a substantial proportion of the U.S. sample consisted of undergraduate students and therefore did not hold a college degree.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. (<i>N</i> = 98)	34.80 (11.10)	Male: 50 Female: 44.9 Non- binary/Other: 5.1	European American: 72.4 Asian American/Pacific Islander: 10.2 Hispanic/Latino: 8.2 Black/African American: 7.1 Multiracial/Biracial: 2.0	63.3
China (<i>N</i> = 100)	34.59 (12.73)	Male: 52.0 Female: 48.0	Han Chinese: 98.0 Ethnic Minorities: 2.0	96.0

Measures

The procedure and measures were the same as in Study 1a, except for removing all additional measures that were not central to the hypothesis. We averaged the ratings of the four anticipated negative emotions into one composite score in each time window block ($\alpha > 0.88$). Filial piety beliefs were measured using the same scale (Fu et al., 2020) ($\alpha_{US} = 0.89$; $\alpha_{CH} = 0.77$).

We deviated from the preregistration such that the intersubjective perceptions of the social clock and anticipated negative emotional outcomes of deviation from the intersubjective social clock (upper-bound) were not included as a part of this paper. These measures are identical to those in Study 1a. We did not report the preregistered analyses related to the intersubjective perceptions of the social clock, as those will be presented in a separate paper (Zang & Kim, in preparation). In addition, we dropped the event of beginning graduate school when finalizing study materials as it is not a common life milestone.

Results

Correlations between Variables

We calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and China (Table 6).

Table 6

Descriptive statistics of the variables and bivariate correlations between them in the U.S. and China in Study 1b.

	The U.S. (<i>N</i> = 98)							China (<i>N</i> = 100)								
	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7
1. Time window for career-related life events	43.00 (18.69)	-							9.75 (10.09)	-						
2. Time window for family-related life events	34.73 (14.22)	.62 ***	-						10.58 (6.52)	.51 ***	-					
3. Filial piety beliefs	3.12 (.67)	-.28 **	-.34 ***	-					3.94 (.44)	-.23 *	-.19	-				
4. Anticipated negative emotional outcomes resulting from deviation from the career-related social clock (upper bound deviation)	2.60 (1.09)	-.33 ***	-.23 *	.11	-				3.59 (.90)	-.17	-.09	.34 ***	-			
5. Anticipated negative emotional outcomes resulting from deviation from the family-related social clock (upper bound deviation)	2.14 (.99)	-.20 *	-.16	.36 ***	.58 ***	-			3.25 (.97)	-.08	-.11	.36 ***	.61 ***	-		
6. Age	34.80 (11.10)	.10	-.03	.37 ***	-.32 **	-.03	-		34.59 (12.73)	-.14	-.01	.04	-.19	-.01	-	
7. SES	4.85 (1.66)	.08	.13	-.01	-.05	.01	.07	-	5.33 (1.16)	-.03	.21 *	.17	.10	.08	.18	-

*** $p < .001$, ** $p < .01$, * $p < .05$.

Cultural Differences in the Time Windows

Likewise, we examined whether culture affects the social clock's rigidity (Figure 4). See Figure 5 for an additional visualization. In all analyses, we included the same demographic covariates as in Study 1a.

Figure 4

The widths of the time windows for career-related and family-related life events in the U.S. and China in Study 1b.

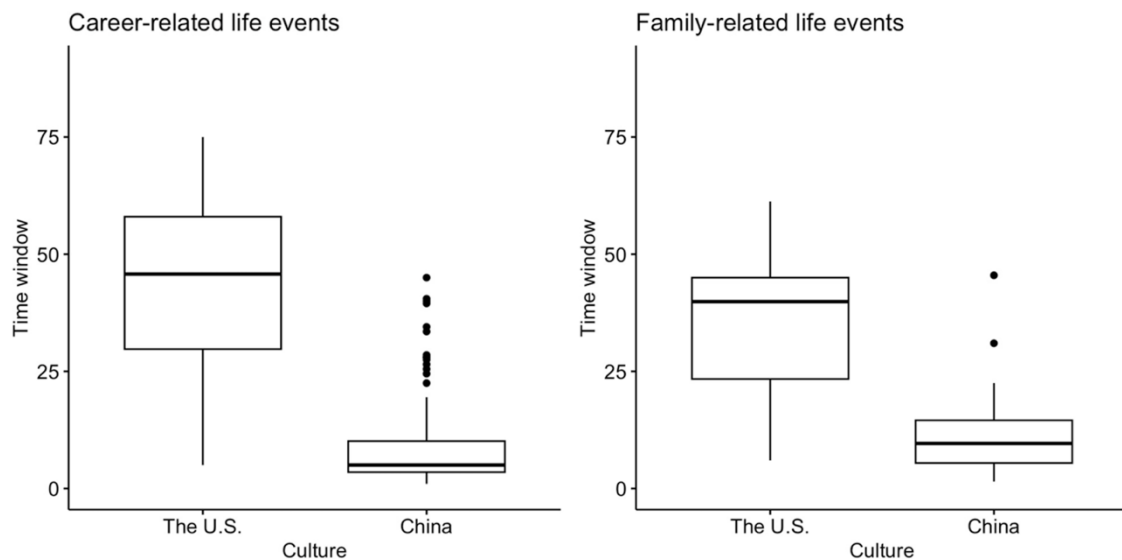
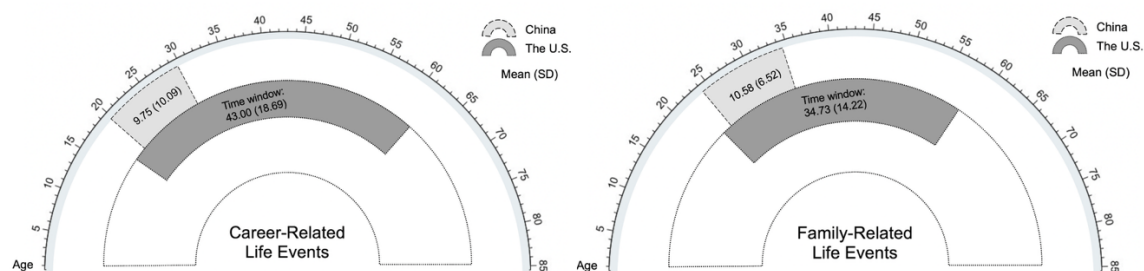


Figure 5

Additional visualization of the finding that culture influences people's perceptions of the social clock's rigidity in Study 1b.



We first examined the cultural differences in the time window for career-related life events. A GEE with robust SEs was conducted on the time window for career-related life

events with culture (the U.S. vs. China) as a predictor with the covariates⁸. We found a significant main effect of culture⁹, Wald $\chi^2(1, N = 198) = 226.92, p < .001$. The time window for career-related life events was narrower in China ($M = 9.69$, robust SE = 1.12, 95% Wald CI [7.49, 11.89]) than in the U.S. ($M = 43.06$, robust SE = 1.81, 95% Wald CI [39.51, 46.61]), $B = 33.37$, robust SE = 2.22, 95% Wald CI [29.03, 37.71].

We ran the same analysis for the cultural differences in the time window for family-related life events. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 260.13, p < .001$. The time window for family-related life events was narrower in China ($M = 10.37$, robust SE = .68, 95% Wald CI [9.03, 11.71]) than in the U.S. ($M = 34.95$, robust SE = 1.34, 95% Wald CI [32.32, 37.58]), $B = 24.58$, robust SE = 1.52, 95% Wald CI [21.59, 27.56]. As in Study 1a, we found significant cultural differences in most of the lower- and upper-bound ages when they were examined separately, although the magnitude of the differences was greater with the upper-bound ages (Table 7)¹⁰.

Table 7

Descriptive statistics and cultural differences in the time window for each life event, as well as in the lower and upper-bound age in Study 1b (controlled for demographic covariates).

⁸ We had preregistered to conduct univariate ANOVAs to examine the cultural differences, but we decided to instead run GEEs with robust SEs for all analyses (except for regression analyses) in Study 1b to account for violations of key statistical assumptions in the outcome variables. See the supplementary materials (pp. 7-9) for the ANOVA results as preregistered.

⁹ The significance patterns of all reported results in Studies 1b remain consistent with or without demographic covariates and will not be discussed further.

¹⁰ We controlled for the lower-bound ages in examining the cultural differences in the time windows, and the main effect of culture remained significant. Specifically, we first examined the cultural differences in the time window for career-related life events. A GEE with robust SEs on the time window for career-related life events with culture (the U.S. vs. China) as a predictor, controlling for demographic covariates and the lower-bound age for career-related life events revealed a significant main effect of culture, Wald $\chi^2(1, N = 198) = 146.21, p < .001$. We then ran the same analysis for the cultural differences in the time window for family-related life events, controlling for demographic covariates and the lower-bound age for family-related life events. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 163.85, p < .001$. We are unable to control for the upper-bound ages due to high correlations between time windows and upper-bound ages, which would result in problematic multicollinearity (with $r_s > 0.98$) if both were included in the same generalized estimating equation (GEE) model.

Specific life event	Culture	Lower bound age Mean (SD) Median	Wald χ^2 (1, N = 198) and B for the effect of culture on the lower bound age	Upper bound age Mean (SD) Median	Wald χ^2 (1, N = 198) and B for the effect of culture on the upper bound age	Time window Mean (SD) Median	Wald χ^2 (1, N = 198) and B for the effect of culture on the time window
Starting college	The U.S. China	17.19 (1.44) 17.00 17.70 (1.91) 18.00	Wald χ^2 = 3.35, B = -.48 	64.70 (21.15) 61.00 28.51 (14.28) 22.00	Wald χ^2 = 176.71, B = 36.77 *** 	47.51 (21.55) 45.00 10.81 (14.66) 4.00	Wald χ^2 = 175.04, B = 37.24 ***
Getting a full-time job	The U.S. China	18.08 (2.34) 18.00 21.59 (2.68) 22.00	Wald χ^2 = 76.59, B = -3.34 *** 	56.57 (20.85) 61.00 30.28 (7.73) 28.00	Wald χ^2 = 136.51, B = 26.16 *** 	38.49 (21.48) 44.00 8.69 (7.99) 6.00	Wald χ^2 = 166.04, B = 29.50 ***
Getting married (male)	The U.S. China	22.46 (4.06) 22.00 24.24 (2.72) 24.50	Wald χ^2 = 11.04, B = -1.76 *** 	73.41 (19.72) 80.00 35.74 (8.57) 35.00	Wald χ^2 = 343.79, B = 38.70 *** 	50.95 (21.28) 60.50 11.50 (8.65) 9.00	Wald χ^2 = 337.52, B = 40.46 ***
Getting married (female)	The U.S. China	21.36 (3.54) 21.00 22.94 (2.87) 22.00	Wald χ^2 = 10.01, B = -1.58 ** 	69.26 (23.49) 80.00 33.75 (9.84) 31.00	Wald χ^2 = 203.66, B = 36.40 *** 	47.90 (23.82) 59.00 10.81 (9.96) 9.00	Wald χ^2 = 217.16, B = 37.98 ***
Having a first child (male)	The U.S. China	24.29 (4.26) 25.00 25.80 (2.89) 26.00	Wald χ^2 = 5.48, B = -1.28 * 	46.11 (11.25) 45.00 36.52 (6.36) 35.00	Wald χ^2 = 46.22, B = 9.71 *** 	21.83 (12.58) 20.00 10.72 (6.37) 10.00	Wald χ^2 = 50.88, B = 10.98 ***
Having a first child (female)	The U.S. China	22.71 (3.94) 22.50 24.09 (2.75) 24.00	Wald χ^2 = 9.11, B = -1.47 *** 	40.98 (7.90) 40.00 33.38 (5.03) 32.00	Wald χ^2 = 65.21, B = 7.44 *** 	18.27 (8.56) 17.50 9.29 (5.38) 8.50	Wald χ^2 = 76.93, B = 8.91 ***

*** $p < .001$, ** $p < .01$, * $p < .05$.

Then, we examined whether the cultural differences in the widths of the time windows could be explained by beliefs in filial piety as exploratory analyses. We conducted a series of regression analyses, controlling for the covariates.

When the outcome variable was the time window for career-related life events, culture predicted the time window ($\beta = -.75$, $b = -33.37$ [-37.71, -29.03], $p < .001$) and filial piety beliefs ($\beta = .59$, $b = .82$ [.66, .99], $p < .001$). When culture and filial piety beliefs were entered simultaneously as predictors, beliefs in filial piety predicted a narrower time window for career-related life events ($\beta = -.21$, $b = -6.67$ [-10.32, -3.03], $p < .001$).

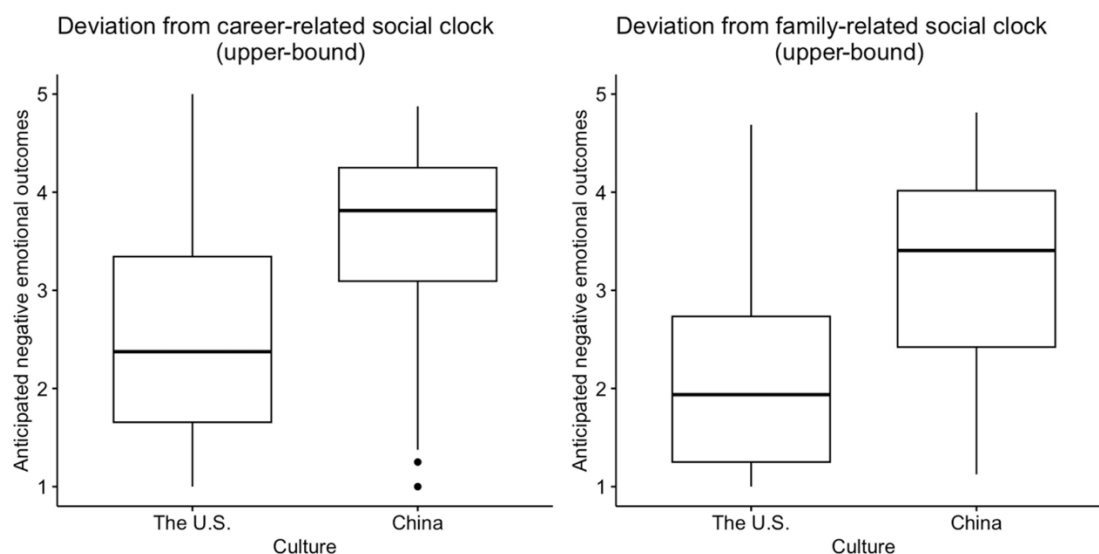
When the outcome variable was the time window for family-related life events, culture predicted the time window ($\beta = -.75$, $b = -24.58$ [-27.73, -21.44], $p < .001$) and filial piety beliefs ($\beta = .59$, $b = .82$ [.66, .99], $p < .001$). When culture and filial piety beliefs were entered simultaneously as predictors, beliefs in filial piety predicted a narrower time window for family-related life events ($\beta = -.23$, $b = -5.44$ [-8.06, -2.83], $p < .001$). Taken together, these analyses suggest that filial piety is positively associated with the social clock's rigidity, and present further support for the notion that cultural differences in the social clock's rigidity are due to cultural differences in endorsement of filial piety beliefs.

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

As an exploratory analysis, we further examined whether anticipated negative emotional outcomes resulting from deviation from the upper-bound of the social clock differ across cultures (Figure 6).

Figure 6

Anticipated negative emotional outcomes of deviation from the social clock (upper-bound) in the U.S. vs. China (Study 1b).



We first looked at anticipated negative emotional outcomes resulting from deviation from the career-related social clock. A GEE with robust SEs was conducted on this variable with culture (the U.S. vs. China) as a predictor with the covariates. We found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 43.62, p < .001$. Deviation from the career-related social clock (upper-bound) was anticipated to be more distressing in China ($M = 3.57$, robust SE = .09, 95% Wald CI [3.39, 3.75]) than the U.S. ($M = 2.62$, robust SE = .10, 95% Wald CI [2.41, 2.82]), $B = -.95$, robust SE = .14, 95% Wald CI [-1.23, -.67]).

In addition, we tested anticipated negative emotional outcomes resulting from deviation from the family-related social clock. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 50.76, p < .001$. Deviation from the family-related social clock was also anticipated to be more distressing in China ($M = 3.23$, robust SE = .10, 95% Wald CI [3.03, 3.42]) than the U.S. ($M = 2.16$, robust SE = .10, 95% Wald CI [1.96, 2.36]), $B = -1.07$, robust SE = .15, 95% Wald CI [-1.36, -.77]. See the supplementary materials (p. 10) for descriptive statistics and the cultural differences in anticipated negative emotional outcomes resulting from deviation from the social clock (upper-bound) for each life event.

The Role of Filial Piety

Then, we examined if the cultural differences in anticipated negative emotional outcomes resulting from deviation from the upper-bound of the social clock could be explained by beliefs in filial piety as exploratory analyses. To do so, we conducted a series of regression analyses, controlling for the same covariates.

With deviation from the career-related social clock, culture predicted anticipated negative emotional outcomes ($\beta = .43$, $b = .95$ [.66, 1.24], $p < .001$) and filial piety beliefs ($\beta = .59$, $b = .82$ [.66, .99], $p < .001$). When culture and filial piety were entered simultaneously as predictors, beliefs in filial piety predicted more anticipated negative emotional outcomes ($\beta = .30$, $b = .47$ [.23, .71], $p < .001$).

With deviation from the family-related social clock, culture predicted anticipated negative emotional outcomes ($\beta = .48$, $b = 1.07$ [.77, 1.36], $p < .001$) and filial piety beliefs ($\beta = .59$, $b = .82$ [.66, .99], $p < .001$). When culture and filial piety were entered simultaneously as predictors, beliefs in filial piety predicted more anticipated negative emotional outcomes ($\beta = .40$, $b = .65$ [.41, .88], $p < .001$). These analyses show that filial piety is positively associated with anticipated negative emotions, and cultural differences in endorsement of filial piety beliefs are likely to explain the cultural differences in anticipated negative.

Discussion

Study 1b replicated Study 1a findings that the social clock tends to be more rigid in China than in the U.S. and that cultural differences in endorsement of filial piety beliefs seem to play an important role. In addition, unlike Study 1a, we found that deviation from the upper-bound of the social clock was anticipated to be more distressing for Chinese than

Americans, despite that Americans' average upper age bound is higher than that of Chinese and that such cultural differences were also meaningfully related to cultural differences in endorsement of filial piety beliefs. We reason that this is because we recruited participants with an older average age who may have more real-life experience (either direct or vicarious) regarding failure to achieve specific life milestones within the appropriate time windows. In addition, we recruited a sample in the U.S. that better represents the national demographics. As such, we believe Study 1b is more likely to represent the actual cultural differences in how deviation from the upper-bound of the social clock affects emotional well-being.

Study 2

The present research examines cultural differences in the rigidity of the social clock and anticipated emotional well-being associated with achieving important life milestones beyond age-appropriate expectations. Yet, Studies 1a and 1b only examined the psychological consequences of deviation from the upper-bound of the social clock. Given that achieving life milestones too early can also cause distress, as individuals may feel unprepared or socially out of sync, Study 2 aimed to provide a more thorough understanding of culture and the social clock by further examining how deviation from the lower-bound of the social clock would affect emotional well-being. We hypothesized that, in addition to replicating the results regarding the time window difference, deviation from the social clock (lower-bound) would be anticipated to be more distressing for the Chinese than Americans and that this cultural difference would be explained by cultural differences in endorsement of filial piety beliefs. The study was preregistered (<https://doi.org/10.17605/OSF.IO/45BUW>)¹¹.

¹¹ We deviated from the preregistration such that other measures, the intersubjective perceptions of the social clock and judgment of deviation from the social clock, were not included as a part of this paper.

Participants

Based on power analysis¹², we set our sample size at $N = 100$ per culture. We recruited 100 participants in the U.S. via the Prolific platform and 111 participants in China via the Naodao platform (comparable to the Prolific platform). The data exclusion rules were the same as in Studies 1a and 1b. Our final sample ($N = 201$) contains 92 American participants and 109 Chinese participants (Table 8).

Table 8

Breakdown of demographics in the U.S. and China in Study 2.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. ($N = 92$)	35.17 (9.36)	Male: 44.6 Female: 54.3 Non- binary/Other: 1.1	European American: 51.1 Black/African American: 27.2 Asian American/Pacific Islander: 7.6 Hispanic/Latino: 5.4 Multiracial/Biracial: 4.3 Native American/Alaskan: 3.3 Other: 1.1	58.7
China ($N = 109$)	25.07 (4.89)	Male: 62.4 Female: 37.6	Han Chinese: 99.1 Ethnic Minorities: 0.9	95.4

Measures

The procedures and measures were the same as in Studies 1a and 1b, except that we measured anticipated negative emotional outcomes of deviation from the lower-bound of the social clock. We averaged the ratings of the four anticipated negative emotions into one composite score in each time window block ($\alpha_s > 0.80$). Filial piety beliefs were measured using the same scale (Fu et al., 2020) ($\alpha_{US} = 0.92$; $\alpha_{CH} = 0.79$). The study also included

¹² Based on the Study 1b results (culture and filial piety simultaneously predicting anticipated negative emotional outcomes), we ran the power analysis using the G*Power software (Erdfelder et al., 1996) using an F test, A Priori, where the smallest $R^2 = .308$, $f^2 = .445$, $\alpha = .05$, Power ($1 - \beta$) = .80, number of predictors = 6. It yields a total sample size of 38. We opted for a fivefold oversampling to increase statistical power. See the supplementary materials (pp. 10-11) for the post-hoc power analyses.

additional measures examining the subjective (i.e., how participants would judge lower-bound social clock deviation) and intersubjective negative social judgments of deviation from the social clock (i.e., how participants think a typical person in their country would judge lower-bound social clock deviation). In addition, the study included measures of the intersubjective perceptions of the social clock and anticipated negative emotional outcomes of deviation from the lower-bound of the intersubjective social clock. Finally, we included the tightness/looseness scale (Gelfand et al., 2011) for an exploratory purpose. See the supplementary materials for a full description of these measures (pp. 11-13).

Results

Correlations between Variables

Likewise, we calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and China (Table 9).

Table 9

Descriptive statistics of the variables and bivariate correlations between them in the U.S. and China in Study 2.

	The U.S. (N=92)								China (N=109)									
	M (SD)	1	2	3	4	5	6	7	8	M (SD)	1	2	3	4	5	6	7	8
1. Time window for career-related life events	38.97 (18.66)	-								9.26 (8.50)	-							
2. Time window for family-related life events	31.81 (14.17)	.64***	-							9.04 (6.75)	.55***	-						
3. Filial piety beliefs	3.29 (.75)	-.53***	-.32**	-						4.11 (.45)	-.25**	-.27**	-					
4. Tightness/Looseness	3.32 (.50)	-.03	-.11	.16	-					4.01 (.34)	-.23*	-.16	.30**	-				
5. Anticipated negative emotional outcomes of deviation from the career-related social clock (lower bound)	1.95 (.72)	-.01	.02	-.09	.14	-				1.94 (.84)	-.08	-.07	.23*	.05	-			
6. Anticipated negative emotional outcomes of deviation from the family-related social clock (lower bound)	2.09 (.84)	.05	.05	-.004	.001	.34***	-			2.36 (.93)	-.07	.14	.12	.31**	.55***	-		
7. Age	35.17 (9.36)	.02	-.01	.04	-.16	.03	-.23*	-		25.07 (4.89)	-.05	-.10	.01	-.15	.03	-.15	-	
8. SES	5.03 (1.65)	-.06	-.10	.10	.01	-.06	.01	.21*	-	5.19 (1.24)	-.08	-.14	.16	.06	.26**	.10	.24*	-

*** $p < .001$, ** $p < .01$, * $p < .05$.

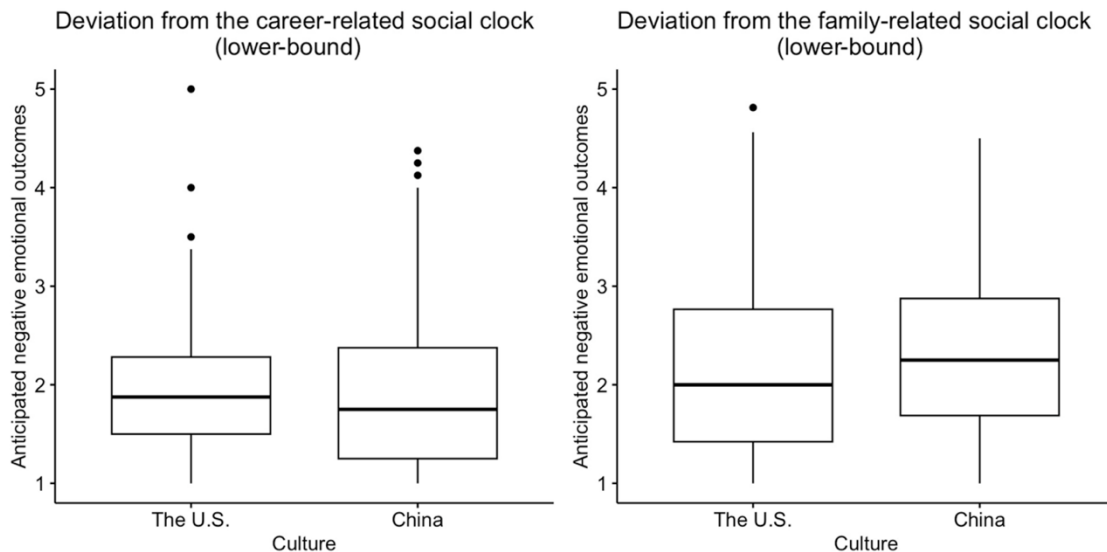
Given that the primary purpose of Study 2 was to examine how deviation from the lower-bound of the social clock would affect emotional well-being, we included the replication results for cultural differences in the time windows and the role of filial piety in explaining the cultural differences in the supplementary materials (pp. 13-19)¹³.

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Lower-bound)

We examined whether anticipated emotional outcomes resulting from deviation from the social clock differ across cultures (Figure 7). In all analyses, we included age, gender, SES, and education as covariates.

Figure 7

Anticipated negative emotional outcomes of deviation from the social clock (lower-bound) in the U.S. vs. China (Study 2).



We first looked at anticipated negative emotional outcomes resulting from deviation from the career-related social clock. A GEE with robust SEs was conducted on the anticipated negative emotional outcomes with culture (the U.S. vs. China) as a predictor with

¹³ Since we preregistered mediation analyses with filial piety, we also include mediation analysis results using the PROCESS macro (Hayes, 2018).

the covariates did not reveal a significant main effect of culture, Wald $\chi^2(1, N = 201) = .10, p = .76$. Anticipated negative emotional outcomes of deviation from the career-related social clock did not significantly differ between the U.S. ($M = 1.97$, robust SE = .08, 95% Wald CI [1.80, 2.13]) and China ($M = 1.93$, robust SE = .08, 95% Wald CI [1.77, 2.09]), $B = .04$, robust SE = .12, 95% Wald CI [-.20, .28].

Then, we repeated the analysis with anticipated negative emotional outcomes resulting from deviation from the family-related social clock. Similarly, we did not find a significant main effect of culture, Wald $\chi^2(1, N = 201) = .002, p = .96$. Anticipated negative emotional outcomes of deviation from the family-related social clock did not significantly differ between the U.S. ($M = 2.24$, robust SE = .09, 95% Wald CI [2.05, 2.42]) and China ($M = 2.24$, robust SE = .09, 95% Wald CI [2.06, 2.42]), $B = -.007$, robust SE = .14, 95% Wald CI [-.28, .27].

Exploratory Analysis with Tightness/Looseness

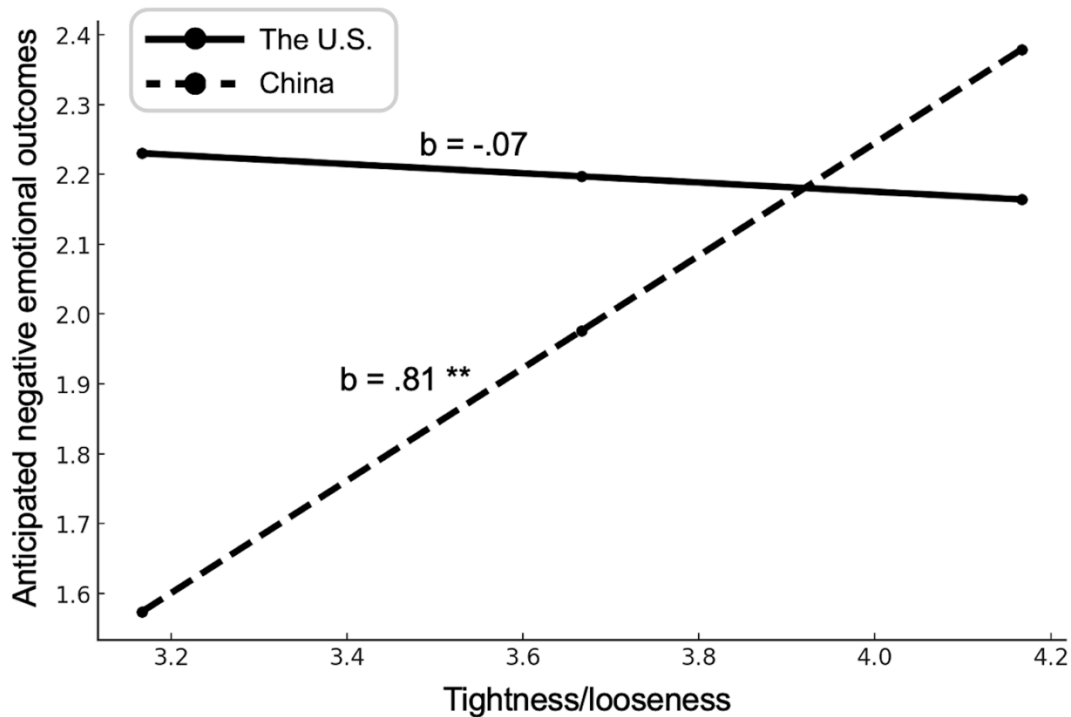
Unlike the first two studies, we did not find strong correlations between filial piety and emotional outcomes. Notably, we found a positive correlation between tightness/looseness and anticipated negative emotions of deviation from the family-related social clock among the Chinese participants ($r(107) = .310, p = .001$) but not among the American participants ($r(90) = .001, p = .991$). This suggests that culture might moderate the relationship between tightness/looseness and anticipated negative emotions. Thus, as outlined in our preregistration, we conducted exploratory analyses to examine the role of tightness/looseness (Gelfand et al., 2011) in anticipated negative emotions. A moderation analysis was conducted using the PROCESS macro in SPSS (Hayes, 2018) to examine whether the relationship between tightness/looseness and anticipated negative emotions of

deviation from the family-related social clock was moderated by culture with the covariates¹⁴, $b = .87$ [.27, 1.47], $SE = .31$, $t(193) = 2.85$, $p = .005$. The overall model indicates that the predictors collectively accounted for 11.4% of the variance in anticipated negative emotions, $R^2 = .114$, $F(7, 193) = 3.55$, $p = .001$. Simple slopes analysis suggests that there was a positive association between tightness/looseness and anticipated negative emotions in China [simple $b = .81$ [.32, 1.29], $SE = .25$, $t(193) = 3.25$, $p = .001$], but no significant association in the U.S. [simple $b = -.07$ [-.43, .29], $SE = .18$, $t(193) = -.36$, $p = .72$] (Figure 8). That is, in China, those with low tolerance of deviant behaviors anticipated feeling worse than those with more tolerance, whereas, in the U.S., they did not differ from their counterparts in anticipated emotions.

Figure 8

*Association between tightness/looseness and anticipated negative emotional outcomes of deviation from the family-related social clock in the U.S. and China. Simple slopes are unstandardized. ** $p < .01$.*

¹⁴ We conducted a post hoc power analysis using the G*Power software (Erdfelder et al., 1996) to compute the achieved power of the moderation analysis, given α (.05), sample size ($N = 201$), number of tested predictors (1, i.e., the interaction term), total number of predictors (7), and effect size ($f^2 = .04$). The achieved power is .82, indicating that the study had sufficient power to detect the observed moderation effect.



Discussion

Study 2 replicated the findings that the social clock tends to be more rigid in China than in the U.S. and that filial piety beliefs appear to play an important role. However, deviation from the lower-bound of the social clock did not differ in emotional outcomes between the two national cultures, and filial piety was not or only weakly correlated with the outcomes. It may be the case that such deviation, unlike deviation from the upper-bound, still fulfills the duties to the family by achieving milestones, and thus, the Chinese do not consider it particularly problematic either.

Interestingly, exploratory analysis suggested that tightness/looseness was positively associated with anticipated negative emotions of deviation from the family-related social clock in China but not in the U.S. We should be cautious about drawing any conclusion, but it raises a possibility that the social clock is so flexible in the U.S. that deviation from it (at least from the lower-bound) is not considered a violation of a social norm, unlike in China.

We did not find such interaction on negative emotional outcomes of deviation from the career-related social clock. This may be attributed to the perception that early attainment of career-related life milestones was indicative of competence, thereby less likely to elicit negative emotions. Taken together, this study furthers the understanding of why and how the two cultures differ in their responses to the social clock violation.

General Discussion

Summary

Across three studies, we found that the social clock was more rigid in China than in the U.S., and the results support the idea that these differences are explained by cultural differences in filial piety. These findings show that China, which is more collectivistic than the U.S., tends to have tighter social clocks because they differ in their value of interpersonal duties and responsibilities, specifically, responsibilities towards one's parents and elders (i.e., filial piety) (Schwartz et al., 2010).

We also examined how deviation from the social clock is associated with anticipated emotional well-being. Study 1b, with a broader age range, supported our hypothesis that upper-bound deviation from the social clock would be anticipated to be more distressing for the Chinese than Americans, with these differences explained by cultural differences in filial piety. Despite the mean upper-bound age being higher in the U.S., the Chinese reported more anticipated negative emotional outcomes. It is also worth noting that quite a few American participants gave the largest number permitted (i.e., 90) when asked to provide an upper-bound age, which indicates that they may not think that such an age limit exists. Thus, the upper-bound ages may be less meaningful for Americans than for the Chinese, which further supports our finding that the social clock tends to be more flexible in the U.S. This

pattern differed in anticipated distress resulting from being too early on the social clock in Study 2 both in terms of the lack of cultural difference in the emotions and the potential underlying reasons as discussed above. It is notable that different cultural beliefs may underlie cultural differences in anticipated emotional responses to deviation from the upper and lower-bounds of the social clock.

Theoretical Contribution and Societal Implication

Our findings contribute to the literature on societal expectations about ages for specific life milestones (e.g., Lee & Payne, 2010; Peterson, 1996; Helson & McCabe, 1994). These previous studies primarily focused on the average age at which people engage in life events and provided demographic and economic explanations. The current research, looking at societal expectations about age and life events, suggests a novel social psychological explanation—filial piety, a specific form of social duties. Leveraging cultural differences in the importance of fulfilling social duties, we were able to show that the value of social duties underlies individuals' endorsement of the social clock. Our studies also show the specificity of such cultural differences. The results from Study 2 show that social clock deviation that does not compromise fulfilling social duties did not lead to cultural differences in anticipation of negative emotions and did not correlate with filial piety strongly. This implies that cultural differences in the social clock's rigidity are distinct from those in general permissibility of participating in non-age-sensitive events (e.g., learning to ride a bicycle), which are less likely tied to social obligations.

Methodologically, the present research is the first to extend the point estimates (i.e., mean ages, or mean upper-bound and lower-bound ages) (e.g., Peterson, 1996) to the interval estimates (i.e., free-response time windows beyond fixed intervals) of the age expectations

for achieving specific life milestones across cultures. This methodology allows us to examine both when social clocks are set and how rigid social clocks are in different societies.

The current research also advances the understanding of timings in the human life cycle, governed by both the biological clock (e.g., Friese et al., 2006; Leader, 2006) and the social clock. One of the biological clock examples is the pressure to have a child during one's most fertile years (Leader, 2006). Different from the biological clocks, which are roughly universal across cultures based on neural-physical development, the current study suggests that the social clock tends to vary across cultures. Therefore, the present research advances our understanding of timings in the human life cycle by identifying a culturally dependent element (i.e., the social clock) in addition to the culturally constant element (i.e., the biological clock). Furthermore, the current study contributes to research on cultural life scripts, which primarily examine culturally unique and shared life events as well as their typical timing and order of occurrence (e.g., Hatiboğlu & Habermas, 2016; Ottsen & Berntsen, 2013) by focusing on not only the list of events and their orders in life memory stories but also the intensity of age-related pressure people experience throughout their lives across cultures.

The findings of the current research could have significant societal implications. On one hand, a more rigid social clock may lead to undesirable social consequences. For instance, a more rigid social clock in China echoes pervasive age discrimination in the Chinese job market, where companies sometimes limit the age of applicants to younger than 35 years. This discrimination may lead to the loss of experienced employees and a lack of innovation due to limited career mobility. Moreover, an extremely rigid social clock may backfire, causing generational rifts and societal problems when the younger generation

“rebel” against strong social norms, either due to pragmatic or ideological reasons, such as the cases in Korea and Japan with the low birth rates among younger generations (e.g., Yun et al., 2022). On the other hand, a more rigid social clock may be collectively adaptive in certain cultures as it may help stabilize employment and birth rates by motivating people to remain employed and have children within a specific time window. The current study could remind policymakers in societies with rigid age expectations to examine if, behind the back of a tighter social clock, there lurk more intensive social issues.

Limitations and Future Directions

The current study only focused on two cultures, which limits the generalizability of its findings to more cultures. Thus, future researchers could consider implementing the study in more cultures (using demographically comparable samples and with a larger sample size) to see if the social clock’s rigidity varies systematically across cultures differing in the individualism-collectivism dimension, with pertinent explanatory psychological constructs. We reason that other specific types of social duty (e.g., familismo, a central Latinx cultural value, see Ayón et al., 2010) or religious duty (e.g., Judaism religious duties, see Cohen et al., 2013, for religion and spirituality of Jews) may be relevant among non-East Asian collectivistic cultures.

Moreover, we focused on a small subset of frequently mentioned life events based on prior research on cultural life scripts (e.g., Hatiboğlu & Habermas, 2016; Ottsen & Berntsen, 2013). Although we believe that our findings would be applicable to other unmeasured important life events, further research on additional life events is needed to confirm the generalizability of the observed patterns.

In addition, future research could investigate the interpersonal consequences of deviation from the social clock. Compared to people from more individualistic cultures (e.g., the U.S.), people from more collectivistic cultures (e.g., China) may judge the targets whose personal life timing deviated from the social clock more negatively, and the more negative judgments would, in turn, influence social interactions. We thus encourage future research to investigate interpersonal or social consequences of deviation from the social clock.

Another noticeable limitation that arises in cross-cultural studies is that the measures may not be precisely equivalent due to linguistic and cultural differences and, consequently, a possible breach of measurement invariance. Future studies could implement *a priori* Exploratory Factor Analysis (EFA) to ensure measurement equivalence. Also, future research could employ experimental approaches of cultural priming with bicultural participants, manipulating cultural contexts or key psychological constructs, such as filial piety, to further support causal interpretations of cultural differences in the rigidity of the social clock.

Finally, the current study measured anticipated negative emotional outcomes, instructing participants to assume that they wanted to achieve certain life milestones yet failed to, whereas it is possible that people may not experience comparable negative self-conscious emotions if they have no desire to attain specific life milestones. Future research could investigate whether people who fail to abide by the social clock due to more uncontrollable reasons (e.g., financial restraints) vs. more controllable reasons (e.g., personal choice) differ in their emotional distress resulting from deviation from the social clock. Moreover, actual negative emotional outcomes of deviation from the social clock may differ from those that were anticipated, and those of deviation from the social clock (completing

life milestones too early or too late) may differ from those associated with life events never achieved (e.g., Luhmann et al., 2021). Future research could use longitudinal or cross-sectional analyses with larger samples to examine whether anticipated well-being outcomes align with actual emotional responses, as well as how missed life events affect emotional well-being.

Conclusion

The present study suggests that people's perceptions of age-related social expectations, and in particular, the rigidity (or flexibility) of the social clock, could be shaped by the culture in which we reside. The current study hopes to serve as a clue to the puzzle, when people feel an urge to achieve important life milestones before or after a particular age, of where such urge comes from. We believe a better understanding of how and why culture shapes the social clock would be beneficial in the pursuit of "following what one's heart desired, without transgressing what was right" (adapted from Confucius, 1999).

CHAPTER II: THE CAUSAL INFLUENCE OF CULTURAL VALUES ON THE SOCIAL CLOCK AND A TEST OF THE GENERALIZABILITY OF BASIC FINDINGS

Chapter I of this dissertation has a few limitations. First, the studies were correlational. To further support causal interpretations of cultural differences, more research is needed that employs experimental approaches, such as cultural priming, to manipulate cultural values or key psychological mediators, like filial piety. Thus, Chapter II (Studies 3 and 4) aims to employ experimental approaches of cultural priming with bicultural participants, manipulating cultural values such as filial piety, a key explanatory psychological construct, to further support causal interpretations of cultural differences in the rigidity of the social clock and anticipated well-being outcomes.

Besides, the studies in Chapter I focused exclusively on comparisons between the U.S. and China. However, these two countries differ not only in major cultural values such as Confucianism vs. Puritan ideas but also in geopolitical histories, political systems, and contemporary sociopolitical dynamics (e.g., Kitayama et al., 2009; Triandis et al., 1988), which may limit the extent to which the findings can be generalized to other cultural contexts. To address this limitation, Chapter II (Study 5) assesses the generalizability of the core findings by comparing the U.S. with South Korea, a society that shares certain cultural characteristics with China but differs markedly from both China and the United States in political and institutional systems. (e.g., Kim, 2009; Zhang et al., 2005).

The hypotheses, analysis plans, and sampling method (and exclusion rules) for Study 3 were preregistered (<https://aspredicted.org/np78-xyt8.pdf>), as were those for Study 4 (<https://aspredicted.org/ycrd-pmqh.pdf>) and Study 5 (<https://aspredicted.org/xyz9-ycr9.pdf>).

Materials and de-identified data, along with their data analysis scripts, are made publicly available at

<https://ucsb.app.box.com/folder/370067905788?s=p70p56zhpacb8ke9syxkabmjh3rbnjyj>.

Study 3

To address the first limitation, Study 3 investigated the causal relationship between cultural values and the social clock's rigidity as well as anticipated well-being outcomes of deviation from the social clock. This study design builds on the hypothesis that people who are multicultural become proficient in both cultures and develop divergent selves that can be selectively activated by various cultural contexts (e.g., LaFromboise et al., 1993). For example, Hong Kong Chinese who were primed with American (vs. Chinese) icons were less likely (vs. more likely) to make external attributions to explain the behavior of a single fish (Y. Y. Hong et al., 2000). It is also noted that the ability of “frame-switching”, i.e., the ability to shift between cultural perspectives or cognitive frameworks in response to contextual cues or cultural priming, is not exclusive to bicultural people (e.g., Kühnen et al., 2001; Lee et al., 2000; Oyserman & Lee, 2008). For example, Americans primed with information related to interdependence (e.g., team performance)—a key aspect of collectivism—were more likely to adopt a prevention orientation compared to those primed with information related to independence (e.g., individual performance) (Lee et al., 2000).

However, while frame-switching may be a universal ability, bicultural individuals may be more responsive to the cultural primes and show more pronounced frame-switching than their monocultural counterparts (see Gardner et al., 2004 for vicarious evidence). As such, we recruited East Asian American participants who are bicultural, as they may be equipped with more efficient frame-switching abilities. We randomly assigned them to one

of two priming conditions: filial piety belief or a neutral concept. It is hypothesized that bicultural East Asian American participants primed with filial piety—a core cultural value in East Asia—would be led to think more like East Asians (compared to Americans). Studies have shown that East Asians (e.g., Chinese) perceive the social clock as more rigid than Westerners (e.g., Americans) and anticipate feeling more emotional distress resulting from deviations from the social clock (Zang & Kim, 2025). As a result, those primed with filial piety beliefs would perceive the social clock as more rigid and anticipate feeling more emotional distress resulting from deviation from the upper-bound of the social clock. Study 3 was preregistered (<https://aspredicted.org/np78-xy8.pdf>).

Participants

Based on power analysis¹⁵, we set our sample at $N = 260$. We recruited 260 East Asian American participants via the Prolific platform. We excluded participants who had failed to complete the survey and who did not given consent to include their data in the analyses. We also excluded trials where one or more of the time windows is smaller than zero. Additionally, we excluded participants who did not follow the instructions for the priming prompts (for example, failing to write relevant information as instructed). Eighteen participants later self-identified as not East Asian American on the demographic question and were therefore excluded from the analyses based on the inclusion criteria. Our final sample contains 229 East Asian Americans (Table 10)

Table 10

Breakdown of demographics in Study 3.

¹⁵ We conducted an a priori power analysis using G*Power (Erdfelder et al., 1996) to determine the required sample size for detecting the effect of condition (filial piety priming vs. control) on the time windows. Using an F test (one-way ANOVA), assuming a medium effect size ($f = .25$), $\alpha = .05$, and power $(1-\beta) = .80$, the analysis indicated that a total sample of $N = 128$ participants would be required. We over-sampled to increase statistical power.

Age <i>M(SD)</i>	Gender (%)	College degree (%)
35.07 (12.04)	Male: 50.7 Female: 47.6 Non-binary/Other: 1.7	84.7

Measures

Cultural Value Priming

We primed bicultural East Asian American participants with either filial piety, a key aspect of collectivism manifested in Chinese culture (Ho, 1996), by making the ideas associated with filial piety more accessible to participants or a neutral concept irrelevant to any particular cultural meaning systems. One of the two experimental conditions—filial piety priming or control—was assigned randomly to participants. Participants in the filial piety priming condition were asked to write about why it is important to support their aging parents in a hypothetical scenario. Those in the control condition were asked to write about why it is important to prepare a healthy meal.

The instructions for the filial piety priming condition read as follows:

Imagine your parents are retiring and need extra support. Think about why it is important for you as a child to take care of them financially, emotionally, or practically.

The instructions for the control condition read as follows:

Imagine you are preparing a meal. Think about why it is important for you to prepare healthy meals.

Immediately following the writing task, participants in the filial piety priming condition completed six items from the filial piety scale (Fu et al., 2020) to further reinforce the salience of filial piety ($M = 3.35$, $SD = 0.63$, $\alpha = 0.72$). In contrast, participants in the control condition completed six adapted eating habit-related items designed to be neutral and

unrelated to cultural values. Example items of the eating habit scale include “I like to find new way to create meals that are good for health” and “Eating healthy is congruent with other important aspects of my life.” Participants reported their agreement or disagreement with each statement on a 5-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*). Item scores were averaged to create a composite score ($M = 3.82$, $SD = 0.52$, $\alpha = 0.67$). Higher scores indicated a stronger preference for eating healthy.

Time Window Blocks

Identical to those in Studies 1a and 1b. Participants were presented with six-time window blocks. They were instructed to scroll two sliders (ranging from 10 to 90) to indicate the earliest (or the lower-bound) and the latest (or the upper-bound) ages they thought appropriate for the person to start attending college, getting a full-time job, getting married (for males and females), and having a first child (for males and females), respectively. After each time window questions, we measured the anticipated negative self-conscious emotions resulting from deviation from the upper-bound of the subjective social clock. Participants were presented with four emotional states, i.e., “regretful,” “ashamed,” “anxious,” and “guilty,” and reported how much they would feel each emotion on a 5-point Likert-type scale (1 = *not at all* to 5 = *a great deal*). The structure and phrasing of questions were comparable in all blocks. As the reliabilities of ratings of the four anticipated negative emotions were high ($\alpha s > 0.87$), we averaged them into one composite score in each block.

Filial Piety Beliefs

Filial piety beliefs were assessed using the six items from the filial piety scale (Fu et al., 2020) that were not used during the filial piety priming task. These items were completed by participants in all conditions ($M = 3.45$, $SD = 0.63$, $\alpha = 0.80$).

Demographic Covariates

Same as those in Studies 1a, 1b, and 2, with the addition of a single item assessing bicultural identity. Immediately following the question about race, participants were asked if they identify as East Asian American.

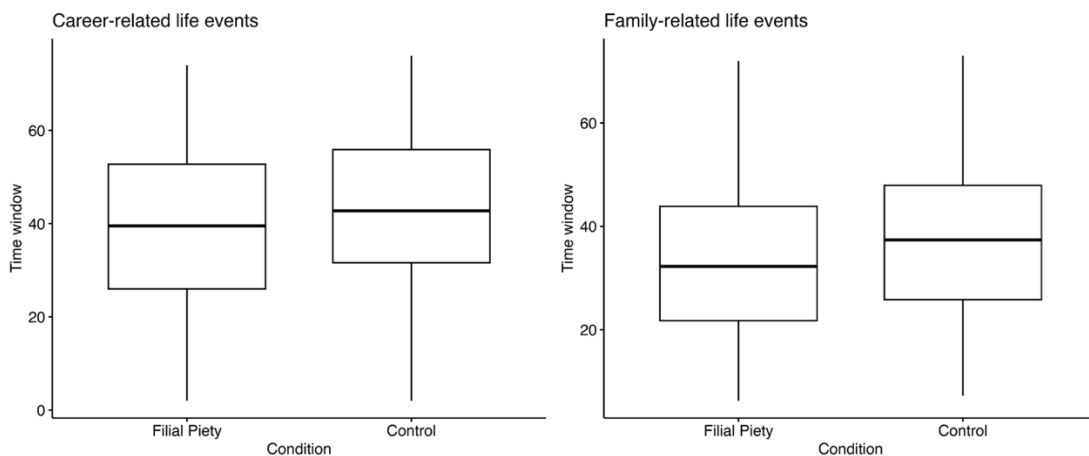
Results

Effect of Priming Condition on Time Windows

As preregistered, we conducted univariate analyses of variance (ANOVAs) to examine the effect of the priming condition on the time windows for career- and family-related life events (Figure 9). Condition (filial piety priming vs. control) was included as a between-subjects factor, with the demographic covariates.

Figure 9

The width of the time windows for career-related and family-related life events in the filial piety priming condition and the control condition in Study 3.



We first examined the effect of the priming condition on the time window for career-related life events. The priming condition did not have a significant main effect on the time window for career-related life events, $F(1, 222) = 3.27, p = .07, \eta^2_p = .02$, with participants in

the filial piety condition showing a numerically narrower time window ($M = 39.11$, $SE = 1.67$) than those in the control condition ($M = 43.32$, $SE = 1.61$).

We then examined the effect of the priming condition on the time window for family-related life events. The priming condition had a significant main effect on the time window for family-related life events, $F(1, 222) = 4.36$, $p = .04$, $\eta^2_p = .02$. The time window for family-related life events was narrower in the filial piety condition ($M = 33.07$, $SE = 1.35$) than in the control condition ($M = 36.98$, $SE = 1.30$). See Table 11 for the descriptive statistics and the effect of the priming condition for each life event in Study 3.

Because the priming condition was experimentally manipulated, we additionally report unadjusted difference-in-means analyses as a randomization-based robustness check. Specifically, we re-ran the same set of univariate analyses of variance (ANOVAs) without demographic covariates; these results are reported for transparency. With the time window for career-related life events as the dependent variable, the priming condition had a significant main effect on the time window for career-related life events, $F(1, 227) = 3.92$, $p = .049$, $\eta^2_p = .02$. With the time window for family-related life events as the dependent variable, the priming condition had a significant main effect on the time window for family-related life events, $F(1, 227) = 4.91$, $p = .03$, $\eta^2_p = .02$. See Table 12 for pairwise comparisons of the effect of priming condition on the time window, as well as on the lower- and upper-bound ages for each life event, based on unadjusted analyses without demographic covariates. Likewise, the time windows are mainly driven by the differences in both the upper- and lower-bound ages.

Table 11

Descriptive statistics and the effect of priming condition in the time window, as well as in the lower and upper-bound age for each life event in Study 3 (controlled for demographic covariates).

Specific life event	Priming condition	Lower bound age Mean (SD)	Pairwise comparison	Upper bound age Mean (SD)	Pairwise comparison	Time window Mean (SD)	Pairwise comparison
Starting college	Filial piety	17.98 (8.00)	$t = 1.50, p = .135$	59.43 (22.10)	$t = -1.74, p = .083$	41.45 (22.93)	$t = -2.08, p = .039$
	Control	16.71 (2.96)		64.66 (21.68)		47.95 (22.23)	
Getting a full-time job	Filial piety	18.32 (2.28)	$t = -.40, p = .689$	54.50 (20.66)	$t = -.86, p = .388$	36.17 (21.27)	$t = -.79, p = .430$
	Control	18.33 (2.84)		57.45 (21.55)		39.12 (22.30)	
Getting married (male)	Filial piety	22.49 (3.65)	$t = 2.89, p = .004$	66.06 (19.42)	$t = -1.24, p = .218$	43.58 (20.75)	$t = -1.67, p = .096$
	Control	21.09 (3.55)		69.61 (18.45)		48.52 (19.62)	
Getting married (female)	Filial piety	22.41 (4.74)	$t = 2.67, p = .008$	64.57 (20.73)	$t = -.71, p = .477$	42.15 (21.96)	$t = -1.19, p = .234$
	Control	20.92 (3.35)		66.99 (20.85)		46.07 (21.56)	
Having a first child (male)	Filial piety	24.12 (4.09)	$t = 2.86, p = .005$	49.21 (10.75)	$t = -1.70, p = .091$	25.09 (12.77)	$t = -2.27, p = .024$
	Control	22.53 (3.96)		52.07 (14.11)		29.53 (15.98)	
Having a first child (female)	Filial piety	22.85 (3.81)	$t = 2.56, p = .025$	43.51 (9.41)	$t = -1.71, p = .088$	20.67 (10.45)	$t = -2.25, p = .025$
	Control	21.73 (3.58)		45.89 (11.60)		24.16 (12.86)	

Table 12

Pairwise comparisons of the effects of priming condition on the time window, as well as on the lower- and upper-bound ages for each life event in Study 3, based on unadjusted analyses without demographic covariates.

Specific life event	Priming condition	Pairwise comparison (Lower bound age)	Pairwise comparison (Upper bound age)	Pairwise comparison (Time window)
Starting college	Filial piety	$t = 1.61, p = .108$	$t = -1.81, p = .072$	$t = -2.18, p = .030$
	Control			
Getting a full-time job	Filial piety	$t = -.02, p = .986$	$t = -1.06, p = .291$	$t = -1.02, p = .308$
	Control			
Getting married (male)	Filial piety	$t = 2.93, p = .004$	$t = -1.42, p = .158$	$t = -1.85, p = .065$
	Control			
Getting married (female)	Filial piety	$t = 2.76, p = .006$	$t = -.88, p = .379$	$t = -1.36, p = .175$
	Control			
Having a first child (male)	Filial piety	$t = 2.98, p = .003$	$t = -1.72, p = .087$	$t = -2.32, p = .021$
	Control			
Having a first child (female)	Filial piety	$t = 2.29, p = .023$	$t = -1.70, p = .091$	$t = -2.25, p = .026$
	Control			

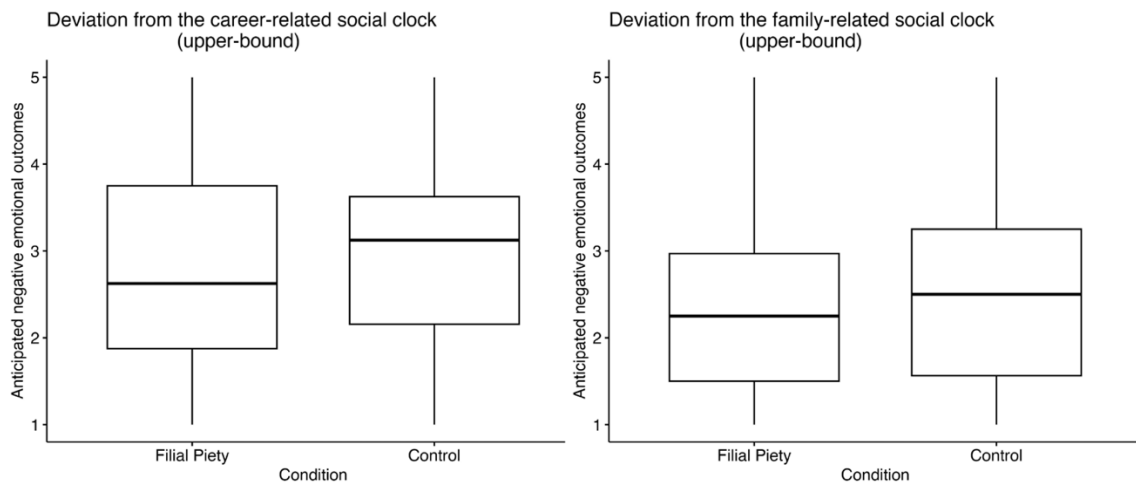
Effect of Priming Condition on Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

In addition, as preregistered, we conducted univariate analyses of variance (ANOVAs) to examine the effect of the priming condition on anticipated negative emotional outcomes resulting from deviation from the social clock (upper-bound) (Figure 10).

Condition (filial piety priming vs. control) was included as a between-subjects factor, with the demographic covariates.

Figure 10

Anticipated negative emotional outcomes of deviation from the social clock (upper-bound) in the filial piety priming condition and the control condition in Study 3.



We first examined the effect of the priming condition on the anticipated negative emotional outcomes of deviation from the career-related social clock (upper-bound). The priming condition did not have a significant main effect on anticipated negative emotional outcomes, $F(1, 222) = 0.70, p = .41, \eta^2_p = .003$. Participants in the filial piety condition ($M = 2.78, SE = 0.10$) anticipated levels of negative emotion comparable to those in the control condition ($M = 2.90, SE = 0.10$).

We then examined the effect of the priming condition on the anticipated negative emotional outcomes of deviation from the family-related social clock (upper-bound). The priming condition did not have a significant main effect on anticipated negative emotional outcomes, $F(1, 222) = 1.01, p = .32, \eta^2_p = .005$. Participants in the filial piety condition ($M = 2.34, SE = 0.10$) anticipated levels of negative emotion comparable to those in the control condition ($M = 2.48, SE = 0.10$). See Table 13 for the descriptive statistics and pairwise comparisons for each life event.

Table 13

Descriptive statistics and pairwise comparisons between anticipated emotional outcomes of deviation from the social clock (upper bound) in the filial piety priming and the control condition (controlled for the covariates) for each life event in Study 3.

Specific life event	Filial Piety	Control	Pairwise comparison
Starting college	2.55 (1.17)	2.64 (1.08)	$t = -0.39, p = .694$
Getting a full-time job	3.00 (1.42)	3.18 (1.30)	$t = -1.05, p = .297$
Getting married (male)	2.26 (1.20)	2.36 (1.20)	$t = -0.54, p = .590$
Getting married (female)	2.38 (1.22)	2.53 (1.26)	$t = -0.94, p = .350$
Having a first child (male)	2.25 (1.12)	2.39 (1.13)	$t = -0.92, p = .361$
Having a first child (female)	2.46 (1.20)	2.65 (1.20)	$t = -1.26, p = .208$

Similarly, given that the priming condition was experimentally manipulated, we report unadjusted difference-in-means analyses as a randomization-based robustness check. Specifically, we re-ran the same set of univariate analyses of variance (ANOVAs) without demographic covariates for transparency. With anticipated negative emotional outcomes of deviation from the career-related social clock (upper-bound), the priming condition did not

have a significant main effect on the time window for career-related life events, $F(1, 227) = 0.88, p = .35, \eta^2_p = .004$. With anticipated negative emotional outcomes of deviation from the family-related social clock (upper-bound), the priming condition also did not have a significant main effect on the time window for family-related life events, $F(1, 227) = 1.06, p = .31, \eta^2_p = .005$. See Table 14 for pairwise comparisons for each life event based on unadjusted analyses without demographic covariates.

Table 14

Pairwise comparisons of the effects of priming condition on anticipated emotional outcomes of deviation from the social clock (upper bound) for each life event in Study 3, based on unadjusted analyses without demographic covariates.

Specific life event	Pairwise comparison between filial piety and control condition
Starting college	$t = -0.62, p = .535$
Getting a full-time job	$t = -1.02, p = .307$
Getting married (male)	$t = -0.61, p = .542$
Getting married (female)	$t = -0.92, p = .356$
Having a first child (male)	$t = -0.94, p = .347$
Having a first child (female)	$t = -1.27, p = .209$

Discussion

Study 3 employed a cultural priming paradigm with bicultural East Asian Americans to test the causal influence of the cultural value of filial piety on the rigidity of the social clock and anticipated emotional responses to upper-bound social clock deviation. Given that priming was randomly assigned, the effect of priming can be interpreted causally.

As hypothesized, making filial piety salient significantly increased the rigidity of the family-related social clock. Participants in the filial piety condition reported narrower time

windows that they thought were appropriate for marriage and childbearing than those in the control condition. For career-related time windows, the effect was directionally consistent with predictions that filial piety priming resulted in narrower windows but was not statistically significant in the preregistered covariate-adjusted model. Importantly, the effect reached significance in the unadjusted models reported as a randomization-based robustness check. The difference between the covariate-adjusted and unadjusted specifications indicates that the estimated effect for career-related time windows is sensitive to covariate adjustment. It suggests that filial piety priming may influence the rigidity of career-related social clocks, although this effect appears less robust than the effect observed for family-related social clocks.

In contrast, filial piety priming did not affect anticipated negative emotional responses to deviation from either the career- or family-related social clock. One likely explanation is procedural: anticipated emotional responses were collected only after participants completed each time window block, which may have attenuated the priming effect due to the temporal gap. Cultural primes are known to be transient, as they provide *temporary* accessibility to specific cultural theories (e.g., Y.-Y. Hong et al., 2003); Thus, intervening cognitively-demanding tasks can weaken their impact on subsequent measurements.

To address this limitation, Study 4 alters the task sequence by administering the priming manipulation immediately before the emotional response questions, which allows for a more direct test of whether priming of the key cultural value, filial piety, affects participants' emotional reactions to deviations from the upper-bound of the social clock.

Study 4

Study 4 aimed to provide a more rigorous examination of the causal effect of filial piety priming on anticipated negative emotional outcomes by altering the task sequence. Specifically, the filial piety priming tasks were administered immediately before the anticipated negative emotional response questions, while the time window blocks were placed prior to the priming tasks. We tested the same theoretical prediction as in Study 3 but focused exclusively on anticipated emotional responses. We hypothesized that participants primed with filial piety beliefs would anticipate feeling stronger negative self-conscious emotions in response to deviations from the upper-bound of the social clocks than those in the control condition. Study 4 was preregistered (<https://aspredicted.org/ycrd-pmqh.pdf>).

Participants

We set the target sample size at $N = 250$ based on power analyses from Study 3, given the theoretical comparability of the design and key outcome variables across the two studies. We recruited 249 East Asian American participants via the Prolific platform, and the data exclusion rules were the same as in Study 3. Our final sample contains 231 East Asian Americans (Table 15).

Table 15

Breakdown of demographics in Study 4.

Age <i>M (SD)</i>	Gender (%)	College degree (%)
36.14 (11.59)	Male: 45.0 Female: 54.1 Non-binary/Other: 0.9	89.6

Measures

The procedures and measures were the same as in Study 3; the only difference was that the time window questions were presented at the beginning of the survey, followed by the priming manipulation immediately before the anticipated emotional response questions. Filial piety beliefs were measured using the same scale (Fu et al., 2020) ($M = 3.44$, $SD = 0.62$, $\alpha = 0.79$).

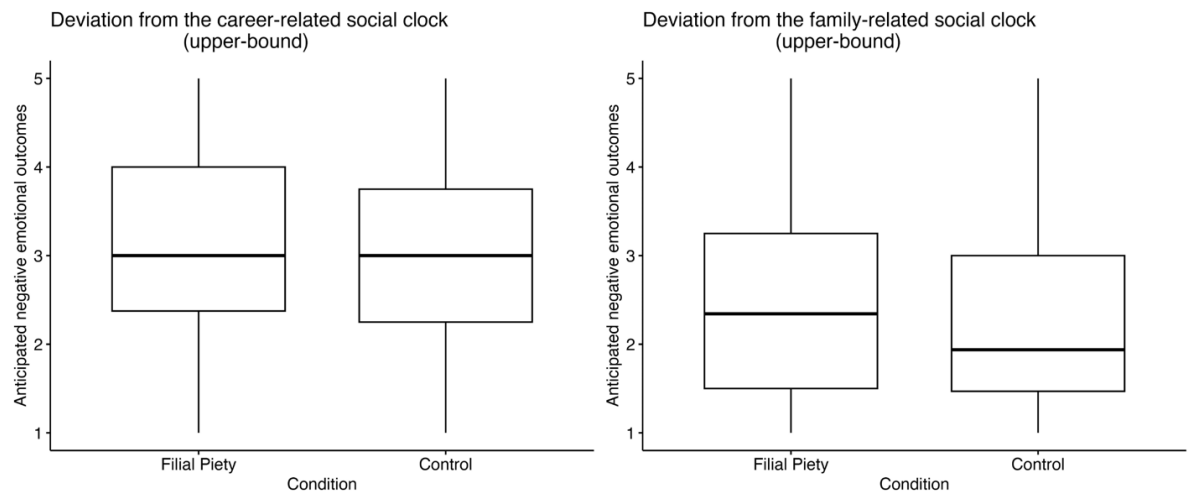
Results

Effect of Priming Condition on Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

Similar to Study 3, as preregistered, we conducted univariate ANOVAs to examine the effect of the priming condition on anticipated negative emotional outcomes resulting from deviation from the social clock (upper-bound) (Figure 11). Condition (filial piety priming vs. control) was included as a between-subjects factor, with the demographic covariates.

Figure 11

Anticipated negative emotional outcomes of deviation from the social clock (upper-bound) in the filial piety priming condition and the control condition in Study 4.



We first examined the effect of the priming condition on the anticipated negative emotional outcomes of deviation from the career-related social clock (upper-bound). The priming condition did not have a significant main effect on anticipated negative emotional outcomes, $F(1, 225) = 0.57, p = .45, \eta^2_p = .003$, with participants in the filial piety condition showing a numerically higher levels of anticipated negative emotion ($M = 3.09, SE = 0.10$) than those in the control condition ($M = 2.98, SE = 0.10$).

We then examined the effect of the priming condition on the anticipated negative emotional outcomes of deviation from the family-related social clock (upper-bound). The priming condition did not have a significant main effect on anticipated negative emotional outcomes, $F(1, 225) = 0.65, p = .42, \eta^2_p = .003$, with participants in the filial piety condition showing a numerically higher levels of anticipated negative emotion ($M = 2.44, SE = 0.10$) than those in the control condition ($M = 2.32, SE = 0.10$). See Table 16 for the descriptive statistics and pairwise comparisons for each life event.

Table 16

Descriptive statistics and pairwise comparisons between anticipated emotional outcomes of deviation from the social clock (upper bound) in the filial piety priming and the control condition (controlled for the covariates) for each life event in Study 4.

Specific life event	Filial Piety	Control	Pairwise comparison
Starting college	2.75 (1.17)	2.64 (1.11)	$t = 0.19, p = .849$
Getting a full-time job	3.52 (1.22)	3.24 (1.30)	$t = 1.12, p = .266$
Getting married (male)	2.52 (1.24)	2.22 (1.12)	$t = 1.46, p = .146$
Getting married (female)	2.58 (1.28)	2.34 (1.19)	$t = 1.01, p = .314$
Having a first child (male)	2.27 (1.08)	2.21 (1.13)	$t = 0.13, p = .897$
Having a first child (female)	2.49 (1.21)	2.42 (1.27)	$t = 0.33, p = .739$

In addition, we report unadjusted difference-in-means analyses as a randomization-based robustness check by re-running the same set of univariate analyses of variance (ANOVAs) without demographic covariates for transparency. With anticipated negative emotional outcomes of deviation from the career-related social clock (upper-bound), the priming condition did not have a significant main effect on the time window for career-related life events, $F(1, 229) = 1.87, p = .17, \eta^2_p = .01$. With anticipated negative emotional outcomes of deviation from the family-related social clock (upper-bound), the priming condition also did not have a significant main effect on the time window for family-related life events, $F(1, 229) = 1.35, p = .25, \eta^2_p = .01$. See Table 17 for pairwise comparisons for each life event based on unadjusted analyses without demographic covariates.

Table 17

Pairwise comparisons of the effects of priming condition on anticipated emotional outcomes of deviation from the social clock (upper bound) for each life event in Study 4, based on unadjusted analyses without demographic covariates.

Specific life event	Pairwise comparison between filial piety and control condition
Starting college	$t = 0.73, p = .468$
Getting a full-time job	$t = 1.69, p = .093$
Getting married (male)	$t = 1.96, p = .052$
Getting married (female)	$t = 1.44, p = .152$
Having a first child (male)	$t = 0.41, p = .688$
Having a first child (female)	$t = 0.41, p = .681$

Discussion

Study 4 modified the task sequence to provide a more direct test of the causal effect of filial piety priming on anticipated negative emotional responses to upper-bound social

clock deviation by administering the priming manipulation immediately before the emotional response questions. However, contrary to our hypothesis, filial piety priming did not significantly affect anticipated negative emotional responses to deviation from either type of social clock. Although participants in the filial piety condition consistently reported numerically higher anticipated negative emotions than those in the control condition, these differences did not reach statistical significance in either the preregistered covariate-adjusted models or the unadjusted analyses reported as a randomization-based robustness check.

Together with Study 3, these findings suggest that filial piety priming has a more reliable impact on subjective perceptions of socially prescribed age norms (i.e., the social clock) than on anticipated emotional reactions to such norm deviations. Anticipated emotional responses may be influenced by additional contextual factors, such as perceived personal control over the deviation or anticipated social judgment, that are less sensitive to brief cultural primes, even when the prime is temporally proximal to the outcome measure. Thus, while filial piety beliefs are theoretically relevant to the emotional costs of being late, experimentally activating these beliefs through priming appears insufficient to produce robust shifts in anticipated emotional responses.

Study 5

Prior studies have documented cultural differences in the rigidity of the social clock and in anticipated emotional responses to social clock deviation between the U.S. and China. However, China's political system, i.e., a single-party socialist political system under the leadership of the Chinese Communist Party (CCP), differs from that of many countries, including the democratic system in the U.S. (e.g., Delmestro, 2010; Naughton, 2010). Given that political systems may complicate prior U.S.-China comparisons, we aimed to replicate

the key findings in a comparison between the United States and South Korea, both of which operate under democratic political systems (e.g., Cotton, 1989). Authoritarian versus democratic political contexts may be relevant, as differences in political control and paternalistic governance can shape individuals' sense of personal freedom and agency, which, in turn, may influence how rigidly they construe the timing of major life events. At the same time, South Korea and China share a Confucian cultural heritage emphasizing hierarchical social relations and filial piety (e.g., Kim, 2009; Zhang et al., 2005). Accordingly, we included filial piety as a potential explanatory cultural value. We hypothesized that U.S.-South Korea differences in social clock rigidity and anticipated emotional responses to deviations from the social clock would replicate the pattern previously observed between Chinese and U.S. participants. Study 5 was preregistered (<https://aspredicted.org/xyz9-ycr9.pdf>).

Participants

Informed by prior studies on the comparable topic (Zang & Kim, 2025), we set our sample size for Study 5 at 200 (100 per culture). We recruited 102 participants in the U.S. via the Prolific platform and 152 South Korean participants via the DataSpring platform (comparable to Prolific). The data exclusion rule was the same as that of Study 1. Our final sample ($N = 188$) contains 91 American participants and 97 South Korean participants (Table 18).

Table 18

Breakdown of demographics in the U.S. and South Korea in Study 5.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
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The U.S. (<i>N</i> = 91 ¹⁶)	37.68 (12.07)	Male: 53.8 Female: 45.1 Missing: 1.1	European American: 61.5 Black/African American: 26.4 Asian American/Pacific Islander: 5.5 Hispanic/Latino: 2.2 Multiracial/Biracial: 2.2 Other: 1.1 Missing: 1.1	78.0
South Korea (<i>N</i> = 97)	44.37 (16.19)	Male: 47.4 Female: 52.6	Korean: 100	64.9

Measures

After consenting, participants completed an online survey in the following order. The English version was initially translated into Korean using AI (ChatGPT), and the translations were subsequently reviewed and edited by a bilingual research assistant fluent in both Korean and English to ensure accuracy. The content of the Korean version is identical to that of the English version, except for some demographic questions due to differences in measures such as educational systems.

Time Window Blocks

Perceptions of the Social Clock and Anticipated Emotional Outcomes of Deviation from the Social Clock. Identical to those in Studies 1a and 1b. Participants were presented with six-time window blocks. They were instructed to scroll two sliders (ranging from 10 to 90) to indicate the earliest (or the lower-bound) and the latest (or the upper-bound) ages they thought appropriate for the person to start attending college, getting a full-time job, getting married (for males and females), and having a first child (for males and females), respectively. After each time window question, we first measured the anticipated

¹⁶ One participant had missing data on gender and ethnicity. Therefore, the descriptive statistics were based on *N* = 90.

negative self-conscious emotions resulting from deviation from the *lower-bound* of the social clock. Participants were presented with four emotional states, i.e., “regretful,” “ashamed,” “anxious,” and “guilty,” and reported how much they would feel each emotion on a 5-point Likert-type scale (1 = *not at all* to 5 = *a great deal*), suppose they completed a certain life event before the lower-bound age they just entered. Next, we measured the anticipated negative self-conscious emotions resulting from deviation from the *upper-bound* of the social clock. Participants were asked to rate how “regretful,” “ashamed,” “anxious,” and “guilty” they would feel, suppose they failed to complete a certain life event by the upper-bound age they just entered. As the reliabilities of ratings of the four anticipated negative emotions were high ($\alpha s > 0.82$), we averaged them into one composite score in each block.

Filial Piety Beliefs

Filial piety beliefs were assessed using the six items from the filial piety scale (Fu et al., 2020). Items were averaged to create a composite score ($M_{US} = 3.87$, $SD_{US} = 0.62$, $\alpha_{US} = 0.85$; $M_{Korea} = 3.30$, $SD_{Korea} = 0.53$, $\alpha_{Korea} = 0.81$).

Tightness/Looseness

Tightness/looseness was measured using the six-item tightness/looseness scale. The ratings of the six items were averaged into a composite score ($M_{US} = 3.57$, $SD_{US} = 0.52$, $\alpha_{US} = 0.68$; $M_{Korea} = 3.63$, $SD_{Korea} = 0.50$, $\alpha_{Korea} = 0.65$).

Choice-Duty Conceptualization

Participants rated the extent to which following socially expected timelines for major life events (e.g., career progression, marriage, childbearing) is a social obligation versus a personal choice using a single-item 10-point slider scale (1 = *entirely a social obligation*, 10 = *entirely a personal choice*). Higher scores indicate greater perceived personal choice.

Demographic Covariates

Basic demographic information, including age, gender, education, and subjective socioeconomic status (SES; Adler et al., 2000), were measured as potential covariates.

Results

Correlations between Variables

We first calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and South Korea (Table 19).

Table 19

Descriptive statistics of the variables and bivariate correlations in the U.S. and South Korea in Study 5.

	The U.S. (N = 91)										South Korea (N = 97)											
	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10
1. Subjective time window for career-related life events	27.53 (21.42)	-										27.50 (19.03)	-									
2. Subjective time window for family-related life events	25.11 (16.02)	.78***	-									16.68 (10.93)	.71***	-								
3. Filial piety beliefs	3.87 (0.62)	-.43***	-.42***	-								3.30 (0.53)	-.14	-.13	-							
4. Tightness/looseness	3.57 (0.52)	-.12***	-.15***	.45***	-							3.63 (0.50)	-.06	-.01	.25*	-						
5. Anticipated negative emotional outcomes of deviation from the subjective career-related social clock (lower bound)	1.71 (0.70)	-.10	-.05	-.01	-.14	-						1.90 (0.79)	-.22*	-.21*	.10	-.06	-					
6. Anticipated negative emotional outcomes of deviation from the subjective career-related social clock (upper bound)	2.52 (1.07)	-.15	-.07	-.02	-.05	.54***	-					2.51 (1.03)	-.25*	-.12	.02	.14	.61***	-				
7. Anticipated negative emotional outcomes of deviation from the subjective family-related social clock (lower bound)	2.03 (0.85)	.11	.17	-.08	.02	.51***	.38***	-				1.96 (0.93)	-.12	-.05	.002	-.01	.58***	.58***	-			
8. Anticipated negative emotional outcomes of deviation from the subjective family-related social clock (upper bound)	2.45 (1.08)	-.21*	-.21*	.18	-.004	.35***	.70***	.37***	-			2.26 (0.88)	-.19	-.05	-.04	.03	.54***	.74***	.63***	-		
9. Age	37.68 (12.07)	.26*	.15	-.08	-.14**	-.30**	-.16	-.14	-.05	-		44.37 (16.19)	-.10	.01	.10	-.01	-.09	-.12	-.22*	-.17	-	
10. SES	5.56 (1.51)	-.27*	-.31**	.42***	.22*	-.05	.02	-.09	.05	.03	-	4.95 (1.75)	.10	.13	.07	.05	-.02	-.11	.13	.04	.07	-

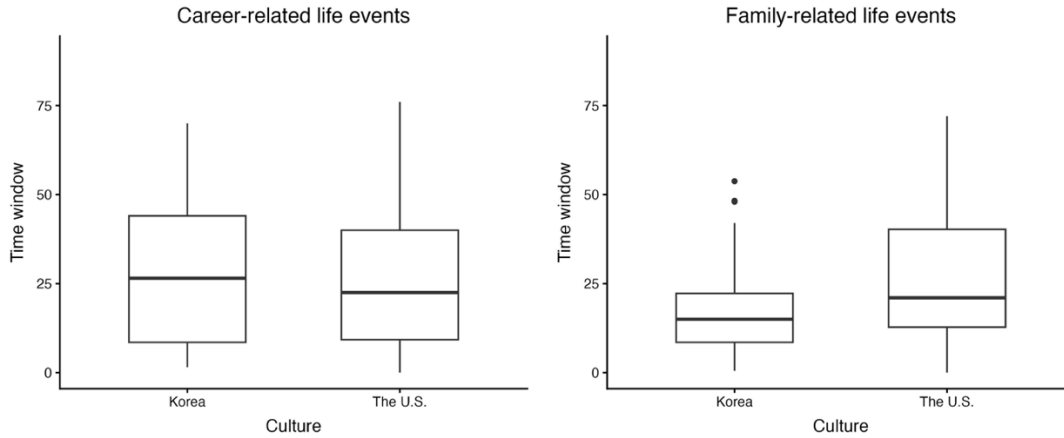
Note. *** $p < .001$, ** $p < .01$, * $p < .05$. Ns are reported in the first row of the table. All variables reported above in Study 5 had complete data except for age, which had one missing observation in the U.S. Accordingly, Ns are identical across all correlations except those involving age ($N_{US} = 90$).

Cultural Differences in the Time Windows

To test our key hypothesis, we examined whether culture affects the social clock's rigidity by looking at the time windows for career-related and family-related life events (Figure 12). In all analyses, we included age, gender, SES, and education as covariates.

Figure 12

The widths of the time windows for career-related and family-related life events in the U.S. and South Korea in Study 5.



We first examined the cultural differences in the time window for career-related life events. A univariate ANOVA on the time window for career-related life events with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates did not reveal a significant main effect of culture, $F(1, 181) = 0.05, p = .83, \eta^2_p < .001$ ($M_{US} = 27.84, SE_{US} = 2.21; M_{Korea} = 27.16, SE_{Korea} = 2.12$). Results are consistent with or without covariates for all analyses in Study 5 and will not be further discussed.

We then examined the cultural differences in the time window for family-related life events. We ran a univariate ANOVA on the time window for family-related life events with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates. We found a significant main effect of culture, $F(1, 181) = 19.99, p < .001, \eta^2_p =$

.10 ($M_{\text{US}} = 25.76$, $SE_{\text{US}} = 1.50$; $M_{\text{Korea}} = 16.16$, $SE_{\text{Korea}} = 1.44$). See Table 20 for descriptive statistics and pairwise comparisons.

Table 20

Descriptive statistics and pairwise comparisons for each life event in Study 5.

Specific life event	Culture	Lower bound age Mean (SD)	Pairwise comparison	Upper bound age Mean (SD)	Pairwise comparison	Time window Mean (SD)	Pairwise comparison
Starting college	The U.S. South Korea	18.08 (6.80) 19.19 (3.10)	$t = -1.23, p = .220$	46.41 (24.87) 47.22 (21.93)	$t = 0.31, p = .755$	28.33 (25.35) 28.03 (22.35)	$t = 0.58, p = .565$
Getting a full-time job	The U.S. South Korea	19.74 (3.63) 22.63 (6.01)	$t = -3.37, p < .001$	46.47 (21.31) 49.60 (18.19)	$t = -1.11, p = .267$	26.74 (22.00) 26.97 (19.62)	$t = -0.24, p = .808$
Getting married (male)	The U.S. South Korea	23.49 (4.52) 26.40 (4.77)	$t = -3.63, p < .001$	55.86 (22.11) 45.27 (12.71)	$t = 4.72, p < .001$	32.36 (23.56) 18.87 (14.78)	$t = 5.17, p < .001$
Getting married (female)	The U.S. South Korea	21.71 (4.11) 24.80 (4.42)	$t = -3.75, p < .001$	51.46 (24.18) 42.58 (13.28)	$t = 4.03, p < .001$	29.75 (24.47) 17.77 (14.44)	$t = 4.68, p < .001$
Having a first child (male)	The U.S. South Korea	24.18 (4.97) 27.78 (4.86)	$t = -4.44, p < .001$	45.09 (11.34) 43.21 (8.07)	$t = 1.04, p = .298$	20.91 (12.73) 15.42 (10.21)	$t = 2.77, p = .006$
Having a first child (female)	The U.S. South Korea	22.26 (3.98) 24.73 (4.17)	$t = -3.35, p < .001$	39.67 (9.84) 39.40 (6.22)	$t = 0.65, p = .519$	17.41 (10.43) 14.67 (8.16)	$t = 2.02, p = .045$

Cultural Differences in the Filial Piety and Tightness/Looseness

We examined whether there are cultural differences in filial piety and tightness/looseness. A univariate ANOVA on filial piety with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates revealed a significant main effect of culture, $F(1, 181) = 32.99, p < .001, \eta^2_p = .15$. American participants endorsed filial piety beliefs more than Korean participants, $M_{US} = 3.84, SE_{US} = 0.06; M_{Korea} = 3.33, SE_{Korea} = 0.06$.

A univariate ANOVA on tightness/looseness with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates did not reveal a significant main effect of culture, $F(1, 181) = 1.47, p = .23, \eta^2_p = .01$. Tightness/looseness was similar among American and Korean participants, $M_{US} = 3.55, SE_{US} = 0.06; M_{Korea} = 3.65, SE_{Korea} = 0.05$.

Psychological Mediators Explaining the Cultural Differences in the Time Windows

We then examined whether cultural differences in the widths of time windows for family-related life events could be explained by beliefs in filial piety (Fu et al., 2020). We conducted a mediation analysis using ordinal least squares regression (path analysis) via the PROCESS macro in SPSS (Hayes, 2018), in which filial piety beliefs mediate the effect of culture on the time windows for family-related life events, controlling for age, gender, SES, and education.

When the outcome variable was the time window for family-related life events, culture significantly predicted the time window ($\beta = -.67, b = -9.60 [-13.84, -5.36], p < .001$) and filial piety beliefs ($\beta = -.78, b = -.50 [-.67, -.33], p < .001$). Participants in South Korea reported lower levels of filial piety beliefs and a narrower time window for family-related

life events. Filial piety beliefs, in turn, significantly predicted the time window ($\beta = -.33$, $b = -7.32$ [-10.77, -3.87], $p < .001$), such that stronger filial piety beliefs were associated with a narrower time window. A bootstrap confidence interval (based on 5,000 samples) for the indirect effect did not include zero, 95% CI for b [1.79, 5.95], indicating a significant indirect effect. After controlling for filial piety beliefs, the direct effect of culture on the time window for family-related life events remained significant and increased in magnitude ($\beta = -.93$, $b = -13.27$ [-17.68, -8.86], $p < .001$). This pattern indicates that filial piety beliefs did not account for the cultural difference. Instead, the cultural difference in time windows for family-related life events emerged despite South Korean participants endorsing filial piety beliefs less strongly.

Choice-Duty Conceptualization

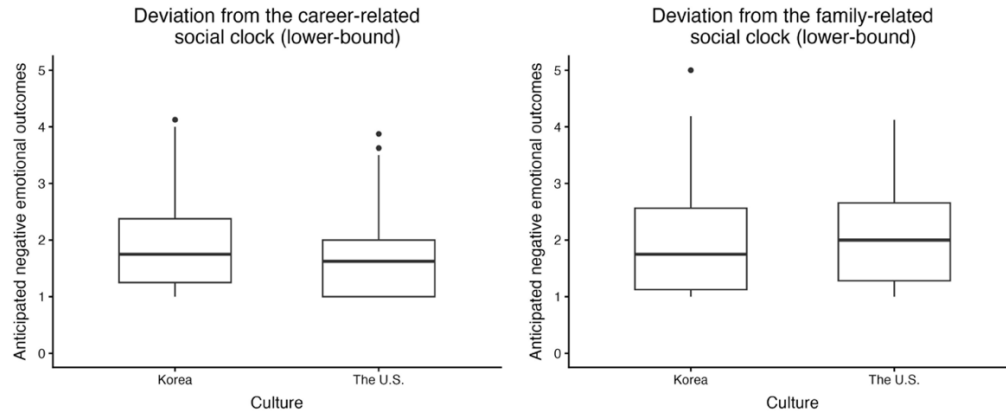
As an exploratory analysis, we examined whether there are cultural differences in the extent to which people perceive following the social clock as a personal choice (vs. social obligation). A univariate ANOVA on perceived choice versus obligation, with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates, did not reveal a significant main effect of culture, $F(1, 179) = 0.33$, $p = .57$, $\eta^2_p = .002$. Participants in the U.S. ($M = 7.16$, $SE = 0.21$) and South Korea ($M = 6.98$, $SE = 0.21$) reported comparable views about whether following the social clock is a personal choice. Notably, both means exceeded the midpoint of the scale (5.5), suggesting that participants in both cultures tended to view following the social clock as a personal choice rather than a social obligation.

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Lower-bound)

In addition, we examined whether anticipated emotional outcomes resulting from deviation from the lower-bound of the social clock varied across cultures (Figure 13).

Figure 13

Anticipated negative emotional outcomes of deviation from the social clock (lower-bound) in the U.S. vs. South Korea (Study 5).



We examined whether there are cultural differences in anticipated emotional outcomes resulting from deviation from the lower-bound of the social clock. We first looked at anticipated negative emotional outcomes resulting from deviation from the lower-bound of the career-related social clock. A univariate ANOVA on anticipated negative emotions resulting from deviation from the lower-bound of career-related social clock with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates did not reveal a significant main effect of culture, $F(1, 181) = 3.21, p = .08, \eta^2_p = .02$ ($M_{US} = 1.70, SE_{US} = .08; M_{Korea} = 1.91, SE_{Korea} = .08$). We then looked at anticipated negative emotional outcomes resulting from deviation from the lower-bound of the family-related social clock. Similarly, we did not find a significant main effect of culture, $F(1, 181) = .002, p = .96, \eta^2_p < .001$ ($M_{US} = 2.00, SE_{US} = .10; M_{Korea} = 2.00, SE_{Korea} = .09$). See Table 21 for pairwise comparisons for each life event.

Table 21

Descriptive statistics and pairwise comparisons for anticipated negative emotional outcomes of lower-bound social clock deviation for each life event.

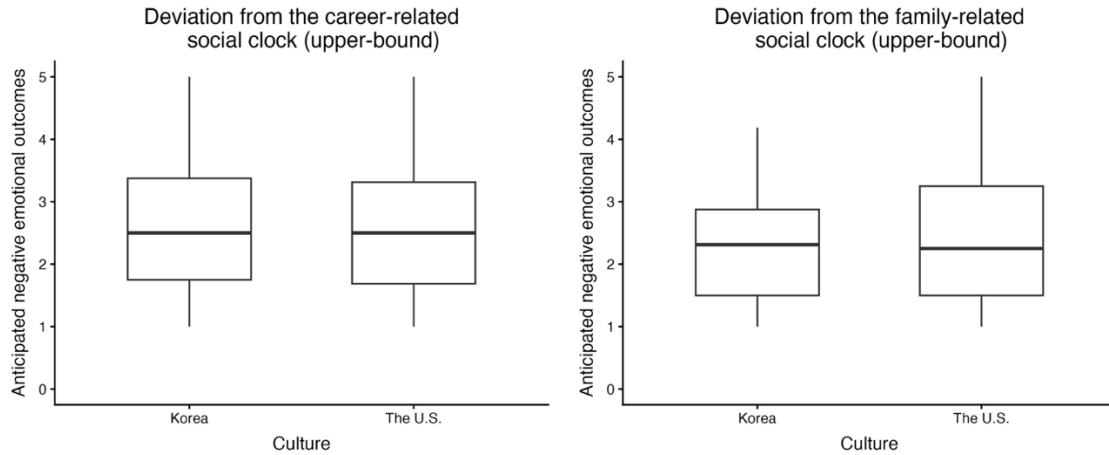
Specific life event	The U.S. Mean (SD)	South Korea Mean (SD)	Pairwise comparison
Starting college	1.80 (0.91)	1.96 (0.84)	$t = -1.45, p = .149$
Getting a full-time job	1.62 (0.76)	1.84 (0.88)	$t = -1.70, p = .089$
Getting married (male)	1.85 (0.86)	1.91 (0.92)	$t = -0.91, p = .366$
Getting married (female)	1.94 (1.00)	1.99 (1.04)	$t = -0.90, p = .368$
Having a first child (male)	2.07 (1.02)	1.92 (0.96)	$t = 0.38, p = .703$
Having a first child (female)	2.28 (1.20)	2.01 (1.07)	$t = 1.33, p = .184$

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

Lastly, we examined whether anticipated emotional outcomes resulting from deviation from the upper-bound of the social clock varied across cultures (Figure 14).

Figure 14

Anticipated negative emotional outcomes of deviation from the social clock (upper-bound) in the U.S. vs. South Korea (Study 5).



We first looked at anticipated negative emotional outcomes resulting from deviation from the upper-bound of the career-related social clock. A univariate ANOVA on anticipated negative emotions resulting from deviation from the upper-bound of career-related social clock with culture (the U.S. vs. South Korea) as a fixed factor and age, gender, SES, and education as covariates did not reveal a significant main effect of culture, $F(1, 181) < .001, p = .99, \eta^2_p < .001$ ($M_{US} = 2.52, SE_{US} = .12; M_{Korea} = 2.52, SE_{Korea} = .11$). We then looked at anticipated negative emotional outcomes resulting from deviation from the upper-bound of the family-related social clock. Similarly, we did not find a significant main effect of culture, $F(1, 181) = .84, p = .36, \eta^2_p = .01$ ($M_{US} = 2.42, SE_{US} = .11; M_{Korea} = 2.28, SE_{Korea} = .10$). See Table 22 for pairwise comparisons for each life event.

Table 22

Descriptive statistics and pairwise comparisons for anticipated negative emotional outcomes of upper-bound social clock deviation for each life event.

Specific life event	The U.S. Mean (SD)	South Korea Mean (SD)	Pairwise comparison
Starting college	2.47 (1.19)	2.24 (1.08)	$t = 1.12, p = .266$
Getting a full-time job	2.58 (1.21)	2.78 (1.23)	$t = -1.02, p = .310$
Getting married (male)	2.38 (1.26)	2.36 (1.02)	$t = -0.33, p = .739$

Getting married (female)	2.43 (1.26)	2.29 (1.06)	$t = 0.58, p = .561$
Having a first child (male)	2.33 (1.17)	2.20 (0.94)	$t = 0.38, p = .702$
Having a first child (female)	2.66 (1.27)	2.20 (0.96)	$t = 2.59, p = .010$

Discussion

The Korea-U.S. comparison on the social clock did not fully replicate the pattern observed in the China-U.S. comparison. Specifically, only the cultural differences in family-related time windows were consistent across the two pairs of cultural contrasts. Notably, despite reporting lower levels of filial piety beliefs, South Korean participants still showed narrower time windows for family-related life events than American participants. One possible explanation is that explicit endorsement of filial piety may be weakening in contemporary South Korea as traditional family structures change under compressed modernity (e.g., Chang, 2010), whereas implicit expectations about the timing of family-related life events may remain shaped by historically strong family-centered norms.

All other effects that were robust in the China-U.S. comparison were nonsignificant in the Korea-U.S. comparison. Several explanations are plausible. First, data quality concerns may have attenuated effects in the Korean sample. A substantial proportion of participants failed attention checks, with only 63.8% passing ($N_{\text{Failed}} = 55$, total $N = 152$), raising the possibility of reduced engagement and thus poor quality. Increased random noise would reduce statistical power and attenuate potential cultural differences. Second, cultural distance may matter. Compared to China, South Korea shares more structural and institutional

similarities with the U.S. (e.g., market economy and strong exposure to Western education and media). If the social clock's rigidity is partly shaped by modernization and exposure to Western cultural norms, the Korea-U.S. gap may be smaller than the China-U.S. gap, particularly outside the family domain.

Thus, future research could consider re-testing the Korea-U.S. comparison using more stringent data quality control with stricter attention filters and bot-detection criteria, as well as testing of measurement invariance. Moreover, future research could consider adding cultural distance as a moderator and more explicitly distinguishing between subjective and intersubjective (e.g., Ching Wan, 2015) social clocks to test whether alignment differs across cultures.

General Discussion

The present research provides initial evidence for a causal influence of cultural values on the social clock's rigidity, which extends prior correlational and cross-sectional work. However, the findings should be interpreted with caution. Although the effect of cultural priming on the career-related time window was directionally consistent, it reached statistical significance only in the unadjusted models and not in the preregistered covariate-adjusted analyses.

In addition, we failed to replicate several basic findings in the U.S.-South Korea comparisons due to concerns about data quality. As a result, we are unable to draw firm conclusions about the robustness of the effects. Still, Study 5 focuses solely on comparisons between East Asian and Western participants, which limits the generalizability of its findings. Other specific types of social duty (e.g., familismo, see Ayón et al., 2010) may be more relevant among non-East Asian bicultural participants.

More importantly, for real-world applications, it remains unknown if people's anticipated well-being outcomes could be changed by altering participants' perceptions of the intersubjectively established social clock. Understanding this is crucial for assessing the efficacy of potential intervention programs intended to change the perceptions of the intersubjectively established social clock and, in turn, reduce the negative impact of social clock deviations on emotional well-being. Thus, Chapter 3 aims to bridge these gaps by examining how intersubjective perceptions (e.g., C. Wan et al., 2007) implicate subjective perception, anticipated emotional outcomes, and social judgments. Also, Chapter 3 aims to examine whether manipulating the intersubjectively established social clock changes participants' perceptions of the social clock's rigidity and anticipated well-being outcomes of social clock deviation, and if such effects vary across cultures.

CHAPTER III: DO PEOPLE THINK I'M LATE IN LIFE? AN INTERSUBJECTIVE APPROACH TO CULTURE AND THE OPTIMAL TIMING OF LIFE¹⁷

Imagine a 28-year-old single woman planning to return to school to become a software engineer. Meanwhile, her friends are getting married, and relatives increasingly ask about her job and marriage plans. Engagement photos, baby announcements, and career updates from peers flood her feed. In such moments, individuals often experience decisional uncertainty—whether to follow their own preferences or align with the choices of most others. This uncertainty often results from the discrepancies between individuals' personal beliefs and what individuals believe most people in their society think or expect. How these two types of beliefs, i.e., personal (or subjective) and perceived shared (or intersubjective) beliefs, shape people's feelings and behaviors may depend on various factors, including culture. The present research investigates this question through the lens of the social clock, exploring how individuals across cultures align their personal beliefs with their perceptions of intersubjective norms.

Research has documented the relationship between subjective beliefs and people's perception of widespread beliefs in their culture—intersubjective perceptions (e.g., Chiu et al., 2010). While studies have shown that there are varying associations between the two in different cultures (e.g., Shteynberg et al., 2009; C. Wan et al., 2007), there is a lack of systematic research on the extent to which individuals align their personal views with perceived intersubjective norms and the underlying reasons for such alignment. Further, while it is acknowledged that intersubjective perceptions can influence both behaviors and

¹⁷ A subset of this research is under review at *Journal of Experimental Social Psychology*. Zang, L., & Kim, H. (under review). Do people think I'm late in life? An intersubjective approach to culture and the optimal timing of life.

implicit cognitions (e.g., Ching Wan et al., 2010), just as subjective perceptions can (e.g., Ajzen, 1991), there is little empirical research on how the two types of perceptions differentially influence psychological and behavioral outcomes, and if such effects vary across cultures. Thus, the present research examines the extent to which people align the two perceptions across cultures.

We use the beliefs about the social clock (Neugarten, 1976) to address this question. The social clock, an understudied concept, refers to culturally shaped expectations about the timing of important life milestones, such as finishing school, getting married, and having children. The social clock is a culture-specific normative expectation that significantly influences individuals' life decisions and psychological well-being (Zang & Kim, 2025). More specifically, we examined whether the alignment between the subjective and intersubjective perceptions of the social clock varies across cultures and, if so, what the explanatory mechanisms are. In addition, the current research examines whether differences between the two perceptions of the social clock are linked to emotional well-being and social judgments. Extending beyond documenting these consequences, we introduce a prospective intervention that experimentally shifts intersubjective perceptions to test whether it alleviates the psychological costs associated with these deviations.

The Role of Intersubjective Perceptions

Intersubjective norms refer to the perceived consensus within a culture or shared beliefs about what other people in their cultures typically think and believe, which matters profoundly in social coordination and behavioral regulation (e.g., Chiu et al., 2010; Vandello et al., 2008). They differ from subjective norms in that subjective norms reflect an individual's own perception of what is socially expected, whereas intersubjective norms

pertain to what individuals believe *most others* in their culture think or expect (C. Wan et al., 2007; Zou et al., 2009). Under the context of the social clock, intersubjective perceptions reflect a form of shared reality regarding culturally appropriate life timing that individuals assume is widely accepted in their culture (Chiu et al., 2010; Hardin & Higgins, 1996). This contrasts with subjective perceptions of the social clock, which are an individual's own internalized personal beliefs or preferences about when certain life events should occur. These perceptions generally correlate only weakly to moderately (e.g., Shteynberg et al., 2009; C. Wan et al., 2007). Given that the subjective social clock tends to vary across cultures (Zang & Kim, 2025), one question that emerges is whether there are systematic cultural variations in how closely people align the two perceptions of the social clock, and if so, why.

Further, while both perceptions are important precursors of behaviors and cognition (Ajzen, 1991; Ching Wan et al., 2010), intersubjective perceptions better explain observed cultural variations in goal-directed strategies and responses to opportunities and constraints in social environments, for example, conformity (e.g., Shteynberg et al., 2009; Zou et al., 2009). By contrast, subjective perceptions better explain internalized cultural dispositions, for example, prosocial and environmental actions (e.g., Chiu et al., 2010; Fischer, 2006; Fischer et al., 2009). Given that the social clock simultaneously reflects deeply personal, *internalized* life values and *culturally shaped* expectations about strategic life planning, it remains unclear which perception matters more for people's emotional well-being and whether culture moderates this association.

Cultural Differences in Subjective and Intersubjective Norm Perception

In this paper, we focus on the cultural dimension of individualism-collectivism to explain variations in how closely people align the two perceptions. People from individualistic cultures (e.g., North American cultures) prioritize their personal goals over the aims of the collective; in contrast, people from collectivistic cultures (e.g., East Asian cultures) either put the collective goals ahead of their personal ones or do not make distinctions between the two goals (Triandis et al., 1988). Consequently, individualistic cultures encourage the construction of the self as independent, autonomous, agentic, and distinct from others; by contrast, collectivistic cultures encourage an interdependent self-construal that sees the self as socially entrenched and mutually obligated (Markus & Kitayama, 1991). Consistently, uniqueness is prized in individualistic cultures, whereas conformity is favored in more collectivistic cultures (Kim & Markus, 1999), and people from collectivistic cultures tend to exhibit higher levels of conformity (e.g., Bond & Smith, 1996).

However, while there is much evidence that people from collectivistic cultures visibly and behaviorally conform more than those from individualistic cultures (e.g., Bond & Smith, 1996), it remains unknown whether people go against their personal beliefs to conform or if they adjust their personal beliefs to social norms. This ambiguity stems from a lack of systematic research on the intensity at which people across cultures absorb the intersubjective norms into their internalized beliefs. Prior research on norm internalization yielded mixed findings (e.g., Bontempo et al., 1990; Oh, 2013). While some studies suggest that compared to individualists, collectivists are more likely to internalize group norms (e.g., Bontempo et al., 1990), others indicate that while collectivists are more likely to conform to group norms, their private attitudes may remain unchanged, and the level of norm internalization did not differ substantially (e.g., Oh, 2013). These inconsistencies likely stem from differences in the

operationalization of norm internalization: Bontempo et al. (1990) inferred internalization from behavioral willingness to conform under anonymous conditions, whereas Oh (2013) assessed it through instantaneous changes in private attitudes in an experimental setting, leaving the question in naturally occurring contexts unexplored. Thus, the current study addresses this gap by directly and quantitatively examining the alignment between subjective and intersubjective perceptions of the social clock across cultures, providing a more impartial assessment of how social norms are internalized. In doing so, the current study contributes to the cultural psychology of norm internalization.

The Role of Culture in Norm Internalization

We predict that people from collectivistic cultures show a closer alignment between their subjective and intersubjective perceptions compared to those from individualistic cultures, based on findings about cultural differences in self-other perception biases. Such biases include the false consensus effect and false uniqueness effect (e.g., Choi & Cha, 2019; Heine & Lehman, 1999; Suls et al., 1988). The false consensus effect, a bias in assuming “others share my view” (e.g., Ross et al., 1977), tends to be stronger among collectivists compared to individualists, potentially because being perceived similarly to others is culturally desirable (e.g., Choi & Cha, 2019; Park, 2012). Therefore, compared to people from individualistic cultures, people from collectivistic cultures may align their intersubjective perceptions closer to their subjective perceptions of the social clock, which results in a smaller difference between the two. On the other hand, people from individualistic cultures are more inclined to value uniqueness (Kim & Markus, 1999), which we reason might coincide with a stronger inclination to view oneself as more distinctive from others. Thus, people in more individualistic cultures may exhibit the false uniqueness effect,

one of the self-other perception biases in assuming “I’m more unique than others” (e.g., Heine & Lehman, 1999; Marks, 1984; Suls et al., 1988). Such an effect may lead people from individualistic cultures to view their subjective beliefs about the social clock as markedly different from what they perceive as widely shared in their culture. We test this idea in the context of the social clock.

Culture and the Social Clock

The concept of the social clock can be found in many cultures (e.g., Byrd & Breuss, 1992; Gee, 1990; Lee & Payne, 2010; Peterson, 1996). Moreover, the social clock tends to vary depending on the type of life event, such as family-related events (e.g., getting married) or non-family-related events (e.g., finding a job) (Gee, 1990). Different from the biological clocks, which are descriptive of the universal human neural-physical development (e.g., Frieze et al., 2006; Leader, 2006), the social clock is a *culturally* prescribed timeline for important life milestones that help people assess whether they have made adequate progress toward reaching life milestones (Helson & McCabe, 1994; Neugarten, 1976). Indeed, recent research (Zang & Kim, 2025) suggests that the social clock was more rigid in China than in the U.S., and this difference is explained by sense of social obligation, an important aspect of collectivism. More specifically, filial piety beliefs—a type of social obligation especially important for the Chinese (e.g., Chan & Tan, 2008)—likely explain these differences. Filial piety is a multidimensional construct that centers on children’s respect, duty, and care toward their parents and elders (Chan & Tan, 2008; Kyeong et al., 2025; Zhao et al., 2023). That is, in China, where people emphasize fulfilling filial piety by completing life milestones such as having children as a way to cope with the existential threat of mortality (Qi, 2023), a more rigid social clock is helpful for guiding individuals to meet social expectations. In contrast, in

the U.S., strict timelines are less useful, as the timings of essential life milestones are less tied to social obligations (Zang & Kim, 2025). Additionally, deviation from the social clock resulted in more anticipated negative self-conscious emotions, such as shame and guilt, in China than in the U.S. (Zang & Kim, 2025). Building on existing research that has focused on subjective perceptions of the social clock, the present research examines how the intersubjective social clock functions across cultures and how individuals align the two perceptions of the social clock in different cultures.

The Present Research

The present research presents a cultural perspective on norm internalization regarding the social clock that influences individuals' emotional well-being and social evaluations. Building on Zang and Kim (2025), the present research continued to focus on two national cultures, the U.S. and China, which differ in the general cultural dimension of individualism-collectivism (Hofstede, 2011; Pelham et al., 2022), and also in the specific filial piety component (e.g., Chan & Tan, 2008; Schwartz et al., 2010). We assessed the rigidity of the social clock by the *width of the perceived time window* (i.e., the gap between the earliest and latest ages appropriate for each life event).

Across four studies, we examined how and why the social clock's rigidity differs across cultures and social clock types (subjective vs. intersubjective) and how deviations from them carry emotional and interpersonal consequences. Study 6 examined anticipated negative emotions following *upper-bound* deviations from the subjective vs. intersubjective social clock. Study 7 extended this question to social judgments of upper-bound subjective social clock deviations, testing whether evaluations vary across cultures (the U.S. vs. China) and judgment perspectives (subjective vs. intersubjective). Looking at these two perspectives

informs how intersubjective norms operate and align with personal beliefs, as the perceived gap between one's own and perceived most others' judgments reflects the process through which individuals internalize and coordinate shared social expectations. Study 8 paralleled these designs for *lower-bound* deviations to examine whether similar patterns emerge when people experience or evaluate being "too early." Finally, Study 9 experimentally manipulated intersubjective norms to test whether promoting a more flexible intersubjective social clock can alleviate the psychological costs of upper-bound deviation.

Transparency and Openness

The hypotheses, analysis plans, and sampling method (and exclusion rules) for Study 6 were preregistered (https://drive.google.com/file/d/1lbumy1XDjh_mXP_HV3MZZtIn_VhQI9AN/view?usp=drive_link; the preregistration link will be provided after review to maintain anonymity), as were those for Study 7 (<https://aspredicted.org/9vfg-8drm.pdf>), Study 8 (https://osf.io/r36ky/?view_only=6e277d48d4844f1fa3cbbafd870d5de3), and Study 9 (<https://aspredicted.org/ytt9-nvfc.pdf>). Materials and de-identified data, along with their codebooks and data analysis scripts, are made publicly available at https://osf.io/y87zq/overview?view_only=331d5e8880b443c69d47b90ec93f78a1. Additional measures and results can be found in our supplementary materials (<https://drive.google.com/file/d/15UiWlls4ydSwsieNHmqe6nNvx3WS3gPm/view?usp=sharing>). We report all data exclusions, manipulations, and measures in the study, consistent with the APA Journal Article Reporting Standards.

Study 6

In Study 6, we examined the variations in the widths of the time windows suitable for engaging in four life events (career- or family-related) across cultures (the U.S. vs. China) and social clock types (subjective vs. intersubjective). We hypothesized that time windows would be narrower in China than in the U.S., time windows for intersubjective social clocks would be narrower than for subjective social clocks, and that deviation from the upper-bound of the subjective social clock would elicit more negative emotions than deviation from the intersubjective social clock for Americans, whereas the two types of deviation would have comparable effects for Chinese participants. We also explored the role of filial piety beliefs as a potential explanatory factor.

Participants

Based on power analysis¹⁸, we set our sample size at $N = 100$ per culture. We recruited 107 participants in the U.S. via the Prolific platform and 102 participants in China via the Credamo platform (comparable to the Prolific platform). Participants who failed to complete the survey or declined to share anonymous data were excluded from the analyses. Participants who listed a lower value for the upper limit than the value for the lower limit were also excluded. Our final sample ($N = 198$) contains 98 American participants and 100 Chinese participants (Table 23). Study 6 drew on the same dataset as Study 1b in Zang and Kim (2025).

¹⁸ Power analysis was originally conducted based on the results from a pilot dataset reported in Zang and Kim (2025, Study 1a), using the G*Power software (Erdfelder et al., 1996) using an F test, A Priori, where the smallest $R^2 = .314$, $f^2 = .458$, $\alpha = .05$, power = .80, 6 predictors, yielding a required sample size of 37. Given that the present analysis utilizes the full dataset already collected and reported previously (Zang and Kim, 2025, Study 1b), we report a post hoc observed power. Based on Study 6 results regarding culture and filial piety simultaneously predicting alignments, given $\alpha (.05)$, sample size ($N = 198$), number of predictors (6), and effect size (smallest $f^2 = .429$). The achieved power is approximately 1.00, indicating a very high probability of detecting a significant effect if it exists.

Table 23*Breakdown of demographics in the U.S. and China in Study 6.*

Culture	Age <i>M</i> (<i>SD</i>)	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. (<i>N</i> = 98)	34.80 (11.10)	Male: 50 Female: 44.9 Non-binary/Other: 5.1	European American: 72.4 Asian American/Pacific Islander: 10.2 Hispanic/Latino: 8.2 Black/African American: 7.1 Multiracial/Biracial: 2.0	63.3
China (<i>N</i> = 100)	34.59 (12.73)	Male: 52.0 Female: 48.0	Han Chinese: 98.0 Ethnic Minorities: 2.0	96.0

Measures

After consenting, participants completed an online survey with items following the subsequent order. The English version was translated into simplified Chinese for Chinese participants using the back-translation method. The content of the Chinese version is identical to that of the English version, except for some demographic questions, given national differences in these measures (e.g., in education systems).

Time Window Blocks

Subjective Perceptions of the Social Clock. Participants were presented with six time-window blocks. In each block, we first measured participants' perceptions of the subjective social clock by asking them to provide the earliest and the latest ages *they* thought appropriate for engaging in a particular event (Table 24)¹⁹. For example, participants read the description: "Assuming a person wants to attend a college. Please provide a range of ages that you think is appropriate for the person to start attending a college." Then, participants were instructed to scroll two sliders (ranging from 10 to 90) to indicate the earliest (or the

¹⁹ We dropped the event of beginning graduate school when finalizing study materials as it is not a common life milestone.

lower-bound) and the latest (or the upper-bound) ages they thought appropriate for the person to start attending college, respectively.

As family-related life events may be gender-dependent, we measured participants' perceptions of the earliest and the latest ages appropriate for a male or a female to participate in each life event. The structure and phrasing of questions were similar to those for career-related life events. The time window for each life event is calculated by deducting the earliest age (or lower-bound age) from the latest age (or upper-bound age).

Anticipated Negative Emotional Outcomes of Deviation from the Subjective Social Clock (Upper-bound). We measured the anticipated negative self-conscious emotions resulting from deviation from the upper-bound of the subjective social clock. For instance, participants read: "Assuming you want to attend a college—Imagine you didn't start attending college by the time you are reaching *this upper-bound* of the appropriate age for attending college (i.e., by age [quoting the numeric value of the upper-bound age they entered previously]). Please indicate how much you would feel the following emotions if you are not fulfilling the age-appropriate expectation." Participants were presented with four emotional states, i.e., "regretful," "ashamed," "anxious," and "guilty," and reported how much they would feel each emotion on a 5-point Likert-type scale (1 = *not at all* to 5 = *a great deal*). The structure and phrasing of questions were comparable in all blocks. As the reliabilities of ratings of the four anticipated negative emotions were high ($\alpha s > 0.88$), we averaged them into one composite score in each block.

Intersubjective Perceptions of the Social Clock. We measured participants' perceptions of the intersubjective social clock using the same procedure as for subjective

perceptions, except that participants indicated the age ranges they thought *a typical person in their country* would consider appropriate.

Anticipated Negative Emotional Outcomes of Deviation from the Intersubjective Social Clock (Upper-bound). We then measured the anticipated negative self-conscious emotions resulting from deviation from the upper-bound of the intersubjective social clock. The structure and phrasing of the questions were comparable to those measuring anticipated negative emotional outcomes of deviation from the upper-bound of the subjective social clock. We averaged the ratings of the four anticipated negative emotions into one composite score in each time window block ($\alpha_s > 0.90$).

Table 24

Sequences of the questions measuring time windows in Study 6.

	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
Life event subcategories	Career-related life events		Family-related life events			
Specific life event	Starting college	Getting a full-time job	Getting married (male)	Getting married (female)	Having a first child (male)	Having a first child (female)

Filial Piety Beliefs

The 12-item filial piety scale (Fu et al., 2020) was used to assess the extent to which one endorses filial piety beliefs. Example items include “Children should ask after their parents’ well-being” and “Children should try their best to honor their parents.” Participants reported their agreement or disagreement with each statement on a 5-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*). Item scores were averaged to create a composite score ($\alpha_{US} = 0.89$; $\alpha_{CH} = 0.77$). Higher scores indicated a higher endorsement of filial piety.

Demographic Covariates

Basic demographic information, including age, gender, education, and subjective socioeconomic status (SES; Adler et al., 2000), were measured as potential covariates.

Results

Correlations between Variables

We calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and China (Table 25).

Table 25

Descriptive statistics of the variables and bivariate correlations between them in the U.S. and China in Study 6.

	The U.S. (N=98)											China (N=100)												
	M (SD)	1	2	3	4	5	6	7	8	9	10	11	M (SD)	1	2	3	4	5	6	7	8	9	10	11
1. Subjective time window for career-related life events	43.00 (18.69)	-											9.75 (10.09)	-										
2. Intersubjective time window for career-related life events	25.59 (15.93)	.66 ***	-										7.25 (6.59)	.75 ***	-									
3. Subjective time window for family-related life events	34.73 (14.22)	.62 ***	.51 ***	-									10.58 (6.52)	.51 ***	.45 ***	-								
4. Intersubjective time window for family-related life events	27.26 (14.26)	.52 ***	.71 ***	.74 ***	-								8.80 (4.26)	.40 ***	.55 ***	.68 ***	-							
5. Filial piety beliefs	3.12 (.67)	-.28 **	-.08 ***	-.34 ***	-.09 *	-							3.94 (.44)	-.23 *	-.01 *	-.19 *	.13	-						
6. Anticipated negative emotional outcomes of deviation from the subjective career-related social clock (upper bound)	2.60 (1.09)	-.33 ***	-.29 **	-.23 *	-.24 *	.11	-						3.59 (.90)	-.17 *	-.10 *	-.09 *	.03	.34 ***	-					
7. Anticipated negative emotional outcomes of deviation from the intersubjective career-related social clock (upper bound)	2.45 (1.12)	-.29 **	-.17 *	-.21 *	-.20 *	.15	.87 ***	-					3.56 (.90)	-.17 *	-.09 *	-.17 *	-.02	.31 **	.82 ***	-				
8. Anticipated negative emotional outcomes of deviation from the subjective family-related social clock (upper bound)	2.14 (.99)	-.20 *	-.09 *	-.16 *	-.15 *	.36 ***	.58 ***	.68 ***	-				3.25 (.97)	-.08 *	.03	-.11	.15	.36 ***	.61 ***	.61 ***	-			
9. Anticipated negative emotional outcomes of deviation from the intersubjective family-related social clock (upper bound)	2.05 (.98)	-.23 *	-.09 *	-.16 *	-.09 *	.38 ***	.56 ***	.68 ***	.93 ***	-			3.28 (1.04)	-.09 *	.01	-.09 *	.17	.37 ***	.57 ***	.61 ***	.89 ***	-		
10. Age	34.80 (11.10)	.10 **	.27 **	-.03 *	.12 ***	.37 ***	-.32 **	-.26 **	-.03 *	-.02	-		34.59 (12.73)	-.14 *	.03	-.01	.06	.04	-.19	-.13	-.01	.03	-	
11. SES	4.85 (1.66)	.08	.09	.13	.09	-.01	-.05	-.04	.01	.05	.07	-	5.33 (1.16)	-.03	.02	.21 *	.19	.17	.10	.16	.08	.13	.18	-

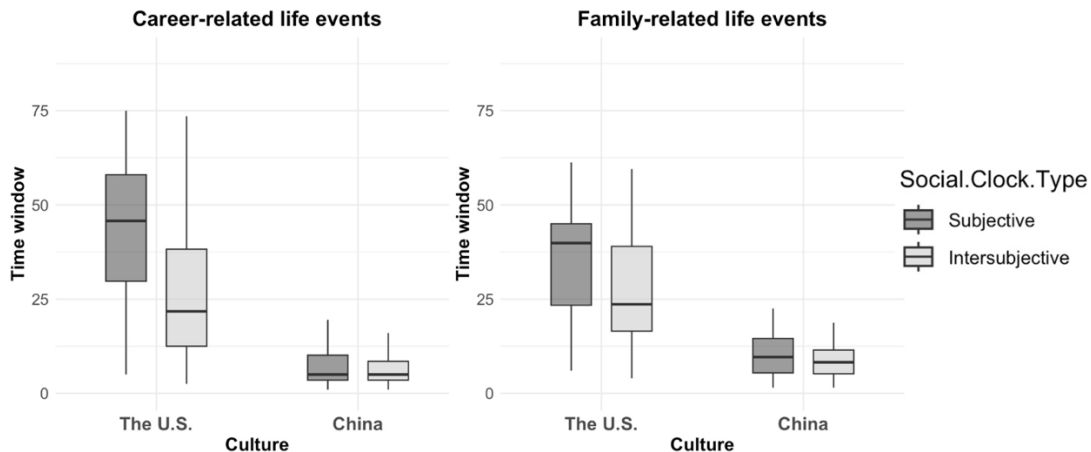
*** $p < .001$, ** $p < .01$, * $p < .05$.

Time Windows Varying by Culture and Social Clock Type

We examined whether culture and social clock type affect the social clock's rigidity (Figure 15). In all analyses, we included age, gender, SES, and education as covariates.

Figure 15

The widths of the time windows for career-related and family-related life events vary by culture and social clock type in Study 6.



We first examined the time windows for career-related life events. We ran a generalized estimating equation (GEE) with robust standard errors (SEs) on the time window for career-related life events with culture (the U.S. vs. China) and social clock type (subjective vs. intersubjective) as predictors with the covariates²⁰. The results revealed a significant main effect of culture, Wald $\chi^2(1, N = 198) = 195.89, p < .001$. The time window for career-related life events was narrower in China ($M = 8.30$, robust SE = .87, 95% Wald CI [6.60, 10.01]) than in the U.S. ($M = 34.49$, robust SE = 1.56, 95% Wald CI [31.44, 37.54]). Also, the results revealed a significant main effect of social clock type, Wald $\chi^2(1, N$

²⁰ We had preregistered to conduct repeated-measures ANOVAs to examine the cultural differences, but we decided to instead run GEEs with robust SEs for all analyses (except for regression analyses) in Study 6 to account for violations of key statistical assumptions in the outcome variables. See the supplementary materials (pp. 3-4) for the ANOVA results as preregistered. The significance patterns of all reported results in Study 6 remain consistent with or without demographic covariates and will not be discussed further.

= 198) = 152.69, $p < .001$. The time window for the intersubjective social clock ($M = 16.42$, robust SE = .83, 95% Wald CI [14.79, 18.05]) was narrower than that for the subjective social clock ($M = 26.38$, robust SE = 1.03, 95% Wald CI [24.36, 28.39]). In addition, we found a significant two-way interaction between culture and social clock type, Wald $\chi^2(1) = 85.54$, $p < .001$. We ran post-hoc pairwise comparisons using Bonferroni adjustments to examine the interaction further. In both cultures, the intersubjective social clock was more rigid than the subjective social clock for career-related life events, $ps < .001$, and the time window for career-related life events was narrower in China than in the U.S. across both social clock types, $ps < .001$. Given the strong differences in all contrasts, the exact nature of interaction pattern could not be clearly described. Instead, we will describe the cultural differences in the degree of gap between the subjective and intersubjective social clocks in the next section where we explore the alignment between the two social clocks.

We then examined the time windows for family-related life events. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 229.39$, $p < .001$. The time window for family-related life events was narrower in China ($M = 9.42$, robust SE = .56, 95% Wald CI [8.34, 10.51]) than in the U.S. ($M = 31.26$, robust SE = 1.28, 95% Wald CI [28.75, 33.78]). Also, the results revealed a significant main effect of social clock type, Wald $\chi^2(1, N = 198) = 65.64$, $p < .001$. The time window for the intersubjective social clock ($M = 18.03$, robust SE = .72, 95% Wald CI [16.62, 19.44]) was narrower than that for the subjective social clock ($M = 22.66$, robust SE = .75, 95% Wald CI [21.20, 24.12]). In addition, we found a significant two-way interaction between culture and social clock type, Wald $\chi^2(1) = 24.79$, $p < .001$. We ran post-hoc pairwise comparisons using Bonferroni adjustments to examine the interaction further. In both cultures, the intersubjective social

clock was more rigid than the subjective social clock for family-related life events, $ps < .001$, and the time window for family-related life events was narrower in China than in the U.S. across both social clock types, $ps < .001$. As with the career-related life events results, the specific description of the interaction will be presented in the following section.

In addition, we examined pairwise comparisons between the upper- and lower-bound ages as well as time windows in the U.S. and China across social clock types, as well as pairwise comparisons between the upper- and lower-bound ages as well as time windows for the subjective and intersubjective social clock in the U.S. and China. See the supplementary materials for the results (pp. 4-6).

The Role of Filial Piety in Explaining the Cultural Differences

Beliefs in filial piety played a significant role as a potential explanation for cultural differences in the time windows of subjective social clocks in previous research (Zang & Kim, 2025). We ran a similar analysis with the time windows of intersubjective social clocks, and found that the beliefs in filial piety were unrelated to those time windows (see the supplementary materials, pp. 6-7). This is reasonable given that one's personal beliefs should not be meaningfully associated with their perception of what a typical person in their society thinks.

Further, as exploratory analyses, we examined whether the alignment between the subjective and intersubjective social clocks could be explained by beliefs in filial piety. As analyses revealed high correlations in both the U.S. and China, the alignment score was operationalized as the absolute mean difference between subjective and intersubjective time windows, with smaller values indicating greater internalization. We conducted mediation analyses using ordinary least squares regression via the PROCESS macro in SPSS (Hayes,

2018), testing whether filial piety beliefs mediated the effect of culture on the alignment score while controlling for covariates.

Descriptive analyses indicated that the mean alignment score for the subjective and intersubjective career-related social clock was 18.11 ($SD = 13.69$) in the U.S. and 3.57 ($SD = 6.28$) in China. When the outcome variable was the alignment between the subjective and intersubjective career-related social clock, culture predicted the alignment ($b = -14.36 [-17.68, -11.04], p < .001$) and filial piety beliefs ($b = .82 [.66, .99], p < .001$). Chinese participants were more likely to align the subjective and intersubjective career-related social clocks closer and to endorse beliefs in filial piety. Beliefs in filial piety, in turn, predicted a closer alignment ($b = -5.02 [-7.81, -2.23], p < .001$). A bootstrap confidence interval (based on 5,000 samples) for the indirect effect did not include zero, 95% CI $[-7.11, -1.64]$, although after controlling for filial piety beliefs, there was still a significant direct association between culture and the alignment ($b = -10.23 [-14.19, -6.27], p < .001$). Thus, filial piety beliefs partially mediated the cultural difference in the alignment between the subjective and intersubjective career-related social clock.

Descriptive analyses indicated that the mean alignment score for the subjective and intersubjective family-related social clock was 9.01 ($SD = 9.03$) in the U.S. and 2.65 ($SD = 4.36$) in China. When the outcome variable was the alignment between the subjective and intersubjective family-related social clock, culture predicted the alignment ($b = -5.48 [-7.85, -3.11], p < .001$) and filial piety beliefs ($b = .82 [.66, .99], p < .001$). Chinese participants were more likely to align the subjective and intersubjective family-related social clocks closer and to endorse beliefs in filial piety. Beliefs in filial piety, in turn, predicted a closer alignment ($b = -4.62 [-6.57, -2.68], p < .001$). A bootstrap confidence interval (based on

5,000 samples) for the indirect effect did not include zero, 95% CI [-6.00, -1.92], and after controlling for filial piety beliefs, there was no significant direct association between culture and the alignment ($b = -1.67$ [-4.43, 1.09], $p = .23$). Thus, filial piety beliefs fully mediated the cultural difference in the alignment between the subjective and intersubjective family-related social clock.

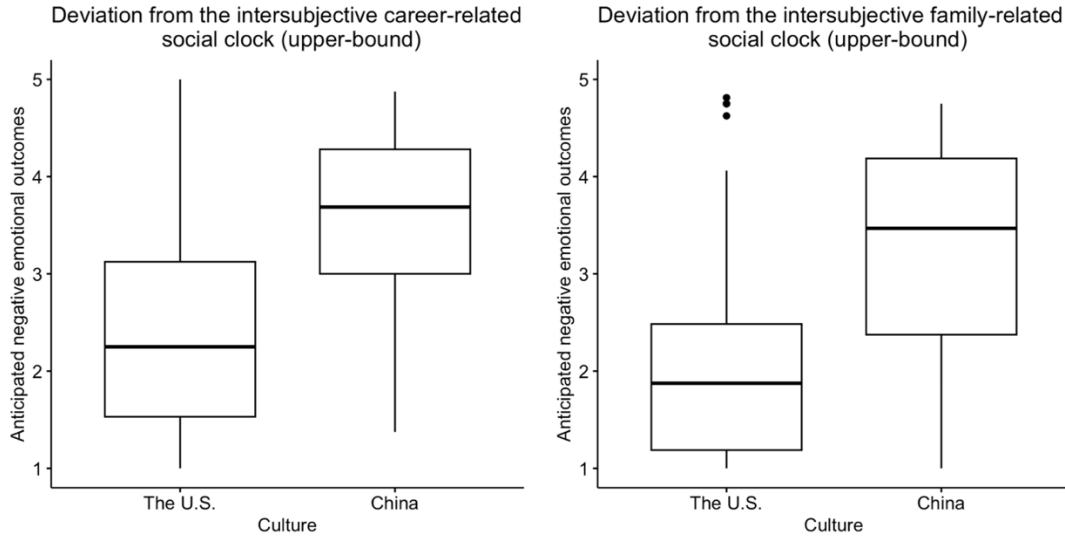
Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

In addition, we examined whether anticipated emotional outcomes resulting from deviation from the upper-bound of the intersubjective social clock varied across cultures (Figure 16). We had preregistered to test the interaction between culture and social clock type. However, although the interactions were statistically significant²¹, we decided not to interpret or report it further because of a confound: in the U.S., the upper-bound age for the subjective social clock was considerably higher than that for the intersubjective social clock, whereas in China, the two were much closer. This discrepancy makes it difficult to disentangle whether the observed interaction reflects true cultural differences in the effect of social clock type on anticipated emotional outcomes or merely differences in the upper-bound ages. In summary, as Zang and Kim (2025) examined the anticipated emotional consequences of deviation from the subjective social clock, we conducted a parallel analysis focusing on the intersubjective social clock to extend this line of inquiry.

Figure 16

Anticipated negative emotional outcomes of deviation from the intersubjective social clock (upper-bound) in the U.S. vs. China (Study 6).

²¹ We ran the preregistered analyses and found that in the U.S., deviation from the subjective social clock (either career- or family-related) was anticipated to be more distressing than deviation from the intersubjective social clock, $ps < .02$, whereas in China, there was no significant difference between the two, $ps > .55$.



We first looked at anticipated negative emotional outcomes resulting from deviation from the intersubjective career-related social clock. A GEE with robust SEs was conducted on this variable with culture (the U.S. vs. China) as a predictor with the covariates. We found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 54.31, p < .001$. Deviation from the intersubjective career-related social clock (upper-bound) was anticipated to be more distressing in China ($M = 3.54$, robust SE = .09, 95% Wald CI [3.56, 3.72]) than the U.S. ($M = 2.47$, robust SE = .11, 95% Wald CI [2.25, 2.68]), $B = -1.07$, robust SE = .15, 95% Wald CI [-1.36, -.79]), despite the fact that on average, the upper-bound age in China was lower than the age in the U.S.

In addition, we tested anticipated negative emotional outcomes resulting from deviation from the intersubjective family-related social clock. Similarly, we found a significant main effect of culture, Wald $\chi^2(1, N = 198) = 58.93, p < .001$. Deviation from the intersubjective family-related social clock was also anticipated to be more distressing in China ($M = 3.25$, robust SE = .11, 95% Wald CI [3.04, 3.46]) than the U.S. ($M = 2.07$, robust SE = .10, 95% Wald CI [1.87, 2.28]), $B = -1.18$, robust SE = .15, 95% Wald CI [-1.48, -.88], again, despite the lower upper-bound age in China. See the supplementary materials (p. 8)

for descriptive statistics and the cultural differences in anticipated negative emotional outcomes resulting from deviation from the intersubjective social clock (upper-bound) for each life event.

The Role of Filial Piety in Cultural Differences in Anticipated Negative Emotional Outcomes

We also examined whether the cultural differences in anticipated negative emotional outcomes could be explained by beliefs in filial piety. Beliefs in filial piety played a significant role as a potential explanation for cultural differences in anticipated negative emotional outcomes resulting from deviation from the upper-bound of the subjective social clock (Zang & Kim, 2025). We ran a similar analysis with anticipated negative emotional outcomes resulting from deviation from the upper-bound of the intersubjective social clock. Specifically, we conducted mediation analyses using ordinary least squares regression via the PROCESS macro in SPSS (Hayes, 2018), testing whether filial piety beliefs mediated the effect of culture on anticipated negative emotional outcomes.

With deviation from the intersubjective career-related social clock, culture predicted anticipated negative emotional outcomes ($b = 1.07$ [.77, 1.37], $p < .001$) and filial piety beliefs ($b = .82$ [.66, .99], $p < .001$). Chinese participants were expected to experience more negative emotional outcomes with deviation from the intersubjective career-related social clock and to endorse beliefs in filial piety. Beliefs in filial piety, in turn, predicted more anticipated negative emotional outcomes ($b = .48$ [.23, .73], $p < .001$). A bootstrap confidence interval (based on 5,000 samples) for the indirect effect did not include zero, 95% CI [.15, .66], and after controlling for filial piety beliefs, there was still a significant direct association between culture and anticipated negative emotional outcomes ($b = .68$ [.32, 1.03],

$p < .001$). Thus, filial piety beliefs partially mediated the cultural difference in anticipated negative emotional outcomes resulting from deviation from the intersubjective career-related social clock.

With deviation from the intersubjective family-related social clock, culture predicted anticipated negative emotional outcomes ($b = 1.18 [.88, 1.48]$, $p < .001$) and filial piety beliefs ($b = .82 [.66, .99]$, $p < .001$). Chinese participants were expected to experience more negative emotional outcomes with deviation from the intersubjective family-related social clock and to endorse beliefs in filial piety. Beliefs in filial piety, in turn, predicted more anticipated negative emotional outcomes ($b = .68 [.43, .92]$, $p < .001$). A bootstrap confidence interval (based on 5,000 samples) for the indirect effect did not include zero, 95% CI [.32, .81], and after controlling for filial piety beliefs, there was still a significant direct association between culture and anticipated negative emotional outcomes ($b = .62 [.28, .97]$, $p < .001$). Thus, filial piety beliefs partially mediated the cultural difference in anticipated negative emotional outcomes resulting from deviation from the intersubjective family-related social clock. These analyses show that cultural differences in endorsement of filial piety beliefs are likely to explain the cultural differences in anticipated negative emotions.

Discussion

Study 6 revealed that the social clock tends to be more rigid in China than in the United States, and that the intersubjective social clock is perceived as more rigid than the subjective one. Chinese participants also aligned their subjective perceptions more closely with intersubjective perceptions, and these differences were explained by cultural variations in endorsement of filial piety. Moreover, deviation from the upper-bound of the intersubjective social clock was anticipated to be more distressing for Chinese than for

Americans, and this cultural difference was likewise accounted for by stronger endorsement of filial piety among Chinese participants. Although we used mediation analyses to examine whether filial piety beliefs statistically accounted for the observed cultural differences, the cross-sectional design precludes causal inferences. Thus, the mediation results should be interpreted as indicative of potential explanatory mechanisms rather than as evidence of causality. Study 7 extends this investigation to the interpersonal level, examining how people evaluate others' deviations from the social clock.

Study 7

In Study 7, we examine social judgments of upper-bound social clock deviation, marking a shift from intrapersonal to interpersonal consequences. Building on Study 6, which examined self-relevant emotional responses to deviations from the social clock, Study 7 focused on interpersonal evaluations of others' deviations. Accordingly, the methodological focus also differed: participants judged how they themselves (subjective social judgments) and indicated their perception of how a typical person in their country (intersubjective social judgments) would evaluate the same target person's deviation. This shift highlights the distinction between self-evaluation and social evaluation processes, providing a complementary test of how culture influences interpersonal consequences of social clock deviation. In this study, we investigated whether social judgments of social clock deviation (upper-bound) vary across cultures (the U.S. vs. China) and judgment perspectives (subjective vs. intersubjective).

In addition to replicating the findings of cultural differences in the social clock's rigidity, we preregistered the hypothesis that Chinese participants would judge deviation from the subjective social clock (upper-bound) more negatively. Further, we hypothesized

that in both cultures, the intersubjective social judgments would be more negative than subjective social judgments. We also preregistered exploratory analyses regarding the role of filial piety and tightness/looseness in negative social judgments of social clock deviation. We included tightness/looseness as an index of the strength of social norms (Gelfand et al., 2011) because tighter cultures prescribe narrower ranges of acceptable behavior and may enforce stronger sanctions for norm deviation, making it relevant for understanding cultural differences in social judgments of social clock deviations.

Participants

Based on power analysis²², we set our sample size at $N = 100$ per culture. We recruited 100 participants in the U.S. via the Prolific platform and 91 participants in China via the Credamo platform. The data exclusion rules were the same as in Study 6. Our final sample ($N = 183$) includes 92 American participants and 91 Chinese participants (Table 26).

Table 26

Breakdown of demographics in the U.S. and China in Study 7.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. ($N = 92$)	36.03 (10.28)	Male: 50.0 Female: 48.9 Non-binary/Other: 1.1	European American: 69.6 Asian American/Pacific Islander: 10.9 Black/African American: 7.6 Hispanic/Latino: 7.6 Multiracial/Biracial: 4.3	59.8
China ($N = 91$)	28.83 (7.81)	Male: 49.5 Female: 50.5	Han Chinese: 97.8 Ethnic Minorities: 2.2	97.8

Measures

²² We ran the power analysis using the G*Power software (Erdfeider et al., 1996; F test, repeated-measures ANOVA: within-between interaction) to determine the required sample size for detecting an interaction effect in a 2 (Culture: U.S. vs. China; between-subjects) $\times$ 2 (Judgment perspective (subjective vs. intersubjective); within-subjects) mixed-design ANOVA. Assuming a medium effect size ($f = .25$), an alpha (α) level of .05, and power ($1 - \beta$) of .80, the analysis indicated that a total sample of $N = 34$ participants would be sufficient. We opted for a substantially larger sample ($N = 200$) to increase statistical power.

After consenting, participants completed an online survey with items following the subsequent order. Similarly, the English version was translated into simplified Chinese for Chinese participants using the back-translation method.

Time Window Blocks

Subjective Perceptions of the Social Clock. Subjective perceptions of the social clock were measured using the same method as in Study 6. Participants were presented with three time-window blocks. We decided to exclude the time window blocks of attending college and having a first child to shorten the survey. The remaining life events are getting a full-time job, which was used to represent career-related life events, and “getting married (males and females),” which was used to represent family-related life events. The time window calculation method was identical to that used in Study 6.

Subjective Social Judgments of Deviation from the Subjective Social Clock (Upper-bound). We measured subjective social judgments of deviation from the upper-bound of the subjective social clocks. Specifically, we asked participants how they think a person SHOULD feel if they have failed to abide by the social clock, with the word SHOULD capturing the evaluative judgment of the participants, thus reflecting their approval or disapproval towards that person. For instance, participants read: “Assuming there is a person who wants to get a full time job. Imagine that person didn’t get a full time job when they are reaching this upper bound of the appropriate age for a person to get a full time job (i.e., by age [quoting the numeric value of the upper-bound age of the subjective social clock they entered previously]). Please indicate how much you think that person SHOULD feel the following emotions if they are not fulfilling this age-appropriate expectation.” Participants were presented with four emotional states, i.e., “regretful,” “ashamed,”

“anxious,” and “guilty,” and reported how much they thought that person *should* feel each emotion on a 5-point Likert-type scale (1 = *not at all* to 5 = *a great deal*). As the reliabilities of participants’ ratings of the negative emotions were high in all blocks ($\alpha s > 0.90$), we averaged them into one composite score in each block.

Intersubjective Social Judgments of Deviation from the Subjective Social Clock (Upper-bound). After that, we measured intersubjective negative social judgments of deviation from the upper-bound of the subjective social clocks. For example, participants read: “Recap: there is a person who wants to get a full time job but didn’t when they are reaching this upper bound of the appropriate age for a person to get a full time job (i.e., by age [quoting the same numeric value of the upper-bound age of the subjective social clock they entered previously]). To your best guess, please indicate how much *a typical American person* would think that person SHOULD feel the following emotions if they are not fulfilling this age-appropriate expectation.” Participants were presented with the same four emotional states and reported how much they thought a typical American person would think that person *should* feel each emotion on a 5-point Likert-type scale (1 = *not at all* to 5 = *a great deal*). As the reliabilities of participants’ ratings of the negative emotions were high in all blocks ($\alpha s > 0.89$), we averaged them into one composite score in each block.

Other Measures

Filial piety beliefs were measured using the same scale as in Study 6 (Fu et al., 2020) ($\alpha_{US} = 0.83$; $\alpha_{CH} = 0.79$). In addition, we included the tightness/looseness scale (Gelfand et al., 2011) for exploratory purposes ($\alpha_{US} = 0.53$; $\alpha_{CH} = 0.38$). Although the reliability of this measure was not satisfactory, we retained it for exploratory analysis. See the supplementary materials for a full description of this measure (p. 9). In addition, basic demographic

information, including age, gender, education, and subjective socioeconomic status (SES; Adler et al., 2000), were measured as potential covariates.

Results

Correlations between Variables

We first calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and China (Table 27).

Table 27

Descriptive statistics of the variables and bivariate correlations in the U.S. and China in Study 7.

	The U.S. (<i>N</i> =92)										China (<i>N</i> =91)											
	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	8	9	10	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	8	9	10
1. Subjective time window for career-related life events	38.43 (24.32)	-										14.03 (13.01)	-									
2. Subjective time window for family-related life events	47.32 (21.80)	.68 ***	-									12.06 (9.37)	.65 ***	-								
3. Filial piety beliefs	3.09 (.56)	-.08	-.01	-								3.70 (.42)	-.24 *	-.38 ***	-							
4. Tightness/Looseness	3.26 (.50)	-.01	-.01	-.01	-							3.96 (.36)	-.12	-.07	.26 *	-						
5. Subjective negative social judgments of deviation from the career-related social clock (upper bound)	2.12 (1.09)	-.07	-.19	.30 **	-.10	-						3.42 (.86)	-.18	-.24 *	.50 ***	.20	-					
6. Intersubjective negative social judgments of deviation from the career-related social clock (upper bound)	2.88 (1.30)	-.10	-.25 *	-.16	.11	.52 ***	-					3.84 (.72)	.05	-.10	.25 *	.35 ***	.64 ***	-				
7. Subjective negative social judgments of deviation from the family-related social clock (upper bound)	1.76 (.89)	-.01	-.15	.16	-.12	.38 ***	.32 **	-				2.80 (.84)	-.10	-.26 *	.58 ***	.29 **	.67 ***	.41 ***	-			
8. Intersubjective negative social judgments of deviation from the family-related social clock (upper bound)	2.85 (1.20)	-.06	-.07	-.12	.20	.23 *	.57 ***	.40 ***	-			3.48 (.80)	.06	.10	.02	.37 ***	.37 ***	.59 ***	.52 ***	-		
9. Age	36.03 (10.28)	.08	.05	-.02	-.04	-.05	-.09	-.21 *	-.17	-		28.83 (7.81)	.07	-.10	.32 **	-.11	.17	-.05	.07	-.19	-	
10. SES	4.89 (1.62)	.05	.12	-.04	-.09	.16	.03	.11	.09	.09	-	5.11 (1.12)	.01	-.05	.13	.06	-.19	-.12	-.01	-.19	.12	-

*** $p < .001$, ** $p < .01$, * $p < .05$

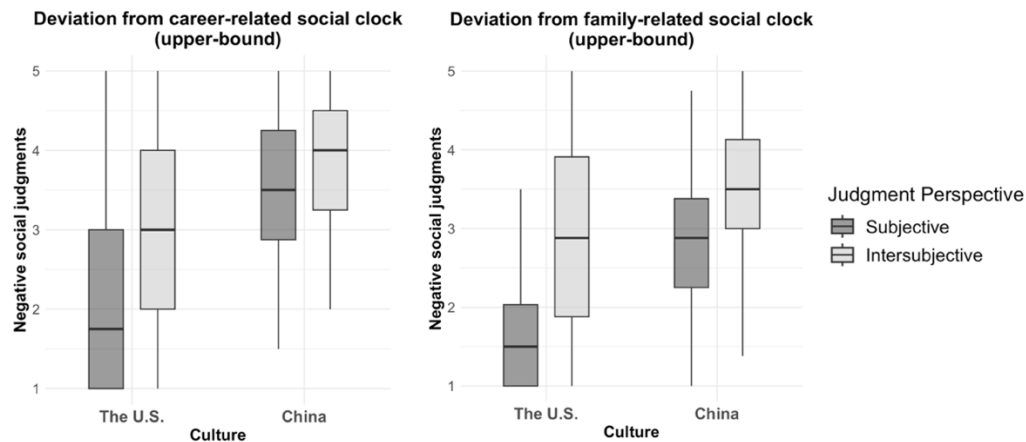
Given that the primary purpose of Study 7 was to examine how culture and judgment perspectives would affect negative social judgments of deviation from the subjective social clock (upper-bound), we included the replication results of cultural differences in the time windows in the supplementary materials (pp. 9-11).

Social Judgements of Deviation from the Subjective Social Clock (Upper-bound)

We examined whether negative social judgments of deviation from the upper-bound of the subjective social clock varied across cultures and judgment perspectives (Figure 17). In all analyses, we included age, gender, SES, and education as covariates. We had preregistered to conduct repeated-measures ANOVAs to examine cultural differences, but decided to instead use generalized estimating equations (GEEs) with robust standard errors. This approach ensured consistency across analyses and accounted for potential violations of key assumptions (e.g., homogeneity of variance in some outcome variables, such as time windows).

Figure 17

Negative social judgments of deviation from the subjective social clock (upper-bound) vary by culture and judgment perspective (Study 7).



We first looked at negative social judgments resulting from deviation from the subjective career-related social clock (upper-bound). We ran a GEE with robust SEs on the negative social judgments with culture (the U.S. vs. China) and judgment perspective (subjective vs. intersubjective) as predictors with the covariates. We found a significant main effect of culture, Wald $\chi^2(1, N = 182) = 47.84, p < .001$. Deviation from the subjective career-related social clock (upper-bound) was judged more negatively in China ($M = 3.62$, robust SE = .08, 95% Wald CI [3.45, 3.78]) than in the U.S. ($M = 2.52$, robust SE = .12, 95% Wald CI [2.29, 2.76]). Also, we found a significant main effect of judgment perspective, Wald $\chi^2(1, N = 182) = 68.73, p < .001$. Intersubjective social judgments ($M = 3.37$, robust SE = .08, 95% Wald CI [3.21, 3.52]) were more negative than subjective social judgments ($M = 2.77$, robust SE = .07, 95% Wald CI [2.63, 2.91]). In addition, we found a significant interaction effect, Wald $\chi^2(1) = 5.27, p = .02$. We ran post-hoc pairwise comparisons using Bonferroni adjustments to examine the interaction further. In both cultures, intersubjective social judgments were more negative than subjective social judgments, $ps < .001$, and the social judgments were more negative in China than in the U.S. across both judgment perspectives, $ps < .001$. Further, the alignment score for the subjective and intersubjective social judgments, operationalized as the absolute difference between subjective and intersubjective social judgments, was smaller in China ($M_{\text{diff}} = .43$, robust SE = .07) than in the U.S. ($M_{\text{diff}} = .76$, robust SE = .12), $p = .02$.

We then looked at negative social judgments resulting from deviation from the subjective family-related social clock (upper-bound). We found a significant main effect of culture, Wald $\chi^2(1, N = 182) = 25.01, p < .001$. Deviation from the subjective family-related social clock (upper-bound) was judged more negatively in China ($M = 3.09$, robust SE = .08,

95% Wald CI [2.92, 3.25]) than in the U.S. ($M = 2.36$, robust SE = .10, 95% Wald CI [2.16, 2.56]). Also, we found a significant main effect of judgment perspective, Wald $\chi^2(1, N = 182) = 142.74, p < .001$. Intersubjective social judgments ($M = 3.17$, robust SE = .07, 95% Wald CI [3.02, 3.31]) were more negative than subjective social judgments ($M = 2.28$, robust SE = .06, 95% Wald CI [2.16, 2.40]). In addition, we found a significant interaction effect, Wald $\chi^2(1) = 7.02, p = .008$. We ran post-hoc pairwise comparisons using Bonferroni adjustments to examine the interaction further. In both cultures, intersubjective social judgments were more negative than subjective social judgments, $ps < .001$, and the social judgments were more negative in China than in the U.S. across both judgment perspectives, $ps < .001$. Further, the alignment score for the subjective and intersubjective social judgments was smaller in China ($M_{\text{diff}} = .69$, robust SE = .08) than in the U.S. ($M_{\text{diff}} = 1.08$, robust SE = .12), $p = .01$.

See the supplementary materials (pp. 13-14) for descriptive statistics and pairwise comparisons between negative social judgments of deviation from the subjective social clock (upper-bound) for each life event.

The Role of Filial Piety and Tightness/Looseness in Negative Social Judgments

As preregistered, we examined whether cultural differences in negative social judgments of subjective social clock deviation could be explained by beliefs in filial piety and by tightness/looseness as exploratory mediators. We conducted mediation analyses using ordinary least squares regression via the PROCESS macro in SPSS (Hayes, 2018), testing whether filial piety beliefs and tightness/looseness mediated the effect of culture on negative social judgments while controlling for covariates.

When the outcome variable was the subjective negative social judgments of deviation from the subjective career-related social clock (upper-bound), culture predicted the negative social judgments ($b = 1.32$ [.99, 1.65], $p < .001$), filial piety beliefs ($b = .66$ [.50, .83], $p < .001$), and tightness/looseness ($b = .67$ [.52, .82], $p < .001$). When culture, filial piety beliefs, and tightness/looseness were entered simultaneously as predictors, filial piety beliefs remained a significant predictor of subjective negative social judgments ($b = .73$ [.44, 1.02], $p < .001$), whereas tightness/looseness did not ($b = -.04$ [-.36, .27], $p = .79$). A parallel mediation model (PROCESS Model 4; Hayes, 2018) tested whether filial piety and tightness/looseness statistically accounted for the cultural difference in negative social judgments while controlling for covariates. The total indirect effect was significant, 95% CI [.15, .75]. Specifically, the indirect effect through filial piety beliefs was significant, $b = .48$, 95% CI [.28, .72], whereas the indirect effect through tightness/looseness was not, $b = -.03$, 95% CI [-.28, .21]. After accounting for both mediators, the direct effect of culture on negative social judgments remained significant ($b = .87$ [.45, 1.28], $p < .001$), indicating partial mediation. Thus, filial piety beliefs, but not tightness/looseness, partially mediated the cultural difference in negative social judgments of deviation from the subjective career-related social clock.

When the outcome variable was the subjective negative social judgments of deviation from the subjective family-related social clock (upper-bound), culture predicted the negative social judgments ($b = .95$ [.66, 1.24], $p < .001$), filial piety beliefs, and tightness/looseness. When culture, filial piety beliefs, and tightness/looseness were entered simultaneously as predictors, beliefs in filial piety predicted subjective negative social judgments ($b = .52$ [.27, .78], $p < .001$), whereas tightness/looseness did not ($b = .05$ [-.23, .33], $p = .71$). Similarly, a

parallel mediation model tested whether filial piety and tightness/looseness statistically accounted for the cultural difference in negative social judgments while controlling for covariates. The total indirect effect was significant, 95% CI [.09, .66]. Specifically, the indirect effect through filial piety beliefs was significant, $b = .35$, 95% CI [.15, .57], whereas the indirect effect through tightness/looseness was not, $b = .04$, 95% CI [-.27, .30]. After accounting for both mediators, the direct effect of culture on negative social judgments remained significant ($b = .57$ [.21, .93], $p = .002$), indicating partial mediation. Thus, filial piety beliefs, but not tightness/looseness, partially mediated the cultural difference in negative social judgments of deviation from the subjective family-related social clock.

When the outcome variable was the intersubjective negative social judgments of deviation from the subjective career-related social clock (upper-bound), culture predicted the negative social judgments ($b = .87$ [.51, 1.22], $p < .001$), filial piety beliefs, and tightness/looseness. When culture, filial piety beliefs, and tightness/looseness were entered simultaneously as predictors, tightness/looseness predicted subjective negative social judgments ($b = .43$ [.07, .79], $p = .02$), whereas filial piety beliefs did not ($b = -.11$ [-.43, .22], $p = .52$). A parallel mediation model tested whether filial piety and tightness/looseness statistically accounted for the cultural difference in intersubjective negative social judgments while controlling for covariates. The total indirect effect was not significant, 95% CI [-.10, .53]. Specifically, the indirect effect through tightness/looseness was significant, $b = .29$, 95% CI [.01, .56], whereas the indirect effect through filial piety beliefs was not, $b = -.07$, 95% CI [-.31, .18]. After accounting for both mediators, the direct effect of culture on negative social judgments remained significant ($b = .65$ [.18, 1.11], $p = .007$), indicating partial mediation. Thus, tightness/looseness, but not filial piety beliefs, partially mediated the

cultural difference in intersubjective negative social judgments of deviation from the career-related social clock.

When the outcome variable was the intersubjective negative social judgments of deviation from the subjective family-related social clock (upper-bound), culture predicted the negative social judgments ($b = .51 [.16, .85], p < .001$), filial piety beliefs, and tightness/looseness. When culture, filial piety beliefs, and tightness/looseness were entered simultaneously as predictors, tightness/looseness predicted subjective negative social judgments ($b = .58 [.24, .92], p < .001$), whereas filial piety beliefs did not ($b = -.12 [-.43, .18], p = .43$). Likewise, a parallel mediation model tested whether filial piety and tightness/looseness statistically accounted for the cultural difference in intersubjective negative social judgments while controlling for covariates. The total indirect effect was significant, 95% CI [.01, .61]. Specifically, the indirect effect through tightness/looseness was significant, $b = .39$, 95% CI [.14, .62], whereas the indirect effect through filial piety beliefs was not, $b = -.08$, 95% CI [-.30, .16]. After accounting for both mediators, the direct effect of culture on negative social judgments was no longer significant ($b = .20 [-.24, .64], p = .36$), indicating full mediation. Thus, tightness/looseness, but not filial piety beliefs, fully mediated the cultural difference in intersubjective negative social judgments of deviation from the family-related social clock.

Taken together, these analyses suggest that the cultural differences in the subjective negative social judgments of deviation from the subjective social clock (upper-bound) are probably due to cultural differences in endorsement of filial piety beliefs. By contrast, the cultural differences in the intersubjective negative social judgments of deviation from the

subjective social clock (upper-bound) are likely to be due to cultural differences in tightness/looseness.

Discussion

Across life events, Chinese participants judged deviations from the social clock more negatively than Americans, and intersubjective social judgments were consistently perceived to be harsher than subjective ones. Moreover, the pattern of mediation differed by judgment perspective. Filial piety beliefs accounted for the cultural differences in subjective social judgments, suggesting that stronger beliefs in filial piety among Chinese participants may shape more self-imposed evaluative standards regarding social clock deviation. In contrast, tightness/looseness accounted for the cultural differences in intersubjective social judgments, indicating that perceived social norm strength contributes to how people expect others to evaluate social clock deviation. This pattern aligns with theoretical expectations: personal beliefs about filial duties shape one's own evaluative standards but are not necessarily directly related to perceptions of collective or "typical" social judgments, which are better captured by perceived strength of social norms. These findings suggest that distinct cultural mechanisms underlie personal versus collective evaluations of norm deviation. While the current mediation models are correlational and do not establish causality, they offer initial evidence that filial piety and tightness/looseness play complementary roles in shaping subjective and intersubjective social judgments across cultures. However, these findings are limited to upper-bound deviations. Accordingly, Study 8 investigates whether comparable patterns emerge with lower-bound deviations.

Study 8

Studies 6 and 7 focused on the emotional and interpersonal consequences of deviations from the upper-bound of the social clock. However, achieving milestones too early may also cause emotional distress and social disapproval as people tend to raise concerns about preparedness, sustainability, and motives. Study 8, therefore, examined how deviation from the lower-bound of the social clock would affect anticipated emotional well-being and social judgments. We hypothesized that, in addition to replicating the results regarding the time window differences, deviation from the lower bound of the social clock would elicit more anticipated negative emotions for Chinese than for Americans, and that these cultural differences would be explained by endorsement of filial piety beliefs (Fu et al., 2020). We further expected an interaction between culture and social clock type on anticipated negative emotions.

For social judgments, we hypothesized that people in China would judge others whose personal life timing was ahead of the lower bound of the social clock more negatively than people in the U.S. Furthermore, we hypothesized that in both cultures, intersubjective social judgments would be more negative than subjective social judgments of lower-bound social clock deviations. Lastly, we hypothesized that filial piety would mediate the cultural difference in subjective social judgments, whereas tightness/looseness would mediate the cultural difference in intersubjective social judgments. Likewise, we included tightness/looseness as an index of the strength of social norms (Gelfand et al., 2011), as it is conceptually relevant for understanding cultural differences in social judgments of norm deviations.

Participants

Based on power analysis²³, we set our sample size at $N = 100$ per culture. We recruited 100 participants in the U.S. via the Prolific platform and 111 participants in China via the Naodao platform (comparable to the Prolific platform). The data exclusion rules were the same as in Studies 6 and 7. Our final sample ($N = 201$) contains 92 American participants and 109 Chinese participants (Table 28). Study 8 drew on the same dataset as Study 2 in Zang and Kim (2025).

Table 28

Breakdown of demographics in the U.S. and China in Study 8.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. ($N = 92$)	35.17 (9.36)	Male: 44.6 Female: 54.3 Non-binary/Other: 1.1	European American: 51.1 Black/African American: 27.2 Asian American/Pacific Islander: 7.6 Hispanic/Latino: 5.4 Multiracial/Biracial: 4.3 Native American/Alaskan: 3.3 Other: 1.1	58.7
China ($N = 109$)	25.07 (4.89)	Male: 62.4 Female: 37.6	Han Chinese: 99.1 Ethnic Minorities: 0.9	95.4

Measures

The procedures and measures were the same as in Study 6, except that we measured anticipated negative emotional outcomes of deviation from the lower-bound of the social clock. Participants first completed the subjective time window block, after which the lower-bound ages derived from their responses were piped into the subsequent blocks assessing

²³ Power analysis was originally conducted based on the results of Study 1b reported in Zang and Kim (2025), which corresponds to the dataset used as Study 6 in the present research. We ran the power analysis using the G*Power software (Erdfelder et al., 1996) using an F test, A Priori, where the smallest $R^2 = .308$, $f^2 = .445$, $\alpha = .05$, Power ($1 - \beta$) = .80, number of predictors = 6. It yields a total sample size of 38. Given that the present analysis utilizes the full dataset already collected and reported previously (Zang and Kim, 2025, Study 2), we report a post hoc observed power. Based on Study 8 results regarding culture and filial piety simultaneously predicting alignments, given $\alpha (.05)$, sample size ($N = 201$), number of predictors (6), and effect size (smallest $f^2 = .230$). The achieved power is approximately 1.00, indicating an extremely high probability of detecting a significant effect if it exists.

anticipated negative emotions and social judgments (subjective and intersubjective) of deviation from *this* lower-bound age. They then completed the intersubjective time window block, followed by the corresponding emotional-outcome block, in which the lower-bound ages from the intersubjective time window were piped into the questions measuring anticipated emotions. We averaged the ratings of the four anticipated negative emotions into one composite score in each time window block ($\alpha_s > 0.80$). The subjective and intersubjective negative social judgments of deviation from the subjective social clock were comparable to those in Study 7, except that we measured negative social judgments of deviation from the lower-bound of the social clock. We averaged the ratings of the four judgment items into one composite score in each time window block ($\alpha_s > 0.84$). Filial piety beliefs ($\alpha_{US} = .92$; $\alpha_{CH} = .79$) and tightness/looseness ($\alpha_{US} = .51$; $\alpha_{CH} = .36$) were measured using the same scales. Filial piety beliefs were measured using the same scale (Fu et al., 2020) ($\alpha_{US} = 0.92$; $\alpha_{CH} = 0.79$). In addition, we included the tightness/looseness scale (Gelfand et al., 2011) for exploratory purposes. See the supplementary materials for a full description of this measure (p. 14).

Results

Correlations between Variables

We calculated the descriptive statistics of the variables and bivariate correlations between them in the U.S. and China (Table 29).

Table 29

Descriptive statistics of the variables and bivariate correlations between them in the U.S. and China in Study 8.

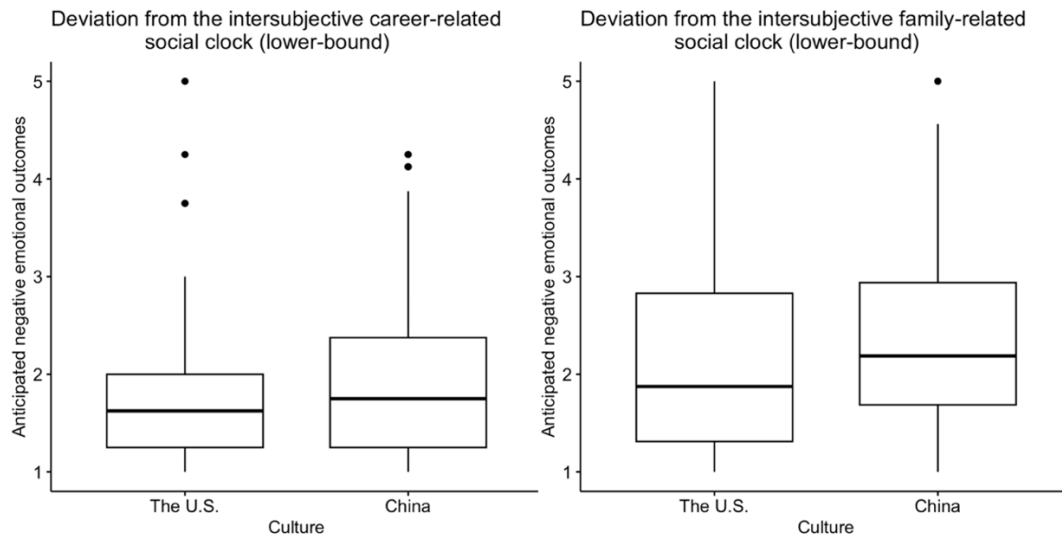
Given that the primary purpose of Study 8 was to examine how deviation from the lower-bound of the social clock would affect emotional well-being, we included the replication results for cultural differences in the time windows and the role of filial piety in explaining the cultural differences in the supplementary materials (pp. 14-21)²⁴.

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Lower-bound)

We examined whether anticipated emotional outcomes resulting from deviation from the lower-bound of the intersubjective social clock varied across cultures (Figure 18). In all analyses, we included age, gender, SES, and education as covariates. Similar to Study 6, we preregistered to test the interaction between culture and social clock type but decided not to interpret or report it further because of the same confound.

Figure 18

Anticipated negative emotional outcomes of deviation from the intersubjective social clock (lower-bound) in the U.S. vs. China (Study 8).



²⁴ Since we preregistered mediation analyses with filial piety, we also include mediation analysis results using the PROCESS macro (Hayes, 2018).

We first looked at anticipated negative emotional outcomes resulting from deviation from the intersubjective career-related social clock. A GEE with robust SEs was conducted on this variable with culture (the U.S. vs. China) as a predictor with the covariates. We did not find a significant main effect of culture, Wald $\chi^2(1, N = 201) = 1.90, p = .17$. Deviation from the intersubjective career-related social clock (lower-bound) was comparably distressing in China ($M = 1.96$, robust SE = .08, 95% Wald CI [1.80, 2.12]) and the U.S. ($M = 1.79$, robust SE = .08, 95% Wald CI [1.63, 1.95]), $B = -.16$, robust SE = .12, 95% Wald CI [-.40, .07]).

In addition, we tested anticipated negative emotional outcomes resulting from deviation from the intersubjective family-related social clock. Similarly, we did not find a significant main effect of culture, Wald $\chi^2(1, N = 201) = .04, p = .85$. Deviation from the intersubjective family-related social clock (lower-bound) was comparably distressing in China ($M = 2.25$, robust SE = .09, 95% Wald CI [2.07, 2.44]) and the U.S. ($M = 2.28$, robust SE = .11, 95% Wald CI [2.06, 2.50]), $B = .03$, robust SE = .16, 95% Wald CI [-.28, .35]). See the supplementary materials (pp. 22-23) for descriptive statistics and the cultural differences in anticipated negative emotional outcomes resulting from deviation from the intersubjective social clock (lower-bound) for each life event.

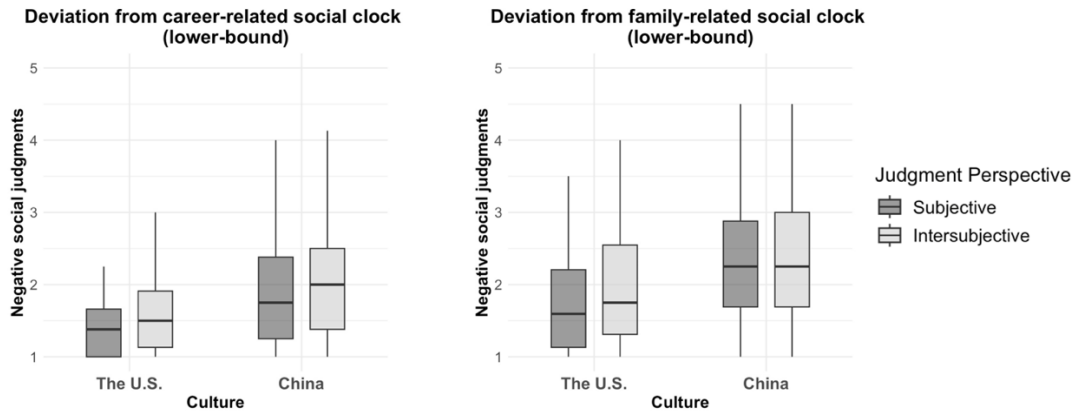
Social Judgements of Deviation from the Subjective Social Clock (Lower-bound)

We examined whether negative social judgments of deviation from the lower-bound of the subjective social clock vary across cultures and judgment perspectives (Figure 19). In all analyses, we included the covariates. We had preregistered to conduct repeated measures ANOVAs to examine the cultural differences, but decided to instead run GEEs with robust SEs for all analyses, given that this approach ensured consistency across analyses and

accounted for potential violations of key assumptions. See the supplementary materials (pp. 23-24) for the ANOVA results as preregistered.

Figure 19

Negative social judgments of deviation from the subjective social clock (lower-bound) vary by culture and judgment perspective (Study 8).



We first looked at social judgments resulting from deviation from the subjective career-related social clock (lower-bound). We ran a GEE with robust SEs on the negative social judgments with culture (the U.S. vs. China) and judgment perspective (subjective vs. intersubjective) as predictors, with the covariates. We found a significant main effect of culture, Wald $\chi^2(1, N = 201) = 5.01, p = .03$. Deviation from the subjective career-related social clock (upper-bound) was judged more negatively in China ($M = 1.97$, robust SE = .08, 95% Wald CI [1.82, 2.12]) than in the U.S. ($M = 1.69$, robust SE = .08, 95% Wald CI [1.53, 1.86]). Also, we found a significant main effect of judgment perspective, Wald $\chi^2(1, N = 201) = 8.64, p = .003$. Intersubjective social judgments ($M = 1.88$, robust SE = .06, 95% Wald CI [1.78, 1.99]) were more negative than subjective social judgments ($M = 1.78$, robust SE = .06, 95% Wald CI [1.67, 1.89]). We did not find a significant interaction effect, Wald $\chi^2(1) = .04, p = .85$.

We then looked at social judgments resulting from deviation from the subjective family-related social clock (lower-bound). We ran a GEE with robust SEs on the negative social judgments with culture (the U.S. vs. China) and judgment perspective (subjective vs. intersubjective) as predictors with the covariates. We did not find a significant main effect of culture, Wald $\chi^2(1, N = 201) = 1.02, p = .31$, but found a significant main effect of judgment perspective, Wald $\chi^2(1, N = 201) = 14.77, p < .001$. Intersubjective social judgments ($M = 2.24$, robust SE = .07, 95% Wald CI [2.11, 2.37]) were more negative than subjective social judgments ($M = 2.10$, robust SE = .06, 95% Wald CI [1.98, 2.22]). We also found a significant interaction effect between culture and judgment perspective, Wald $\chi^2(1) = 10.65, p = .001$. We conducted post-hoc pairwise comparisons using Bonferroni adjustments to examine the interaction further. We found that in the U.S. (but not in China, $p = .58$), intersubjective social judgments were more negative than subjective social judgments, $p < .001$. The alignment score for the subjective and intersubjective social judgments, operationalized as the absolute difference between the two judgments, was smaller in China ($M_{\text{diff}} = .02$, robust SE = .04) than in the U.S. ($M_{\text{diff}} = .26$, robust SE = .06), $p = .001$.

See the supplementary materials (pp. 24-25) for descriptive statistics and pairwise comparisons between negative social judgments of deviation from the subjective social clock (lower-bound) for each life event.

The Role of Filial Piety and Tightness/Looseness in Negative Social Judgments

As preregistered, we examined whether cultural differences in subjective negative social judgments of subjective social clock deviation could be explained by beliefs in filial piety as exploratory mediators. In addition, we examined whether cultural differences in intersubjective negative social judgments of subjective social clock deviation could be

explained by tightness/looseness as exploratory mediators. We conducted mediation analyses using ordinary least squares regression via the PROCESS macro in SPSS (Hayes, 2018), testing whether filial piety beliefs and tightness/looseness mediated the effect of culture on subjective and intersubjective negative social judgments, respectively, while controlling for covariates.

When the outcome variable was the subjective negative social judgments of deviation from the subjective career-related social clock (lower-bound), the total effect of culture on these judgments was not statistically significant, $b = .27 [-.02, .56]$, $p = .06$. Culture, however, significantly predicted filial piety beliefs, $b = .77 [.56, .98]$, $p < .001$. In turn, filial piety beliefs significantly predicted subjective negative social judgments when culture and covariates were controlled, $b = .20 [.01, .39]$, $p = .04$. Although the effect of culture on the judgments was not significant, given that its significance level was marginal, we conducted a mediation analysis (PROCESS Model 4; Hayes, 2018), which revealed a significant indirect effect of culture on subjective negative social judgments through filial piety beliefs, 95% CI $[.01, .34]$, whereas the corresponding direct effect of culture was not significant, $b = .12 [-.20, .44]$, $p = .46$. These results suggest that cultural differences in filial piety beliefs are associated with differences in subjective negative social judgments, even though the overall (total) effect of culture on these judgments was not statistically significant.

When the outcome variable was the subjective negative social judgments of deviation from the subjective family-related social clock (lower-bound), culture predicted the negative social judgments ($b = .31 [.004, .61]$, $p = .047$) and filial piety beliefs. In turn, filial piety beliefs significantly predicted subjective negative social judgments when culture and covariates were controlled, $b = .22 [.02, .42]$, $p = .03$. A mediation analysis (PROCESS

Model 4; Hayes, 2018) revealed a significant indirect effect of culture on subjective negative social judgments through filial piety beliefs, 95% CI [.02, .33], whereas the corresponding direct effect of culture was not significant, $b = .14 [-.20, .48]$, $p = .42$. These results suggest that cultural differences in filial piety beliefs fully mediated the effect of culture on subjective negative social judgments of deviation from the subjective family-related social clock.

When the outcome variable was the intersubjective negative social judgments of deviation from the subjective career-related social clock (lower-bound), the total effect of culture on these judgments was not statistically significant, $b = .28 [-.002, .57]$, $p = .05$. Culture, however, significantly predicted tightness/looseness, $b = .57 [.43, .72]$, $p < .001$. However, tightness/looseness did not significantly predict intersubjective negative social judgments when culture and covariates (age, gender, SES, and education) were controlled, $b = -.002 [-.28, .27]$, $p = .99$.

When the outcome variable was the intersubjective negative social judgments of deviation from the subjective family-related social clock (lower-bound), the total effect of culture on these judgments was not statistically significant, $b = -.01 [-.35, .32]$, $p = .93$.

Taken together, these analyses suggest that cultural differences in subjective negative social judgments of deviation from the social clock (lower bound) were explained by filial piety beliefs. However, there were no cultural differences in intersubjective negative social judgments for either family- or career-related events, and neither filial piety beliefs nor tightness/looseness mediated cultural differences in intersubjective negative social judgments. Compared to the Study 7 findings regarding negative social judgments of deviation from the upper-bound of the social clock, these patterns were less consistent, and

the model involving intersubjective social judgments of career-related social clock deviation did not show a significant mediation.

Discussion

Study 8 replicated Studies 6 and 7's findings regarding the social clock's rigidity varying across cultures and social clock types, as well as the findings regarding the explanatory role of filial piety. However, we did not find the hypothesized cultural differences in anticipated negative emotions resulting from deviation from the lower-bound of the intersubjective social clock. Consistent with Zang & Kim (2025), deviations from the lower-bound did not differ between the U.S. and China and were only weakly associated with filial piety. One possible explanation is that, unlike upper-bound deviations, lower-bound deviations mean that the targets still fulfilled familial duties and thus are not perceived as particularly problematic in China.

Findings on social judgments of lower-bound social clock deviations largely mirrored those for upper-bound deviations. However, patterns of interaction varied across life events: in social judgments of career-related social clock deviation (lower-bound), no significant interaction between culture and judgment perspective was found, whereas in family-related social clock deviation (lower-bound), the difference between subjective and intersubjective social judgments emerged only in the U.S. These findings suggest that the closeness of alignment between the subjective and intersubjective social judgments might be event-specific across cultures, which may reflect the relative importance of values emphasized in each culture. For example, the relative importance of career advancement, which can enhance self-worth (highly valued in both the U.S. and China), versus starting a family, which fulfills familial and social obligations (valued more in China than in the U.S.). While

it remains a conjecture, it is possible that individuals' perceptions and judgments may be more accurate or more closely aligned with perceived intersubjective norms in domains of greater cultural importance, thus contributing to the observed patterns. Besides, overall, the patterns of results for lower-bound deviations (e.g., the explanatory roles of filial piety beliefs and tightness/looseness) were less consistent with those for upper-bound deviations, potentially because earlier milestone achievements are seen as reflecting greater personal autonomy and are therefore evaluated with more variability or leniency across individual circumstances.

Study 9

The first three studies established that there are cultural differences in emotional and interpersonal costs stemming from deviations from the social clock, highlighting the psychological burden of a rigid social clock but leaving open the question of whether such costs can be alleviated. In Study 9²⁵, we move beyond documenting these consequences to test a prospective intervention that alters intersubjective perceptions of the social clock, especially given that, on average, actual subjective perceptions of the social clock and judgments are more lenient than individuals' intersubjective perceptions. Prior work demonstrates that shifting perceived social norms can change attitudes and behaviors without altering private beliefs (e.g., Paluck, 2009; Tankard & Paluck, 2016). Extending this approach to the domain of the social clock, we examine whether presenting more flexible intersubjective norms regarding the social clock reduces anticipated negative emotions resulting from upper-bound social clock deviation. We hypothesize that participants primed

²⁵ In the preregistration document, the flexible condition was mislabeled as the “control” condition in the hypotheses section. All other sections correctly identified the flexible condition.

with a flexible intersubjective social clock will anticipate experiencing fewer negative emotions resulting from deviation from the upper-bound of the social clock. We conducted the study in both the U.S. and China to test the cross-cultural generalizability of the effect. We did not have a clear prediction about cultural differences in the magnitude of the intervention effect because prior work suggests that short-term psychological responses to experimental manipulations tend to be comparable across cultural contexts (e.g., Oh, 2013).

Participants

Based on power analysis²⁶, we set our sample size at $N = 150$ per culture. We recruited 150 participants in the U.S. via the Prolific platform and 158 participants in China via the Naodao platform (comparable to the Prolific platform). The data exclusion rules were the same as in Studies 6, 7, and 8. Our final sample ($N = 294$) contains 140 American participants and 100 Chinese participants (Table 30).

Table 30

Breakdown of demographics in the U.S. and China in Study 9.

Culture	Age <i>M (SD)</i>	Gender (%)	Ethnicity (%)	College degree (%)
The U.S. ($N = 140$)	46.81 (13.12)	Male: 45.7 Female: 53.6 Non-binary/Other: .7	European American: 71.4 Black/African American: 15.0 Hispanic/Latino: 7.9 Asian American/Pacific Islander: 2.1 Native American/Alaskan: 2.1 Multiracial/Biracial: 1.4	60.7
China ($N = 154$)	26.56 (7.11)	Male: 34.4 Female: 65.6	Han Chinese: 95.5 Ethnic Minorities: 4.5	97.4

Measures

²⁶ An a priori power analysis for an independent-samples t-test was conducted using G*Power (Erdfelder et al., 1996). Assuming a medium effect size ($d = .50$), $\alpha = .05$, and desired power = .80, the analysis indicated that a minimum of 128 participants would be required. To ensure sufficient power and allow for exclusions, we set our target sample size at 150 participants per culture.

After consenting, participants completed an online survey with items following the subsequent order. The English version was translated into simplified Chinese for Chinese participants using the back-translation method. In the Chinese version, names, locations, and phrasing were adapted to culturally comparable Chinese contexts (e.g., replacing “Nicole” with a common Chinese name), while keeping the content equivalent to the original version.

Subjective Perceptions of the Social Clock

Subjective perceptions of the social clock were measured using the same method as in Study 6.

Manipulation of Intersubjective Norms

After providing their subjective perceptions, participants were randomly assigned to one of two between-subjects conditions. In both conditions, they were told they would read excerpts from a recent national survey on social attitudes in the United States and would later answer questions about their impressions. Each participant was then presented with three anonymized interview excerpts, accompanied by fictitious demographic information (e.g., name, gender, age, state). In the flexible intersubjective norms condition, the excerpts emphasized variability and openness in the timing of life events (e.g., starting college in either late teens, mid-20s, or later, retirement across a wide range of ages). In the rigid intersubjective norms condition, the excerpts highlighted less variability and narrower expectations regarding life timing (e.g., college immediately after high school, marriage by early 30s, retirement at 60-65).

After reading the excerpts, participants responded to two questions about their impressions, i.e., “How surprising do you find the perspectives expressed in these interview excerpts?” on a 7-point Likert-type scale (1 = *not at all surprising* to 7 = *extremely*

surprising), and “To what extent did the perspectives expressed in these interview excerpts match your expectations?”, also on a 7-point Likert-type scale (1 = *not at all* to 7 = *completely*)²⁷.

Anticipated Negative Emotional Outcomes of Deviation from the Subjective Social Clock (Upper-bound)

Following the manipulation, participants reported their anticipated negative self-conscious emotions if they failed to achieve the event by the upper-bound age they had entered earlier. Anticipated negative emotional outcomes were measured using the same method as in Study 6. We averaged the ratings of the four anticipated negative emotions into one composite score in each time window block ($\alpha_s > 0.88$).

Other Measures

Filial piety beliefs were measured using the same scale as in Study 6 (Fu et al., 2020) ($\alpha_{US} = 0.87$; $\alpha_{CH} = 0.89$), as was the tightness/looseness scale (Gelfand et al., 2011) for exploratory purposes ($\alpha_{US} = 0.68$; $\alpha_{CH} = 0.45$). In addition, basic demographic information was measured as potential covariates.

Results

Correlations between Variables

We calculated the descriptive statistics of the main study variables and bivariate correlations between them in the U.S. and China (Table 31).

Table 31

Descriptive statistics of the main study variables and bivariate correlations between them in the U.S. and China in Study 9.

²⁷ To account for individual differences in perceived expectation incongruence, we computed a composite score (mean of reverse-coded expectedness and surprise ratings) and included it as a covariate. The inclusion of this covariate did not alter the significance or direction of any results (see the supplementary materials, p. 29).

	The U.S. (N=140)								China (N=154)									
	M (SD)	1	2	3	4	5	6	7	8	M (SD)	1	2	3	4	5	6	7	8
1. Subjective time window for career-related life events	49.03 (18.96)	-								18.91 (16.68)	-							
2. Subjective time window for family-related life events	40.16 (13.55)	.68 ***	-							15.49 (10.09)	.70 ***	-						
3. Filial piety beliefs	3.23 (.64)	-.26 **	-.12	-						3.47 (.60)	-.45 ***	-.43 ***	-					
4. Tightness/Looseness	3.27 (.59)	-.21 *	-.07	.33 ***	-					3.89 (.38)	.15	.13	.03	-				
5. Anticipated negative emotional outcomes of deviation from the subjective career-related social clock (upper bound)	3.32 (1.03)	-.17	-.27 **	.19 *	.23 **	-				3.15 (.98)	-.54 ***	-.44 ***	.40 ***	-.10	-			
6. Anticipated negative emotional outcomes of deviation from the subjective family-related social clock (upper bound)	2.02 (.94)	-.17 *	-.24 **	.26 **	.20 *	.66 ***	-			2.55 (1.05)	-.40 ***	-.37 ***	.53 ***	-.03	.66 ***	-		
7. Age	46.81 (13.12)	.12	.14	.03	-.10	-.07	-.16	-		26.56 (7.11)	.002	.04	.17 *	.15	.04	.13	-	
8. SES	4.79 (1.85)	-.16	-.23 **	.26 **	.12	.07	.13	-.08	-	4.94 (1.23)	.01	.07	.20 *	-.02	-.11	.02	.13	-

*** $p < .001$, ** $p < .01$, * $p < .05$.

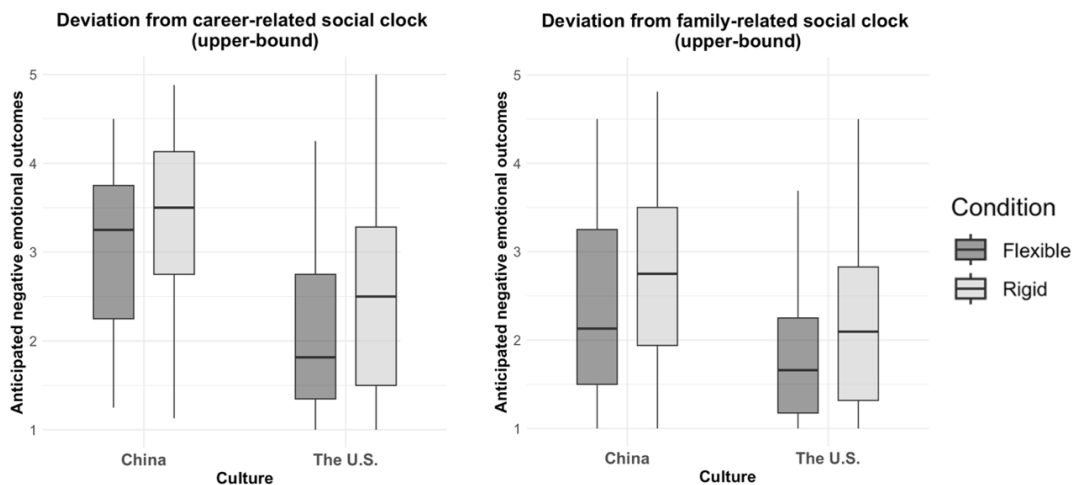
Given that the purpose of Study 9 is to examine whether manipulations of intersubjective norms of the social clock would affect anticipated negative emotional outcomes of deviation from the subjective social clock (upper-bound), we included the replication results of cultural differences in the time windows, as well as participants' responses to the impression questions (i.e., ratings of how surprising and how expected they found the interview excerpts) in the supplementary materials (pp. 26-29).

Anticipated Negative Emotional Outcomes of Deviation from the Social Clock (Upper-bound)

We examined whether anticipated emotional outcomes resulting from deviation from the upper-bound of the social clock vary across cultures and intersubjective norm conditions (Figure 20). In all analyses, we included age, gender, SES, and education as covariates.

Figure 20

Anticipated negative emotional outcomes of deviation from the social clock (upper-bound) vary by culture and intersubjective norm condition (Study 9).



We first examined anticipated negative emotional outcomes resulting from deviation from the career-related social clock. A univariate analysis of covariance (ANCOVA) on anticipated emotional outcomes, with culture (U.S. vs. China) and intersubjective norm

manipulation (flexible vs. rigid) as between-subjects factors with the demographic covariates revealed a significant main effect of culture, $F(1, 286) = 23.94, p < .001, \eta^2_p = .08$, and a significant main effect of intersubjective norm manipulation, $F(1, 286) = 9.15, p = .003, \eta^2_p = .03$. Deviation from the career-related social clock (upper-bound) was anticipated to be more distressing in China ($M = 3.15 [2.95, 3.34], SE = .10$) than in the U.S. ($M = 2.32 [2.11, 2.53], SE = .11$). In addition, participants in the flexible intersubjective norm condition ($M = 2.56 [2.40, 2.72], SE = .08$) anticipated feeling fewer negative emotions than those in the rigid condition ($M = 2.91 [2.75, 3.08], SE = .08$). We did not find a significant interaction between culture and intersubjective norm manipulation, $F(1, 286) = .01, p = .91, \eta^2_p < .001$.

We then examined anticipated negative emotional outcomes resulting from deviation from the family-related social clock. A univariate analysis of covariance (ANCOVA) on anticipated emotional outcomes, with culture (U.S. vs. China) and intersubjective norm manipulation (flexible vs. rigid) as between-subjects factors with the covariates revealed a significant main effect of culture, $F(1, 286) = 8.02, p = .01, \eta^2_p = .03$, and a significant main effect of intersubjective norm manipulation, $F(1, 286) = 7.41, p = .01, \eta^2_p = .03$. Deviation from the career-related social clock (upper-bound) was anticipated to be more distressing in China ($M = 2.53 [2.33, 2.72], SE = .10$) than in the U.S. ($M = 2.05 [1.85, 2.26], SE = .11$). In addition, participants in the flexible intersubjective norm condition ($M = 2.13 [1.97, 2.29], SE = .08$) anticipated feeling fewer negative emotions than those in the rigid condition ($M = 2.45 [2.29, 2.61], SE = .08$). We did not find a significant interaction between culture and intersubjective norm manipulation, $F(1, 286) = .02, p = .88, \eta^2_p < .001$. See the supplementary materials (pp. 29-31) for descriptive statistics and pairwise comparisons between anticipated negative emotions of deviation from the social clock for each life event.

Discussion

Study 9 provides experimental evidence that changing intersubjective norms regarding the social clock can improve individuals' anticipated emotional well-being. In both cultures, participants exposed to more flexible intersubjective norms anticipated experiencing fewer negative emotions resulting from deviations from the upper-bound of the social clock. By experimentally manipulating intersubjective norms, this study extends prior correlational evidence linking rigid intersubjective norms to higher psychological costs of social-clock deviations and highlights a promising intervention for reducing such costs. Importantly, the consistent pattern across the U.S. and China, in the absence of a significant interaction, suggests that the effect of intersubjective norm manipulation generalizes across cultures. This cross-cultural generalizability further supports the robustness of the intervention and its potential relevance for promoting well-being in diverse cultural contexts.

General Discussion

Summary

Across four studies, we found consistent evidence for how the subjective and intersubjective social clocks are perceived in China than in the U.S., and how the two types of social clocks align with each other. Study 6 provided initial evidence that both subjective and intersubjective social clocks were narrower in China than in the U.S., and that deviations from the upper-bound of these clocks were anticipated to elicit stronger negative self-conscious emotions among Chinese participants. Moreover, subjective and intersubjective social clocks were more closely aligned in China than in the U.S. Importantly, filial piety beliefs accounted for the cultural differences in the alignments between the two perceptions of the social clock and the anticipated emotional costs of social clock deviation. Study 7

extended these findings to the interpersonal domain: deviations from the upper-bound of the social clock were judged more negatively in China than in the U.S., and intersubjective social judgments were harsher than subjective ones across cultures. In addition, filial piety beliefs explained the cultural differences in subjective social judgments, whereas tightness/looseness accounted for the cultural differences in intersubjective social judgments.

Study 8 focused on anticipated emotions and social judgments that could result from deviations from the lower-bound of the social clock, i.e., being “too early.” The findings replicated cultural differences in the alignment between subjective and intersubjective perceptions of the social clock and the role of filial piety, but revealed no cultural difference in anticipated negative emotions for early deviation. Across cultures, early achievements appeared less socially problematic, perhaps because they still fulfill familial duties or signal competence. In the domain of social judgments, patterns were largely similar to those for upper-bound deviations but varied by life event: the difference between the alignment score for the subjective and intersubjective social judgments emerged *only* for family-related events in the U.S. Filial piety predicted cultural differences in subjective negative social judgments of lower-bound social clock deviation. In contrast, there were no cultural differences in intersubjective negative social judgments for either family- or career-related events, and neither filial piety nor tightness/looseness mediated these outcomes. This dissociation suggests that early achievement in non-family domains may be governed by distinct cultural mechanisms, possibly tied to competence-based or status-related norms rather than filial obligations.

Finally, Study 9 experimentally manipulated intersubjective norms regarding the social clock, showing that presenting them as more flexible reduced the anticipated

emotional costs of upper-bound deviation across both cultures. By integrating subjective and intersubjective perspectives, this research advances our understanding of norm internalization as a dynamic cultural process through which shared beliefs about “the right timing” become personally felt obligations. Notably, when intersubjective norms were framed as more flexible, participants anticipated less emotional distress, indicating that perceived flexibility in intersubjective norms can buffer the pressures of rigid social expectations of life timing.

Theoretical Contribution and Societal Implication

Our study contributes to the literature on the cultural variations in degrees of norm internalization (e.g., Bontempo et al., 1990; Oh, 2013). In our study, Chinese participants aligned their subjective and intersubjective perceptions of the social clock more closely than American participants, suggesting a stronger internalization of shared cultural norms. Specifically, our findings indicate that collectivists may not only conform to cultural norms outwardly (e.g., Bond & Smith, 1996), but they also tend to align their private attitudes with perceived shared norms internally.

Moreover, this study expands the limited literature on cultural differences in perceptions of the social clock by comparing both subjective and intersubjective perspectives. This approach provides a more nuanced understanding of how subjective expectations about individuals’ optimal life timing align with intersubjective cultural norms (e.g., Chiu et al., 2010). Additionally, our findings contribute to the research on false polarization, an interpersonal bias in social judgments that exaggerates the extremity of others’ opinions relative to one’s own (e.g., Fernbach & Van Boven, 2022; Kenyon, 2014),

by illustrating how individuals may overestimate the rigidity of social norms presumed to be shared by most others in their cultures.

The current research also advances the understanding of the cultural differences in the psychological and interpersonal consequences of non-normative behaviors (e.g., Kinias et al., 2014), especially regarding deviations from the social clock. To our knowledge, this study is the first to investigate the interpersonal consequences of social clock deviation across cultures. These findings are highly relevant in cross-cultural contexts, where individuals encounter conflicting expectations about life timing and face culturally specific social judgments of age norm deviation. Building on earlier work identifying filial piety—a distinct form of social duty—as a key explanatory mechanism, the current research confirms that filial piety, rather than tightness/looseness, more effectively accounts for cultural differences in social clock’s rigidity, alignment between subjective and intersubjective perceptions, anticipated emotional responses, and negative social judgments. These findings imply that a more rigid social clock, as well as its associated anticipated negative emotional and interpersonal impacts, may derive not only from the pressure to conform, but from a sense of obligation, particularly in more collectivistic cultures such as China, where responsibility is more highly emphasized.

Finally, our study demonstrates that intersubjective norms are deeply rooted in culture yet remain malleable. By experimentally shifting these norms toward greater flexibility, the study illustrates that perceived cultural expectations can be reframed in ways that alleviate the emotional burden resulting from social clock deviation. This finding moves beyond correlational evidence to establish a causal link between perceived intersubjective norm flexibility and emotional well-being, highlighting intersubjective norm framing as a

potential mechanism for effective interventions. Theoretically, this underscores that norm internalization is not merely a static process of conformity but a dynamic, context-sensitive process that can be reshaped to foster adaptive outcomes across cultures.

Limitations and Future Directions

First, a limitation of the current study is that the identified cultural differences are correlational. Therefore, we cannot draw explicit causal conclusions about the effect of culture on perceptions of the social clock and its associated outcomes. Future research could use an experimental approach, such as manipulating key psychological mechanisms, such as filial piety, to better support causal interpretations. Additionally, the correlational nature of the data prevents determining the direction of influence between subjective and intersubjective perceptions—whether individuals project their subjective views onto others or adjust their personal beliefs to align with perceived intersubjective norms.

In addition, future research could examine how actual norms, both descriptive and injunctive, impact emotional and interpersonal consequences of deviating from those norms by incorporating external benchmarks, such as large-scale survey data or analyses of public discourse, to more precisely estimate intersubjective perceptions of the social clock and associated outcomes of deviation from the intersubjective social clocks.

Future research could also distinguish the emotional and interpersonal impact of intersubjective norms from that of expectations from close relationship partners, such as parents, relatives, or romantic partners. Although intersubjective perceptions reflect what individuals believe most people in their society think and are relevant to one's well-being, expectations from close others may be more directly relevant to one's daily decisions and emotional experiences, as social influence is typically stronger when it originates from

psychologically significant others (e.g., Orina et al., 2002). These two sources of social expectation may not always align, and deviations from each may carry different emotional and interpersonal consequences. Examining their relative and joint effects would provide a more nuanced understanding of how social expectations surrounding the social clock shape emotional and interpersonal responses.

Another limitation involves the generalizability of our findings. Future researchers could consider extending the study to a broader range of cultures to examine whether the alignment of the subjective and intersubjective perceptions of the social clock varies systematically among cultures that differ in the individualism-collectivism dimension, explained by pertinent explanatory psychological mechanisms. For example, it is possible that other specific types of social duty (e.g., familismo, a central Latinx cultural value, see Ayón et al., 2010) may be relevant among Latinx cultures.

Finally, although Study 9 experimentally demonstrated that intersubjective norms can be reframed toward greater flexibility, future research is needed to test the durability and scope of these effects. Specifically, it remains unclear whether changes in perceived norm flexibility translate into long-term improvements in emotional well-being or observable behavioral outcomes (e.g., flexible life planning). Further work could also explore interventions that target different life domains or societal levels, for example, workplace policies, media messaging, or community programs, to assess how intersubjective norm shifts may promote well-being and facilitate smoother adaptation to changing social expectations.

Constraints on Generality

The present findings are intended to generalize to cultural contexts resembling those represented in our samples, namely, adults in contemporary China and the United States. Because our research focused specifically on a comparison between these two cultures, we do not assume that the observed patterns extend to other societies that do not resemble the cultural contexts represented in our samples. Likewise, the dynamics we identified may not fully characterize subgroups within China or the United States that differ substantially in socioeconomic conditions, regional contexts, or access to online research environments. Besides, the stimuli represented a limited set of life events and hypothetical scenarios of social clock deviations, and thus, the conclusions may not capture the full complexity of real-world experiences. In addition, the use of self-report measures introduces potential influences of social desirability and subjective interpretation. Finally, the priming manipulation in Study 9 reflects a brief intervention and should not be assumed to produce lasting changes in intersubjective norms. These considerations outline the boundary conditions under which our conclusions are most likely to hold.

Conclusion

The present studies reveal emerging evidence that culture shapes the alignment between subjective and intersubjective perceptions of age-related social norms, and specifically, the rigidity (or flexibility) of the social clock. Together, our findings offer a comprehensive account of how culture shapes the internalization of intersubjective perceptions of the social clock and how these processes carry emotional and interpersonal consequences when expectations are violated. Importantly, the results also demonstrate that intersubjective norms can be reframed, positioning the social clock as a dynamic system rather than a static timetable. Recognizing this malleability opens possibilities for alleviating

the emotional costs resulting from deviations from the social clock and fostering individual and collective well-being across diverse cultural contexts.

CONCLUSION

Summary

The dissertation examined how culture shapes perceptions of the social clock, the socially prescribed age norms for important life events. Across nine studies spanning three chapters, the dissertation addressed the three overarching research questions outlined in the introduction and highlighted directions for future research.

Chapter 1 addressed the first research question regarding cultural differences in perceptions of the social clock's rigidity and the anticipated emotional consequences of social clock deviations. Studies revealed robust cultural differences in the rigidity of the social clock. Across three studies, participants in China consistently reported narrower acceptable age ranges for important life events than participants in the U.S. These cultural differences were partly explained by filial piety beliefs, a sense of social obligation toward parents and elder family members that is particularly emphasized in East Asian cultures (e.g., Chan & Tan, 2008). The findings also suggested that deviation from the upper-bound of the social clock was more distressing for Chinese participants than for American participants (Study 1b), whereas anticipated emotional distress associated with being "too early" did not differ across cultures (Study 2).

Moving beyond documenting the cultural differences, Chapter 2 addressed the second research question by examining whether cultural values causally shape perceptions of the social clock and whether the observed cultural differences generalize across broader cultural contexts. Study 3 provided preliminary evidence that cultural values such as filial piety have a causal effect on the rigidity of the social clock. However, given that the difference is sensitive to covariate adjustment, the results should be interpreted with caution. Study 4

suggested that filial piety priming did not affect anticipated negative emotional responses to social clock deviation. In addition, attempts to replicate the cultural differences in the U.S.-South Korea comparison yielded inconclusive results due to concerns about data quality. Together, these findings provided preliminary support for a causal effect of cultural values while highlighting the need for further research on generalizability.

Lastly, Chapter 3 addressed the final research question regarding the intersubjective social clock. Across studies, the findings suggest that both subjective and intersubjective social clocks are perceived as more rigid in China than in the U.S., and that individuals' subjective perceptions of the social clock tended to align more closely with intersubjective perceptions in China. Filial piety beliefs partly explained cultural differences in alignments and anticipated negative emotions associated with social clock deviation. Extending these findings to the interpersonal domain, Study 7 suggested that deviations from the upper-bound of the social clock were judged more negatively in China than in the U.S., and intersubjective social judgments were generally harsher than individuals' subjective judgments across cultures. Additional analyses suggested that filial piety accounted for cultural differences in subjective social judgments, whereas tightness-looseness explained differences in intersubjective judgments. Further research in Study 8 on deviations from the lower-bound of social clock revealed that achieving life events "too early" elicited similar emotional responses across cultures, although patterns of negative social judgment varied by life-event domain. Finally, Study 9 indicated that experimentally framing the intersubjective norms regarding the social clock as more flexible reduced the anticipated emotional distress associated with "being late" in both cultures, suggesting that perceived flexibility in shared cultural norms can mitigate the psychological pressures of rigid age norms.

Closing Thoughts

Becker (1934) once noted that when viewed from a sufficiently broad perspective, human life on Earth may appear as “a mere momentary ripple on the surface of one of the minor planets in one of the minor stellar systems”. On one hand, human life may appear fleeting. Yet for individuals living within that brief moment, questions about the optimal timing of life and the intensity of age-related pressure in life events carry profound psychological and social significance. The present research suggests that these experiences could be shaped, at least in part, by the culture in which people reside.

Recognizing cultural differences in the social clock may therefore have important implications. At the individual level, understanding that both subjective and intersubjective norms surrounding life timing vary across cultures may encourage people to approach their own life trajectories and those of others with greater compassion. At the societal level, such insights may become increasingly relevant as social institutions and life trajectories evolve in response to technological and economic change.

As societies enter periods of rapid transformation marked by developments such as artificial intelligence and shifting expectations surrounding education, work, marriage, and parenthood (e.g., Tai, 2020; Hmoud & Várallyai, 2019), the meanings and expectations attached to life timing may also shift across cultures. In such periods of uncertainty, it becomes increasingly important to understand how these expectations are culturally constructed and how they influence individuals’ perceptions, judgments, and behaviors. Understanding how these expectations are constructed, internalized, and potentially reframed will remain an important direction for future research on culture and the social clock.

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