Holding the Middle and Achieving Harmony: A Three-Level Meta-Analysis of the Relationship Between Zhongyong Thinking and Mental Health

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Date: 2025-11-26T00:00:00+00:00

Abstract

Based on the Zhongyong practical thinking system and the dual-factor model of mental health, this study employed a three-level meta-analytic method to examine the relationship between Zhongyong thinking and mental health and its moderating factors. Literature published before April 30, 2025 was searched, resulting in the inclusion of 56 studies examining the relationship between Zhongyong thinking and positive mental health, comprising 60 independent samples, 139 effect sizes, and 35,410 participants, as well as 43 studies examining the relationship between Zhongyong thinking and negative mental health, comprising 45 independent samples, 136 effect sizes, and 35,596 participants. The results revealed that Zhongyong thinking was significantly positively correlated with positive mental health indicators (r = 0.24) and significantly negatively correlated with negative mental health indicators (r = -0.21), both representing medium effect sizes; the correlations between Zhongyong thinking and psychological resilience, job satisfaction, and work well-being were higher than its correlation with life satisfaction; the correlations between Zhongyong thinking and well-being, peace of mind, and positive emotions did not differ significantly from its correlation with life satisfaction. Effect sizes measured by the Zhongyong Belief-Value Scale, Zhongyong Opinion Expression Scale, and Zhongyong Value Orientation Scale showed small differences among themselves, but differed significantly from those measured by the Zhongyong Practice Self-Assessment Scale. Based on the meta-analytic results, the theoretical connotation and measurement of Zhongyong thinking, as well as its relationship with mental health, were discussed, highlighting the theoretical significance of understanding Zhongyong thinking and mental health from the perspective of transcending binary oppositions through "upholding the mean to achieve harmony."

Full Text

Holding Balance Brings Harmony: A Three-Level Meta-Analysis of the Relationship Between Zhongyong Thinking and Mental Health

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Abstract: Drawing on the Zhongyong practical thinking framework and the dual-factor model of mental health, this study employed a three-level meta-analytic approach to examine the relationship between Zhongyong thinking and mental health, as well as its moderators. A systematic review identified 56 studies on Zhongyong thinking and positive mental health and 43 studies on Zhongyong thinking and negative mental health published before April 30, 2025. The final analysis incorporated 60 independent samples (139 effect sizes, N = 35,410) for the relationship with positive mental health, and 45 independent samples (136 effect sizes, N = 35,596) for the relationship with negative mental health. The pooled correlation indicated that Zhongyong thinking had a significant positive association with positive mental health (r = 0.24) and a significant negative association with negative mental health (r = − 0.21), both of medium effect size. Furthermore, Zhongyong thinking showed stronger correlations with resilience, job satisfaction, and work-related well-being than with life satisfaction. Its correlations with general well-being, peace of mind, and positive affect did not significantly differ from its correlation with life satisfaction. Moreover, the effect sizes measured by the Zhongyong Belief–Value Scale, the Zhongyong Opinion Expression Scale, and the Zhongyong Value Orientation Scale were relatively similar to each other, but differed significantly from those measured by the Zhongyong Practice Self-report Scale. Based on these findings, the study discusses the theoretical connotations and measurement approaches of Zhongyong thinking, as well as its relationship with mental health, highlighting the theoretical significance of understanding Zhongyong thinking and mental health from the perspective of "Holding Balance Brings Harmony," which transcends binary oppositions.

Keywords: Zhongyong thinking, mental health, three-level meta-analysis

Introduction

As one of the most representative concepts in traditional Chinese culture, Zhongyong has exerted a profound and subtle influence on Chinese ways of thinking. Psychological research on Zhongyong thinking has emerged as a rapidly developing domain of indigenous psychology in recent years (Yang, 2022) and represents an important theoretical perspective in discussions about constructing an autonomous knowledge system for Chinese psychology (Liu, 2019; Yang & Wei, 2024). It also constitutes a significant topic in contemporary debates about how traditional Chinese culture can address

the social-psychological adaptation of modern Chinese people (Yang, 2023). Empirical studies have demonstrated that Zhongyong thinking continues to hold positive applied value for the psychological and behavioral adaptation of contemporary Chinese individuals (Peng & Huang, 2015; Yang, 2009; Yang et al., 2016).

In recent years, researchers have extensively explored the structural connotations, measurement methods, and functional roles of Zhongyong thinking, aiming to systematically organize and understand its influence on individual psychology and behavior. Relevant topics include holistic perception, mental health, stress coping, conflict resolution, emotion regulation, creativity, voice behavior, and change-oriented behavior (e.g., Duan & Ling, 2011; Du et al., 2014; Huang et al., 2014; Li, 2014; Wang & Liu, 2014; Lin et al., 2014; Pan & Sun, 2018; Qu et al., 2018; Zhou et al., 2019).

As an important cultural-psychological resource for individual adaptation among Chinese people, a central focus of Zhongyong thinking research lies in examining its relationship with mental health—a domain that has also accumulated the largest body of empirical research (Wei & Han, 2022; Yang, 2022). Numerous correlational studies conducted across different populations have found consistent relationships between Zhongyong thinking and various mental health indicators. For instance, Zhongyong thinking has been shown to enhance life satisfaction and well-being while reducing negative emotions such as anxiety and depression (Gao et al., 2013; Li, 2014; Wu, 2006; Yang & Lin, 2014; Yang et al., 2014; Yang et al., 2016). However, the strength of association between Zhongyong thinking and mental health has varied considerably across studies. Some research has reported strong positive correlations ($r > 0.5$, e.g., Liu, 2011; Xu, 2019; Liu et al., 2023), while others have found nonsignificant relationships (e.g., Guo et al., 2012; Guo et al., 2016; Cai, 2022; Zhao & Chen, 2013). Similarly, in studies examining the relationship between Zhongyong thinking and negative mental health indicators, some have reported strong negative correlations ($r < -0.5$, e.g., He, 2021), whereas others have found correlations close to zero (e.g., Cheng, 2013; Li, 2016; Li, 2017; Mai, 2017). Moreover, substantial variation exists across studies in the measurement approaches for both Zhongyong thinking and mental health, and no quantitative synthesis has systematically analyzed the existing findings. Meta-analysis can effectively avoid biases resulting from sample errors or statistical artifacts in individual studies, yielding more accurate conclusions. In recent years, numerous studies have employed meta-analysis to summarize empirical research on mental health, contributing to advancements in relevant fields (Gao et al., 2015; Li et al., 2019; Liu et al., 2019; Polanin et al., 2020). Therefore, this study utilizes meta-analysis to quantitatively examine the relationship between Zhongyong thinking and mental health from a macro perspective, aiming to provide a more comprehensive and objective understanding of this relationship and its potential variations across different mental health indicators, thereby offering a reference for future research.

1.1 The Connotation and Measurement of Zhongyong Thinking

Zhongyong thinking embodies a worldview and value system unique to traditional culture and represents a crucial philosophical concept in Confucianism. "Zhong" refers to impartiality and avoiding extremes, while "Yong" signifies perseverance and adherence to principles. In essence, Zhongyong thinking denotes a behavioral pattern of appropriateness, impartiality, and moderation that adapts to changing circumstances to maintain balance and harmony with the environment—what is known as the pursuit of "Zhonghe" (harmony through moderation) (Zhang et al., 2001). Yang and Zhao (1997) first introduced Zhongyong thinking into psychological research, conceptualizing it as a practical thinking system that guides individuals' action strategies and execution in daily life events. Subsequently, Yang (2001, 2008, 2009, 2010, 2014) continuously refined and expanded the framework of Zhongyong practical thinking, ultimately developing a two-part structure encompassing collective-cultural levels (worldview or values) and individual-psychological levels. The individual-psychological level further comprises four aspects: personal life philosophy, specific event processing, post-event reflection, and mental health (see Figure 1 [Figure 1: see original paper]).

The original Zhongyong Thinking Scale was developed by Yang and Zhao (1997), describing Zhongyong thinking across eight dimensions (unity of heaven and humanity, bipolar thinking, consequence thinking, observing changes calmly, avoiding extremes, considering the overall situation, being reasonable and sensible, and strategic retreat) using 16 items. Each item consisted of two statements —one consistent with Zhongyong and one violating it—and respondents selected their preferred statement and rated their degree of agreement. However, because this scale encompassed too many sub-constructs spanning multiple thinking levels, its results lacked stability across studies (Huang et al., 2012). Researchers later streamlined and optimized the scale' s content and structure while retaining its question format and response mode, yielding two new versions: Zhao' s (2000) 3-dimensional, 14-item Zhongyong Practical Thinking Scale and Huang et al.' s (2012) revised unidimensional, 9-item Zhongyong Belief-Value Scale. These scales employed a forced-choice format, which helped control for social desirability effects (Huang et al., 2012). Additionally, the Zhongyong-consistent statements in these scales addressed binary relationships, including yin-yang transformation and the grasp of "degree." For example: "No matter how you look at it, everything can be summarized as good or bad," and "Anything taken to excess usually backfires." Wei and Yan (2014) argued that handling binary relationships is the essence of Zhongyong thinking, suggesting that Zhongyong research differs methodologically and theoretically from Western psychological approaches, while also presenting measurement challenges, such as difficulty achieving high reliability.

Adopting a different approach, Wu and Lin (2005) abandoned the forced-choice method. Building on previous understandings of Zhongyong' s core connotations, they focused on individuals' actual experiences of applying Zhongyong

thinking in life rather than treating it as a value or belief. They conceptualized Zhongyong thinking as considering issues from multiple perspectives, carefully evaluating different viewpoints, and selecting actions that balance self-interest and collective interests when expressing opinions and managing conflicts. Combining this with opinion-expression scenarios, they developed a 13-item Zhongyong Thinking Scale (also called the "Zhongyong Opinion Expression Scale") using a top-down approach, comprising three dimensions: harmony, integration, and multi-perspective thinking. Besides abandoning forced-choice formatting, this scale differed importantly from previous scales by including "I" in each item statement (e.g., "When discussing opinions, I consider conflicting viewpoints"). This distinction separated practical experience from belief-value orientation.

The conceptualization of Zhongyong practical thinking has undergone gradual enrichment. The forced-choice scales described above primarily measure the "life philosophy" level within the early conceptualization of Zhongyong thinking's core connotations (see Figure 1). As the Zhongyong Opinion Expression Scale highlights, belief-value orientation does not equal action. Zhongyong thinking is not merely a guiding principle but manifests as a mode of action in practice. Drawing on the mature Zhongyong practical thinking framework, Yang et al. (2014) developed the Zhongyong Practice Self-report Scale and examined its reliability and validity. This scale assesses the degree to which people actually apply Zhongyong thinking in daily life, corresponding to the "specific event processing" and "post-event reflection/revision" levels in the Zhongyong practical thinking framework (Yang et al., 2014). The scale comprises four relatively independent subscales: "multi-perspective deliberation," "calm restraint," and "post-event reflection" are collectively termed Zhongyong action variables, while the fourth subscale measures negative feelings and emotions arising from insufficient understanding or misapplication of Zhongyong thinking in practice, termed "confusion and grievance."

Evidently, these scales all rely on the Zhongyong practical thinking framework, extracting Zhongyong's structural connotations from classical texts and theoretical analysis before developing or refining measurement instruments. Du and Yao (2015) argued that such top-down approaches might not capture how Chinese people actually perceive and apply Zhongyong thinking in real life. They designed open-ended questionnaires to collect employees' understandings of Zhongyong and developed a bottom-up Zhongyong scale comprising four dimensions: holding balance and consistency, self-cultivation through vigilance, passive achievement, and passive avoidance. The "holding balance and consistency" dimension in this scale aligns essentially with previous scales measuring the "life philosophy" level of Zhongyong practical thinking (e.g., "Be both reasonable and sensible," "Adjust for overall harmony"). These items also adopt a value-orientation format without using forced-choice methods. In subsequent research, this scale has primarily used the "holding balance and consistency" dimension alone to measure Zhongyong, known as the Zhongyong Value Orientation Scale, while the other dimensions reflecting its bottom-up origins have been largely unused.

In summary, differences among Zhongyong thinking scales manifest in several aspects: whether Zhongyong thinking is positioned as value orientation or practical experience, whether the development approach is top-down or bottom-up, whether binary relationships are addressed, and whether forced-choice methods are employed. Table 1 summarizes the characteristics of these most commonly used Zhongyong thinking scales. Additionally, researchers have developed other Zhongyong scales, most of which emphasize practical experience, adopt bottom-up approaches for specific populations (university students, employees, leaders), do not focus on describing binary relationships, and avoid forced-choice methods (Li, 2014; Liu, 2011; Liu et al., 2022; Shao, 2003; Xin & Tu, 2020; Xu, 2012). However, these scales have seen minimal usage in the academic community.

1.2 The Relationship Between Zhongyong Thinking and Mental Health

Given the unique and rich connotations of Zhongyong thinking, its conceptualization and measurement are diverse, and research on its functional roles encompasses numerous domains including mental health, conflict resolution, creativity, and change-oriented behavior. Notably, in Yang' s (2014) conceptual diagram of the Zhongyong practical thinking framework (Figure 1), although Zhongyong thinking permeates all aspects of human conduct—from collective-level worldviews and values to individual-level life philosophy, event processing, post-event reflection, and specific actions—its ultimate goal or outcome variable, as a practical thinking system, is primarily manifested in mental health. In terms of empirical research volume, studies examining the relationship with mental health represent the most extensively accumulated domain in Zhongyong thinking research (Wei & Han, 2022; Yang, 2022).

Previous research has found that Zhongyong thinking promotes positive family functioning and enhances family members' mental health (Yang, 2012); reconciles conflicts among couples, colleagues, and friends to foster harmonious interpersonal relationships and improve life or job satisfaction (Yang et al., 2014; Zhang & Gu, 2019); and cultivates effective emotion regulation strategies, increasing positive emotions while reducing negative emotions such as anxiety and depression (Gao et al., 2013; Yang et al., 2016; Yang & Lin, 2014). Although researchers' understandings of Zhongyong thinking vary, they can generally be categorized into two aspects: holistic thinking (e.g., multi-perspective thinking, elevated perspective) and self-coordination (integration, harmony, self-restraint). Holistic thinking helps individuals contextualize themselves within broader fields by expanding thinking scope, evoking multiple selves, and employing future-oriented "contingency thinking," thereby weakening extreme emotions caused by specific events, awakening rich and balanced multiple selves, and enhancing adaptability and mental health. Self-coordination improves flexibility in emergency situations and interpersonal relationships through field-dependent flexibility and emotional/behavioral control, enabling individuals to utilize their strengths and weaknesses effectively, integrate opposing ideas, promote interper-

sonal harmony, and further enhance mental health (Yang, 2023).

However, current research on the relationship between Zhongyong thinking and mental health faces several issues. First, how strong is the actual relationship? As shown in Figure 1, Zhongyong thinking emphasizes "holding the two extremes to achieve the middle" and "internal-external harmony," suggesting that individuals with Zhongyong thinking do not become excessively happy in positive situations or overly sad in negative ones. Consequently, the resulting mental health state does not represent maximization of positive emotions or minimization of negative emotions but rather emphasizes balance and tranquility (Wei & Guo, 2014). Therefore, the function of Zhongyong thinking in promoting mental health may not manifest as higher correlation coefficients. The actual strength of this relationship, in terms of correlation coefficients and effect sizes, constitutes a theoretically and empirically distinctive question.

Second, the practice of Zhongyong thinking involves a dynamic adjustment process. While the completion of this adjustment naturally leads to psychological harmony, the adjustment process itself may generate more distress than not engaging in deep reflection. As illustrated in Figure 1, the psychological process of handling specific events in Zhongyong thinking emphasizes "deliberation before selection" and "reflection after the event," indicating that individuals with Zhongyong thinking often engage in deep consideration of others and situational contexts. Their self-cultivation represents a dynamic improvement process, and they may not immediately achieve a state of clarity and harmony when they have not yet found the appropriate balance. This is particularly evident in studies using scales that emphasize measuring the experiential process of Zhongyong thinking practice (Yang et al., 2014).

Third, because Zhongyong thinking emphasizes holistic thinking and self-coordination, it is more suitable for handling complex tasks and contexts, and its positive effects may require specific conditions to manifest. In cognitive tasks, Zhongyong thinking only demonstrates its holistic thinking function when emotions are aroused (Huang et al., 2014), while in work contexts, the more complex the tasks, the more pronounced the facilitating effect of Zhongyong thinking (Pan & Sun, 2018). Fourth, different studies employ different mental health indicators—some use cognitive indicators (e.g., life satisfaction, Wu, 2006), others use emotional indicators (e.g., positive affect, Xu, 2019); some use typical Western indicators (e.g., self-esteem, Qu et al., 2018), while others use indigenous indicators (e.g., peace of mind, Huang et al., 2014).

In summary, substantial theoretical and empirical research appears to support the notion that Zhongyong thinking promotes mental health. Confirming that this promoting effect is clear and stable would hold significant meaning: it would not only help understand the function of traditional Zhongyong thinking in modern Chinese psychological adaptation but also provide theoretical and practical inspiration for discussing macro-level issues such as traditional culture, cultural confidence, and "Healthy China."

1.3 The Current Study

To comprehensively understand the relationship between Zhongyong thinking and mental health, this study draws on the two-dimensional model of mental health, conceptualizing mental health as a construct comprising two independent dimensions—negative psychological states such as mental illness and positive psychological states such as well-being—rather than opposite ends of a continuum (Greenspoon & Saklofske, 2001; Keyes, 2005; Suldo & Shaffer, 2008). This study employs meta-analysis to quantitatively analyze the relationship between Zhongyong thinking and mental health, hypothesizing that Zhongyong thinking is significantly positively correlated with positive mental health indicators and significantly negatively correlated with negative mental health indicators. Additionally, it examines the moderating effects of Zhongyong thinking scale type, mental health indicator type, and application context to provide a more comprehensive and in-depth analysis of Zhongyong thinking' s theoretical connotations, measurement methods, and functional conditions.

Following standard meta-analytic procedures, this study tests common demographic variables (including gender, age, education) and measurement tool types (including mental health indicator types and Zhongyong thinking scale types) as potential moderators. To maximize information extraction from the literature and considering that most studies report participant types (common types include middle/high school students, university students, enterprise employees, mental illness patients, and community residents), we also included participant identity as a moderator in the meta-analysis.

All data and code used in the formal meta-analysis are available in the Science Data Bank: https://doi.org/10.57760/sciencedb.psych.00627.

Method

2.1.1 Literature Search

Database Search. Chinese databases included CNKI (China National Knowledge Infrastructure), Wanfang Database, and VIP Chinese Journal Database. The initial search was conducted up to April 1, 2024, with a second search up to April 30, 2025. Drawing on previous meta-analytic search strategies for mental health research (Emmer et al., 2024), we developed search strategies for different Chinese databases using terms including "Zhongyong," "mental health," "depression," "anxiety," "affect," "emotion," "well-being," "satisfaction," "self-esteem," "resilience," and "psychological resilience."

Foreign-language databases included PsycINFO, Web of Science, Scopus, Springer Online Journals, and ProQuest Dissertations and Theses Global. Search terms for Zhongyong included "zhongyong," "zhong yong," "Zhongyong," "doctrine of mean," and "moderate thinking." Mental health search terms included "mental health," "psychological health," "well being," "well-being," "life satisfaction," "quality of life," "happiness," "anxiety," "distress," "depres-

sion," "self-esteem," "self-worth," "self-efficacy," "emotions," "affect," and "mood." Additionally, we searched the Taiwan Academic Literature Database and a university's master's and doctoral dissertation database using "Zhongyong" and its English equivalents.

Book Search. We consulted relevant books including *Chinese Social Psychological Review* (Volumes 7 and 8), *Indigenous Psychological Research*, and *Modern Psychological Research on the Traditional Zhongyong Concept*.

2.1.2 Literature Screening

Using EndNote X9, we imported literature and, after removing duplicates, applied the following inclusion criteria: (1) Studies must be quantitative empirical research, excluding theoretical reviews and meta-analyses; (2) Results must report correlation coefficients (r) between total scores or subscale scores of Zhongyong-related constructs and mental health indicators, or other statistics convertible to r (Cohen's d, ^{2}, F-values, t-values, or univariate linear regression β coefficients); (3) Survey data must not be duplicated; if the same dataset was published in two or more articles or in different formats, the study reporting more detailed information was included; (4) Studies measuring Zhongyong thinking and mental health indicators in different participant groups (e.g., teachers' Zhongyong thinking and students' mental health) were excluded; (5) Studies measuring emotion variables triggered by specific conditions were excluded, such as research measuring emotional states under online live-streaming promotional stimuli. The literature screening process is illustrated in Figure 2 [Figure 2: see original paper].

2.2.1 Data Extraction and Literature Coding

We randomly selected one study from the included literature to extract meta-analytic data and establish a coding scheme, then randomly selected five additional studies to supplement potentially missing coding information. The final data extraction included: (1) Basic literature information: title, author, publication year, journal name, or thesis type; (2) Sample information: participant selection method, response rate, sample size, sample region, participant type, proportion of females, mean age (for studies not reporting mean age, we estimated it based on reported age distributions; if only "university students," "high school students," or "middle school students" were reported without mean age, we used estimates of 20, 16, and 13 years, respectively), and mean education level (scored as: junior high and below = 1, technical school or high school = 2, junior college = 3, bachelor's = 4, master's = 5, doctorate = 6, calculated as a weighted average based on the number of individuals in each category)[1]; (3) Mental health variable information: type of mental health indicator, scale used, scale reliability, and scale score interpretation; (4) Zhongyong thinking variable information: scale used and subscale information, scale reliability, etc.; (5) Effect size information: correlation coefficient r or other convertible statistics.

Coding followed these principles: (1) If a study included multiple mental health indicators, each was coded separately; (2) If a study included both comprehensive mental health indicators (e.g., SCL-90) and subdimensions such as depression and anxiety, both overall and subdimension indicators were coded; (3) Different levels of Zhongyong constructs (e.g., Zhongyong thinking level, virtue level) and their subdimensions were coded. Two independent coders performed the coding, achieving a Kappa coefficient of 0.83. According to Cicchetti' s (1994) criteria, Kappa values of 0.75 and above indicate excellent agreement. Discrepancies were resolved through discussion after reviewing the original literature.

2.2.2 Literature Quality Assessment

We adapted the quality assessment scale for correlational meta-analytic studies developed by Zhang et al. (2019), which includes: (1) Participant sampling method (random sampling = 2 points, non-random sampling = 1 point, not reported = 0 points); (2) Response rate ($\$ 0.9 = 2 points, 0.8–0.9 = 1 point, < 0.8 or not reported = 0 points$); (3)$Measurement reliability$($0.8 = 2 points, 0.7–0.8 = 1 point, <0.7 or not reported = 0 points); (4) Publication level (CSSCI/SSCI journals = 2 points, Peking University core journals = 1 point, regular journals or unpublished theses = 0 points; Taiwan' s *Indigenous Psychological Research* and *Journal of Educational Psychology*, both TSSCI/SSCI-indexed, were scored as 2 points). Total scores ranged from 0 to 10, with higher scores indicating better quality. Two independent raters performed the assessment, achieving a Kappa coefficient of 0.73, indicating substantial agreement. Discrepancies were resolved through discussion.

2.3.1 Effect Size Calculation

For each included study, we extracted or calculated correlation coefficients (r) between mental health indicators and Zhongyong thinking indicators (including subdimensions). One study reported only univariate linear regression coefficients (β), from which we calculated r using the formula proposed by Peterson and Brown (2005). Since correlation coefficients are not normally distributed, we transformed all correlations to Fisher' s z scores when calculating main effects or moderation effects (Cooper et al., 2019), then converted them back to correlation coefficients for interpretation. To interpret correlation magnitude, we adopted Gignac and Szodorai' s (2016) recommended thresholds for effect sizes in meta-analytic research, using 0.10, 0.20, and 0.30 as cutoffs for small, medium, and large effects, respectively.

2.3.2 Model Selection

Traditional univariate meta-analysis assumes independence among effect sizes. When effect sizes are correlated, this can lead to overestimation of meta-analytic reliability (Assink & Wibbelink, 2016). Conventional methods for handling correlated effect sizes include ignoring correlations or calculating unweighted or

weighted average effect sizes, which may reduce statistical power due to information loss (Cheung, 2015). In contrast, three-level meta-analysis can address correlations among effect sizes from the same study, thereby maximizing information retention and improving statistical power (Assink & Wibbelink, 2016). Furthermore, Cheung (2015) noted that many studies report both total scale and subscale effect sizes from the same sample. While such highly correlated effect sizes are theoretically best handled by multivariate meta-analysis, original studies rarely provide the covariance information required for this approach. In such cases, three-level meta-analysis serves as an effective alternative, validated through computer simulation studies (Van den Noortgate et al., 2013).

Since most studies in our literature pool reported multiple effect sizes from the same sample, and some reported only total scale effect sizes while others reported only subscale effect sizes, we included all eligible effect sizes to maximize retention of original information while improving meta-analytic reliability. We employed a three-level random-effects model for main effect testing, heterogeneity testing, moderation effect testing, publication bias assessment, and sensitivity analysis.

2.3.3 Heterogeneity and Moderation Testing

When conducting heterogeneity tests with small numbers of studies or effect sizes, relying solely on significance tests to determine whether variance components are significant may fail to detect substantial variation even when it exists. Therefore, Assink and Wibbelink (2016) recommend using Hunter and Schmidt' s (2004) 75% rule for heterogeneity testing. When sampling variance (Level 1) accounts for less than 75% of total variance, it indicates heterogeneity in main effects, justifying further moderation analysis to identify sources of heterogeneity.

Our moderation variables included: (1) Continuous moderators: publication year, literature quality score, proportion of female participants, mean age, and mean education level. To explore potential non-linear moderation effects, we also included quadratic and cubic terms for mean age and mean education. (2) Categorical moderators: sample region, participant type, mental health indicator type, and Zhongyong measurement approach. To ensure representativeness of moderation results, we set a minimum of 5 effect sizes per level and at least 3 studies per categorical moderator (Card, 2012).

2.3.4 Publication Bias Control and Assessment

Published literature often fails to represent the complete body of completed research, as significant results are more likely to be published—a phenomenon known as "publication bias" (Franco et al., 2014). Publication bias can compromise meta-analytic reliability. To control and assess publication bias, we included as many unpublished dissertations and conference papers as possible and employed multiple assessment methods.

First, we conducted qualitative evaluation using funnel plots, where relative symmetry suggests minimal publication bias (Sterne & Harbord, 2004). The underlying principle is that larger, more precise studies at the top of the plot should cluster tightly around the mean or true effect size, while smaller, less precise studies at the bottom should be more widely dispersed, forming a funnel shape. A symmetric inverted funnel indicates that results from both large and small studies are equally represented, suggesting low likelihood of publication bias.

However, visual inspection of funnel plots is subjective and does not account for the multilevel structure of the data, potentially leading to erroneous publication bias assessments (Lau et al., 2006). Given the nested structure of our data, we also employed Egger-MLMA (Multi-Level Meta-Analysis) regression for quantitative publication bias assessment. In situations with non-independent effect sizes, Egger-MLMA regression more effectively controls Type I error than traditional Egger regression or the trim-and-fill method (Rodgers & Pustejovsky, 2021). Non-significant Egger-MLMA results suggest minimal publication bias influence. Additionally, we analyzed publication status as a moderator to test whether published and unpublished studies differed significantly in effect size. Significant moderation would indicate publication bias, while non-significant moderation suggests minimal bias.

2.3.5 Sensitivity Analysis

In meta-analysis, substantial variation among included effect sizes means that outliers can influence pooled effect sizes and lead to unreliable statistical conclusions. To assess outlier impact and meta-analytic robustness, we employed the "leave-one-out" method, sequentially removing individual effect sizes and entire studies, then re-running the three-level meta-analysis to gauge the influence of anomalous effect sizes (Dodell-Feder & Tamir, 2018).

2.3.6 Data Analysis

We conducted all meta-analyses using the metafor package (version 4.2.3) in R (Viechtbauer, 2010). R code was primarily adapted from Assink and Wibbelink (2016), with Egger-MLMA code referencing Rodgers and Pustejovsky (2021). All model parameters were estimated using restricted maximum likelihood estimation (Viechtbauer, 2010), with two-tailed $p < 0.05$ considered statistically significant.

Results

3.1 Literature Inclusion and Quality Assessment

This meta-analysis included 84 studies (64 Chinese, 20 English), comprising 51 journal articles, 32 dissertations, and 1 conference paper, published between 2006 and 2025. The annual distribution of included studies is shown in Figure

3 [Figure 3: see original paper]. The meta-analysis of Zhongyong thinking and positive mental health included 56 studies with 60 independent samples, 139 effect sizes, and 35,410 participants. The meta-analysis of Zhongyong thinking and negative mental health included 43 studies with 45 independent samples, 136 effect sizes, and 35,596 participants. Basic information about included studies is presented in Table 2 .

3.2 Main Effects and Heterogeneity

The three-level meta-analytic model estimated the main effects of the relationships between Zhongyong thinking and positive/negative mental health indicators. Results showed that Zhongyong thinking was significantly positively correlated with positive mental health indicators ($r = 0.24$, $df = 138$, $p < .001$), with a 95% CI of [0.20, 0.29]. Based on Gignac and Szodorai' s (2016) criteria, this correlation represents a medium effect size in meta-analytic research. Zhongyong thinking was significantly negatively correlated with negative mental health indicators ($r = -0.21$, $df = 135$, $p < .001$), with a 95% CI of [-0.26, -0.17], also a medium effect size.

For the relationship between Zhongyong thinking and positive mental health, variance decomposition showed sampling variance (Level 1) = 5.1%, within-study variance (Level 2) = 43.1%, and between-study variance (Level 3) = 51.8%. For the relationship with negative mental health, sampling variance = 6.0%, within-study variance = 25.0%, and between-study variance = 69.0%. Since sampling error accounted for less than 75% in both meta-analyses, following Hunter and Schmidt' s (2004) recommendation, we proceeded with moderation analysis to further explain the relationships. Main effect and heterogeneity results are summarized in Table 3 .

3.3 Publication Bias and Sensitivity Analysis

We employed multiple methods to assess publication bias. First, we tested whether publication status moderated effect sizes—that is, whether published and unpublished studies differed significantly. For the relationship between Zhongyong thinking and positive mental health, publication status showed no significant moderation effect ($F(1, 137) = 0.37$, $p = 0.544$). Similarly, for the relationship with negative mental health, publication status was not a significant moderator ($F(1, 134) = 1.11$, $p = 0.293$).

Funnel plots (Figures 4 [Figure 4: see original paper] and 5 [Figure 5: see original paper]) showed that the plot for Zhongyong thinking and negative mental health displayed a clear inverted funnel shape with a few extreme values. The plot for positive mental health showed more data points on the right side, but many points aligned horizontally due to the nested data structure (multiple effect sizes from the same study), which does not directly indicate publication bias but requires additional indicators for confirmation.

Egger-MLMA regression results were non-significant for positive mental health

($\beta = -0.13$, SE = 1.04, p = 0.549) but significant for negative mental health ($\beta = 1.75$, SE = 0.83, p = 0.019). However, when Egger-MLMA detects funnel plot asymmetry, this asymmetry may result from factors other than publication bias, such as between-study heterogeneity (Rodgers & Pustejovsky, 2021). In our negative mental health data, we observed that effect sizes from samples larger than 1,000 all used the Zhongyong Opinion Expression Scale, while studies with smaller samples primarily used the Zhongyong Belief-Value Scale and Zhongyong Practice Self-report Scale. Thus, the relationship between precision and effect size may be attributable to different measurement instruments. Moreover, given that 65% of effect sizes in the negative mental health meta-analysis came from unpublished studies and publication status showed no significant moderation, we concluded that while funnel plot and Egger-MLMA results suggested potential publication bias, the inclusion of numerous unpublished studies and non-significant moderation by publication status indicated that any bias likely stemmed more from substantive between-study heterogeneity than from classic "file drawer" problems. Nevertheless, results should be interpreted cautiously.

Sensitivity analysis using the leave-one-out method showed that for positive mental health, removing the correlation of 0.878 between Zhongyong thinking and positive affect reported by Liu (2011) yielded the lowest correlation (r = 0.24, df = 137, $p < 0.001$), while removing the correlation of −0.33 reported by Li et al. (2021) yielded the highest correlation (r = 0.25, df = 137, $p < 0.001$). Both deviations were less than 20% from the original result, indicating robust findings (Kepes et al., 2012).

For negative mental health, removing all correlations reported by He and Li (2023) (−0.57 to −0.56) yielded the lowest correlation (r = −0.20, df = 132, $p < 0.001$), while removing all correlations reported by Mai (2017) (−0.17 to 0.07) yielded the highest correlation (r = −0.21, df = 114, $p < 0.001$). Again, deviations were less than 20%, confirming robust and reliable results.

3.4 Moderation Analysis

We examined the moderating effects of gender (female proportion), mean age and its quadratic and cubic terms, mean education level and its quadratic and cubic terms, publication year, literature quality score, sample region, participant type, mental health indicator type, and Zhongyong thinking measurement approach.

For the relationship between Zhongyong thinking and positive mental health, moderation tests showed that female proportion, mean age (and its quadratic and cubic terms)^2, mean education (and its quadratic and cubic terms), publication year, literature quality score, sample region, and participant type had no significant moderating effects. Mental health indicator type showed a significant effect ($F(6, 118) = 2.20$, $p = 0.047$). Correlations were strongest when using work well-being (r = 0.34) and weakest when using life satisfaction (r = 0.17). Effect sizes for work well-being ($\beta = 0.18$), positive affect ($\beta = 0.12$),

and resilience ($\beta = 0.17$) were significantly larger than for life satisfaction, while effect sizes for general well-being and peace of mind did not differ significantly from life satisfaction.

Zhongyong thinking measurement type showed a marginally significant overall effect ($F(10, 119) = 1.80$, $p = 0.067$). Among the three commonly used total scales, the Zhongyong Value Orientation Scale (Du & Yao) showed the strongest correlation ($r = 0.36$, $p < 0.001$), while the Zhongyong Belief-Value Scale showed the weakest ($r = 0.18$, $p < 0.001$). The post-event reflection ($r = 0.13$, $p < 0.001$) and multi-perspective deliberation ($r = 0.15$, $p < 0.001$) subscales of the Zhongyong Practice Self-report Scale were significantly positively correlated with positive mental health, while the calm restraint subscale was not. Univariate moderation results are presented in Table 4 .

In meta-analytic research, potential moderators are often interrelated, which can create multicollinearity issues (Hox et al., 2017). Hox recommends that after individually assessing potential moderators, those identified as significant in univariate analyses should be tested simultaneously in a unified model to determine their independent effects. In our univariate moderation analysis, mental health indicator type was significant, and Zhongyong measurement type was marginally significant with some measurement types differing significantly from the baseline. Therefore, we included both as moderators in a three-level meta-analytic model, using life satisfaction and the Zhongyong Opinion Expression Scale total score as references. Results showed significant overall moderation ($F(16, 100) = 2.33$, $p = 0.006$). Resilience ($\beta = 0.13$, $t = 3.00$, $p = 0.003$) and job satisfaction ($\beta = 0.07$, $t = 2.12$, $p = 0.037$) showed significant coefficients, while work well-being was marginally significant ($\beta = 0.15$, $t = 1.93$, $p = 0.056$). The difference between positive affect and life satisfaction became non-significant ($\beta = 0.01$, $t = 0.30$, $p = 0.768$), indicating that the moderating effect of mental health indicator type was robust and not confounded. Further multivariate moderation tests using other positive mental health indicators and the Zhongyong Opinion Expression Scale as references confirmed that resilience effect sizes were significantly larger than those for positive affect, peace of mind, and life satisfaction.

The two dimensions of the Zhongyong Belief-Value Scale and the post-event reflection and calm restraint subscales of the Zhongyong Practice Self-report Scale showed significant coefficients, indicating robust moderating effects of measurement type. Multivariate moderation tests using life satisfaction and other Zhongyong measurement types as references showed no significant differences among total scores of the Zhongyong Belief-Value Scale, Zhongyong Opinion Expression Scale, and Zhongyong Value Orientation Scale, all of which were higher than the effect size for the calm restraint subscale of the Zhongyong Practice Self-report Scale. Multivariate moderation results are presented in Table 5 .

For the relationship between Zhongyong thinking and negative mental health, moderation tests showed that female proportion, mean age (and its quadratic and cubic terms)^3, mean education (and its quadratic and cubic terms), litera-

ture quality score, sample region, participant type, and negative mental health indicator type had no significant moderating effects. Publication year showed a significant moderating effect ($F(1, 134) = 6.98$, $p = 0.009$), indicating that the negative correlation between Zhongyong thinking and negative mental health has strengthened in recent years.

Zhongyong measurement type showed a significant effect ($F(9, 122) = 3.73$, $p < 0.001$). The strongest negative correlation was found with the Zhongyong Opinion Expression Scale total score ($r = -0.22$), while the weakest was with the post-event reflection subscale of the Zhongyong Practice Self-report Scale ($r = -0.01$). The Opinion Expression Scale' s effect size differed significantly from those of the post-event reflection and multi-perspective deliberation subscales of the Practice Self-report Scale. Univariate moderation results are presented in Table 6 .

Publication year and Zhongyong measurement type were significant in univariate tests, so we included both in a regression model using the Zhongyong Opinion Expression Scale total score as reference. Results showed significant overall moderation ($F(10, 121) = 3.80$, $p < 0.001$) and a significant effect of publication year ($\beta = -0.01$, $t = -2.02$, $p = 0.046$). The post-event reflection and multi-perspective deliberation subscales of the Zhongyong Practice Self-report Scale differed significantly from the Opinion Expression Scale (post-event reflection: $\beta = 0.19$, $t = 3.95$, $p < 0.001$; multi-perspective deliberation: $\beta = 0.11$, $t = 2.27$, $p = 0.025$), while the Zhongyong Belief-Value Scale total score showed no significant difference ($\beta = -0.01$, $t = -0.36$, $p = 0.723$). Using the Belief-Value Scale as reference, the post-event reflection and multi-perspective deliberation subscales of the Practice Self-report Scale again showed significantly lower effect sizes. Thus, publication year and Zhongyong measurement type represent relatively stable moderators in the relationship between Zhongyong thinking and negative mental health. Multivariate moderation results are presented in Table 7 .

Discussion

4.1 The Relationship Between Zhongyong Thinking and Mental Health

Based on a meta-analysis of 56 studies (60 independent samples, 139 effect sizes, $N = 35{,}410$) on Zhongyong thinking and positive mental health, and 43 studies (45 independent samples, 136 effect sizes, $N = 35{,}596$) on Zhongyong thinking and negative mental health, we found that Zhongyong thinking was significantly positively correlated with positive mental health indicators ($r = 0.24$) and significantly negatively correlated with negative mental health indicators ($r = -0.21$), both representing medium effect sizes. This suggests that individuals with higher Zhongyong thinking tend to experience higher positive mental health and lower negative mental health states. Previous research has found that the "holding balance brings harmony" characteristic of Zhongyong think-

ing often produces dual effects on two different types of mental health indicators within the same study. For example, Li (2014) found that Zhongyong thinking could both alleviate the relationship between work overload and work-family conflict and strengthen the relationship between work commitment and work-family facilitation. Guo and Zeng (2012) found that Zhongyong thinking could predispose individuals to cognitive reappraisal emotion regulation while protecting them from negative effects of expressive suppression. Our meta-analytic results both summarize empirical research on the Zhongyong thinking-mental health relationship and support theoretical arguments about the positive role of Zhongyong thinking as a core of Chinese traditional culture in promoting mental health.

Zhongyong thinking, as a richly connoted construct, influences mental health through diverse pathways. It can reduce depression, anxiety, and burnout levels through emotion regulation strategies such as cognitive reappraisal (Chen et al., 2021; Gong, 2023; Huang et al., 2021), enhance perceived social support (Huang et al., 2014), improve well-being and satisfaction (Zhou & Li, 2022; Fan, 2017), and boost individual adaptability (Tan, 2012). Individuals with high Zhongyong thinking tend to choose healthy coping strategies, such as reducing rumination (He & Li, 2021) and preferring benign over malicious competition (Zhou, 2022). Zhongyong thinking also helps individuals coordinate interpersonal relationships, obtain social support, reduce loneliness, and enhance well-being (Ding et al., 2019; Liao, 2012; Zhu, 2014). Rich cognitive resources embedded in Zhongyong thinking can enhance psychological capital and resilience, enabling flexible responses to various life situations and thereby improving mental health (Li, 2011; Xu, 2019; Liu, 2021).

However, is the correlation between Zhongyong thinking and mental health strong or weak? Compared with recent meta-analytic results on individual characteristics and coping styles in Chinese contexts, the correlations appear relatively low. A meta-analysis on emotional intelligence and mental health in China reported absolute correlation effect sizes >0.3 for most mental health indicators (Luo & Jin, 2016). Another meta-analysis on self-efficacy and mental health found correlations of 0.40 with positive factors and -0.33 with negative factors (Li et al., 2019). Research on positive coping styles and mental health reported a correlation of 0.32 (Liao, 2014). These results raise questions: Does Zhongyong thinking, as a cultural resource for Chinese individual adaptation that theoretically plays a crucial role in promoting mental health, actually have weaker effects than other popular concepts?

Answering this requires comprehensive analysis of both Zhongyong thinking and mental health concepts and their measurement (Peng & Huang, 2015; Wei & Guo, 2014). First, Zhongyong thinking' s core lies in maintaining balance, yin-yang harmony, and avoiding extremes. This emphasis on balance and moderation, with self-restraint and no pursuit of extremes, fundamentally differs from other individual adaptation concepts emphasizing absolute internal control and proactivity (Lin, 2014). For example, research measuring both Zhongyong

thinking and self-efficacy in enterprise employees found no significant correlation between them, suggesting that Zhongyong thinking' s mechanism for promoting adaptation differs from self-efficacy' s confidence-based mechanism (Cai, 2022).

Second, current self-report scales measuring Zhongyong thinking face two challenges: (1) The binary relationship aspect of Zhongyong thinking is difficult to capture reliably through self-report measures (Wei & Yan, 2014); (2) The "middle" standard pursued by Zhongyong thinking changes dynamically with context, which existing measures cannot reflect. Pang (1980) summarized Zhongyong thinking' s manifestations using A and B to represent two opposing sides of a binary relationship and A' to represent A' s opposite, identifying four forms: A yet B, A but not A' , neither A nor B, and both A and B. Current Zhongyong scales primarily measure the first form and rarely address the latter three. "Both A and B" particularly reflects Zhongyong thinking' s dynamic expansion across time and space— "be A when A is appropriate, be B when B is appropriate" —rather than rigidly implementing "A yet B" in all situations, which would become "extremism" or "unbalanced holding of the middle." Thus, a person with high Zhongyong thinking does not necessarily endorse every item on a Likert scale measuring primarily "A yet B" format, or if they do, their endorsement may not always be at the highest level.

Third, this characteristic of Zhongyong thinking is also reflected in mental health concepts, emphasizing moderation, balance, and harmony. This health and well-being perspective aligns with recent Chinese culture-based research on emotions and well-being (Lee et al., 2013; Tsai et al., 2006). However, most current mental health concepts and measures are based on Western individualistic understandings of health and happiness (Krys et al., 2023). Therefore, most existing mental health indicators may not be optimal criterion variables for predicting mental health from Zhongyong thinking. Overall, the moderate correlation between Zhongyong thinking and mental health may reflect: (1) Zhongyong thinking' s non-extreme nature, which doesn' t aim for maximization on mental health indicators; (2) measurement challenges that limit scale reliability and validity; and (3) suboptimal suitability of most mental health indicators as criterion variables in Zhongyong research.

Thus, Zhongyong thinking and its unique approach to mental health reflect distinct Chinese cultural characteristics. Research shows that people who relentlessly pursue maximal happiness are actually less happy than those who pursue happiness moderately (Oishi et al., 2014). Chinese individuals often experience more mixed positive and negative emotions in self-related events, yet this inconsistency does not reduce well-being as it does for Westerners (Du, 2020; Zheng et al., 2021). Higher Zhongyong thinking is associated with lower conflict from self-evaluation inconsistency (Wang & Liu, 2014). Peng and Huang (2015) proposed a "Zhongyong-harmony-based interpersonal well-being" theoretical framework from a Chinese cultural perspective, offering a valuable integration of Zhongyong thinking and mental health. However, most studies simply add scale-measured Zhongyong thinking as a "variable" within existing men-

tal health theories that inadequately consider cultural factors, leaving deeper theoretical and methodological issues underexplored.

4.2.1 Moderating Effect of Mental Health Indicator Type

Overall, mental health indicator type moderated the relationship with positive mental health. Zhongyong thinking showed stronger correlations with resilience, job satisfaction, and work well-being than with life satisfaction. Correlations with general well-being, peace of mind, and positive affect did not differ significantly from the correlation with life satisfaction. Mental health indicator type did not moderate the relationship with negative mental health, with no significant differences among different negative mental health indicators.

The stronger correlation between Zhongyong thinking and resilience reflects Zhongyong' s core characteristics of "considering both poles," "yin-yang transformation," "balance and coordination," and "avoiding extremes." Resilience is a comprehensive psychological adaptability referring to the process by which individuals maintain or restore good functioning when facing stress or adversity through the joint action of multiple psychological traits and environmental factors. It strengthens positive psychological resources and buffers potential negative impacts of stress. Resilience is influenced by multiple factors including optimism, self-esteem, emotion regulation, coping strategies, social support, cultural background, and adversity characteristics (Fletcher & Sarkar, 2013). Resilience not only correlates highly with Zhongyong thinking but often serves as a complete mediator between Zhongyong thinking and different mental health indicators (Li, 2011; Liu, 2021). Through its holistic thinking and flexible self-positioning characteristics, Zhongyong thinking enables more flexible use of cognitive resources, emotion regulation, and adaptation to complex social situations, thereby improving adaptability under adversity. Wei (2022) identified "compatibility-balance" and "flexibility" as two essential features through which Zhongyong thinking promotes psychological adaptation, though research on these mechanisms remains limited and warrants further investigation.

The stronger correlations with job satisfaction and work well-being reflect Zhongyong thinking' s nature as a "practical" thinking style, meaning its effects are more pronounced when dealing with more complex environments requiring greater experience. Work contexts, as typical complex practical scenarios, may require Zhongyong thinking more than simple contexts, explaining why Zhongyong thinking has received considerable attention in management research (Wei, 2022; Ning et al., 2021). In work settings, research has found that Zhongyong thinking can weaken the emotional exhaustion and negative job satisfaction effects of hindrance stress and challenge stress, while transforming challenge stress into positive pressure beneficial for job satisfaction (Chou et al., 2014). For employees with high Zhongyong thinking, bad moods and work tasks are not opposing; Zhongyong thinking can reduce negative effects of bad moods on organizational citizenship behavior while positively influencing task performance (Pan & Sun, 2018). When female managers face higher

work-family conflict, Zhongyong thinking can enhance work-family balance behaviors to improve family satisfaction, while in work settings, higher job complexity strengthens the positive relationship between female managers' Zhongyong thinking and paradoxical leadership behavior, which enhances leadership effectiveness (Yin et al., 2022). Zhongyong thinking not only buffers negative impacts of adverse work factors but can transform some negative factors into positive ones, explaining why work-related positive mental health indicators show significantly stronger relationships with Zhongyong thinking than general well-being and satisfaction, even after controlling for measurement effects.

4.2.2 Moderating Effect of Zhongyong Thinking Scale Type

Zhongyong thinking scale type moderated relationships with both positive and negative mental health. Specifically, for positive mental health, effect sizes measured by the Zhongyong Value Orientation Scale, Zhongyong Opinion Expression Scale, and Zhongyong Belief-Value Scale were similar to each other and all larger than the effect size for the calm restraint subscale of the Zhongyong Practice Self-report Scale. The calm restraint subscale was not significantly correlated with positive mental health indicators, while all other measurement types showed significant correlations. For negative mental health, the Zhongyong Opinion Expression Scale and Zhongyong Belief-Value Scale showed similar effect sizes, both larger than those for the post-event reflection and multi-perspective deliberation subscales of the Practice Self-report Scale, which were not significantly correlated with negative mental health indicators. Other Zhongyong measurement types showed significant correlations.

Overall, the Zhongyong Value Orientation Scale, Opinion Expression Scale, and Belief-Value Scale showed relatively small differences. This indicates that despite variations in measuring value orientation versus practical experience, including "I" in item wording, and using forced-choice formats, these scales consistently measure the core "life philosophy" content of the Zhongyong practical thinking framework (see Table 1), which indeed plays a relatively consistent positive role in mental health. This is encouraging, suggesting that regardless of whether the focus is on value orientation or practical experience, recognizing Zhongyong thinking' s core content promotes mental health. Notably, two intervention studies using control groups found that Zhongyong thinking training could reduce depressive symptoms (Guo et al., 2017; Yang et al., 2016), further supporting Zhongyong thinking' s positive mental health effects.

The Zhongyong Practice Self-report Scale differs somewhat from other scales. In terms of measurement level, its post-event reflection, calm restraint, and multi-perspective deliberation subscales focus on thinking processes during specific event handling (Yang et al., 2014). Its measurement approach also differs: while the Opinion Expression Scale uses fit-to-self ratings and the Belief-Value Scale uses agreement ratings, the Practice Self-report Scale uses frequency-of-behavior ratings. The non-significant correlations with mental health indicators

may suggest that the "frequency of practical behavior"itself has little relationship with mental health, while underlying "value beliefs" or "cognitive frameworks" are key. Alternatively, the Practice Self-report Scale may not accurately capture the action patterns of truly Zhongyong individuals in real situations, which requires analysis from the perspective of the dynamic "Zhongyong action-self" (Yang, 2023). The "Zhongyong action-self" refers to the flexible coordination of a "just right" self based on situational demands when selecting and executing problem-solving actions. A crucial feature is the integration of individual and situation—field dependence or flexibility that the Practice Self-report Scale cannot capture. Conversely, because Zhongyong thinking involves continuous practice and improvement, the "post-event reflection" and "calm restraint" measured by the Practice Self-report Scale may, at immature practice stages, produce effects similar to maladaptive strategies like rumination or expressive suppression, weakening positive associations with mental health. Future scale revisions should address these issues.

4.3 Limitations and Future Directions

Since all included studies were correlational, our findings cannot establish causality despite showing relationships between Zhongyong thinking and mental health. Future research should employ experimental designs manipulating Zhongyong thinking levels to observe direct effects on mental health, or use longitudinal designs to track changes in Zhongyong thinking and mental health over time, revealing dynamic relationships and potential causal mechanisms. Such research would enhance understanding of Zhongyong thinking' s role in mental health and help develop more effective psychological interventions.

Additionally, although we reviewed mediation and moderation pathways in the literature, limited numbers of studies with similar paths prevented systematic statistical analysis. As more research accumulates, future studies could employ structural equation meta-analysis for further exploration.

Conclusion

This three-level meta-analysis found: (1) Zhongyong thinking is significantly positively correlated with positive mental health indicators ($r = 0.24$) and significantly negatively correlated with negative mental health indicators ($r = -0.21$), both medium effect sizes; (2) The relationship is moderated by positive mental health indicator type, with stronger correlations for resilience, job satisfaction, and work well-being than for life satisfaction, while correlations with general well-being, peace of mind, and positive affect do not differ significantly from life satisfaction; (3) Zhongyong thinking scale type moderates the relationship, with the Value Orientation, Opinion Expression, and Belief-Value scales showing similar effect sizes that differ from the Practice Self-report Scale' s calm restraint subscale for positive mental health, and the Opinion Expression and Belief-Value scales showing similar effect sizes that exceed those of the Practice Self-report Scale' s post-event reflection and deliberation subscales for

negative mental health; (4) Publication year significantly moderates the relationship with negative mental health, with the negative correlation strengthening in recent years; (5) Gender, age, education, and sample region (mainland China vs. Taiwan) do not significantly moderate the relationship.

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[1] When original studies did not report continuous characteristics, following *The Handbook of Research Synthesis and Meta-Analysis* (Cooper et al., 2019), researchers should construct coding variables through reasonable inference or group assignment while noting the assumptions and limitations. For mean age, we estimated values for some studies based on sample characteristics. According to China' s Compulsory Education Law, children should enroll at age 6 and complete compulsory education, with most graduating primary school at ages 11-12. Among studies reporting mean ages directly, middle school students averaged 12.5-13.75 years, high school students 15.8-16 years, and undergraduates 18.95-23.19 years (mostly around 20). Therefore, we estimated mean ages as 13, 16, and 20 for middle school, high school, and undergraduate samples, respectively. Given potential estimation bias, we conducted sensitivity analyses in moderation tests. Although treating education as an ordinal variable and calculating weighted averages may introduce estimation error, it maintains consistency and interpretability across studies, so we retained mean education in moderation analyses, with caution advised in interpretation.

[2] In the positive mental health literature, five studies did not report sample age and were estimated by authors: Liu (2022), Liao (2012), Zheng (2016), Meng (2023), and Zhou (2022). When these ages were treated as missing, mean age

(F(1, 122) = 0.19, p = .662), age squared (F(1, 122) = 0.27, p = .603), and age cubed (F(1, 122) = 0.35, p = .556) showed no significant moderation, consistent with current results.

[3] In the negative mental health literature, two studies did not report sample age and were estimated by authors: Qi (2023) and Meng (2023). When these ages were treated as missing, mean age (F(1, 128) = 0.18, p = 0.676), age squared (F(1, 128) = 0.03, p = 0.855), and age cubed (F(1, 128) < 0.01, p = 0.983) showed no significant moderation, consistent with current results.

Appendices

Appendix 1: Search Strategies

Database	Search Strategy
CNKI, Wanfang, VIP	S1: Abstract:(“中庸”)S2: Abstract:(“心理健康” OR “抑郁” OR “焦虑” OR “情感” OR “情绪” OR “幸福感” OR “满意度” OR “自尊” OR “心理弹性” OR “心理韧性”)S1 AND S2
Renmin University Theses	篇关摘:“中庸” 篇关摘:“心理健康” + “抑郁” + “焦虑” + “情感” + “情绪” + “幸福感” + “满意度” + “自尊” + “心理弹性” + “心理韧性” + “压力” S1 AND S2
Taiwan Academic Literature	摘要 = “心理健康” OR “抑郁” OR “焦虑” OR “情感” OR “情绪” OR “幸福感” OR “满意度” OR “自尊” OR “心理弹性” OR “心理韧性” S1 AND S2
PsycINFO	AB (“zhongyong” OR “zhong yong” OR “zhong-yong” OR “doctrine of mean” OR “moderation thinking”)AB (“mental health” OR “psychological health” OR “well being” OR “well-being” OR “life satisfaction” OR “quality of life” OR “happiness” OR “anxiety” OR “distress” OR “depression” OR “self-esteem” OR “self-worth” OR “self-efficacy” OR “emotions” OR “affect” OR “mood”)S1 AND S2

Database	Search Strategy
Web of Science	TS=(“zhongyong” OR “zhong yong” OR “zhong-yong” OR “doctrine of mean” OR “moderation thinking”)TS=(“mental health” OR “psychological health” OR “well being” OR “well-being” OR “life satisfaction” OR “quality of life” OR “happiness” OR “stress” OR “anxiety” OR “distress” OR “depression” OR “self-esteem” OR “self-worth” OR “self-efficacy” OR “emotions” OR “affect” OR “mood”)S1 AND S2
Scopus	TITLE-ABS-KEY (“zhongyong” OR “zhong yong” OR “zhong-yong” OR “doctrine of mean” OR “moderation thinking”)TITLE-ABS-KEY (“mental health” OR “psychological health” OR “well being” OR “well-being” OR “life satisfaction” OR “happiness” OR “anxiety” OR “distress” OR “depression” OR “self-esteem” OR “self-worth” OR “self-efficacy” OR “emotions” OR “affect” OR “mood”)S1 AND S2
Springer	(“zhongyong” OR “zhong yong” OR “zhong-yong” OR “doctrine of mean” OR “moderation thinking”) AND (“mental health” OR “psychological health” OR “well being” OR “well-being” OR “life satisfaction” OR “quality of life” OR “happiness” OR “anxiety” OR “distress” OR “depression” OR “self-esteem” OR “self-worth” OR “self-efficacy” OR “emotions” OR “affect” OR “mood”) within Article
ProQuest	summary(“zhongyong” OR “zhong yong” OR “zhong-yong” OR “doctrine of mean” OR “moderation thinking” OR “中庸”) AND summary(“mental health” OR “psychological health” OR “well being” OR “well-being” OR “life satisfaction” OR “quality of life” OR “happiness” OR “anxiety” OR “distress” OR “depression” OR “self-esteem” OR “self-worth” OR “self-efficacy” OR “emotions” OR “affect” OR “mood”)

Appendix 2: Measurement Information of Included Studies

Construct	Specific Measures	Scales
Positive Mental Health	Positive/Negative Affect	PANAS (Watson et al., 1988), Affect Balance Scale (Bradburn, 1969), Positive-Negative Emotion Checklist (Wang Li translation), Differential Emotions Scale (Izard et al., 1993)
	Life Satisfaction	Satisfaction with Life Scale (SWLS; Diener, 1985), Subjective Well-being Scale Life Satisfaction Subscale (Yan Biaobin revision)

Construct	Specific Measures	Scales
	Job Satisfaction	Job Satisfaction Scale (Tsui, 1992), 3 items from Michigan Organizational Assessment Questionnaire, Job Satisfaction Scale (Tian Lifa), Job Satisfaction Scale (Zhang Tian, Luo Jiade, 2015), Job Satisfaction Scale (Cammann, 1979), Gallup Employee Satisfaction Survey, Single-item, 3-item (Hackman & Oldham, 1980), Job Satisfaction Index (Judge, 1998)
	Family Satisfaction	2 items (Michel & Clark, 2009)
	Friendship Satisfaction	Friendship Satisfaction Scale (Canevello, 2010)
	Marital Satisfaction	Relationship Assessment Scale (Susan et al.)

Construct	Specific Measures	Scales
	Well-being/Subjective Well-being/Psychological Well-being/Chinese Well-being	Subjective Well-being Scale Overall Subjective Well-being Subscale (Yan Biaobin revision), Subjective Well-being (Waterman), Single-item, Subjective Well-being Scale (Ryff, 1989), Li (2014) translation and revised selection from Ryff et al. (1994), Chinese Well-being Scale (Lu & Shih, 1997), Chinese Well-being Scale Short Form (Wang Weiqian, 2006), Chinese Well-being Scale 10-item Ultra-short Form (Lu Luo)

Construct	Specific Measures	Scales
	Work Well-being/Job Well-being	Employee Well-being Scale (Riff & Keys, 1995), Work Well-being Scale (Zheng), Work Well-being Scale (Sanjay)
	Peace of Mind	PoM (Lee, Lin, Huang, & Fredrickson, 2013)
	Resilience/Psychological Resilience	Resilience Scale (Xiao Nan revision), RS-11, Adolescent Resilience Scale (Gan Yiqun, 2008), CDRISC (Connor & Davidson, 2003), Resilience Scale for Adults (RSA)
	Self-Esteem	Rosenberg Self-Esteem Scale (1965), 10-item Self-esteem Scale (Pierce et al., 1989)
	Psychological Capital	Psychological Capital Scale (Luthans), Psychological Capital Scale (Yu Minning et al., 2012)

Construct	Specific Measures	Scales
	Self-Efficacy	General Self-Efficacy Scale (Zhang, 2010)
	Positive Mental Health Composite	GHQ20, Positive Mental Health Scale
Negative Mental Health	Negative Mental Health Composite	SDS, SCL-90
	Depression	SCL-90 Depression, BDI, HAMD, CES-D (Radloff, 1977)
	Anxiety	SAS, SCL-90 Anxiety, BAI, STAI
	SCL-90	SCL-90
	Negative Affect	PANAS (Watson et al., 1988), Affect Balance Scale (Bradburn, 1969), Negative Affect Subscale of Subjective Well-being Scale (Yan Biaobin revision), Positive-Negative Emotion Checklist (Wang Li translation), Specific Emotion Scale (Huang Min' er, Guo Dejun, 2001), Negative Emotion Scale (Fisher)

Construct	Specific Measures	Scales
	Emotional Exhaustion	Work Emotional Exhaustion Scale (Watkins et al., 2015)
	Job Burnout/Learning Burnout	LBUS (Lian Rong), Job Burnout Scale (Maslach)
	Suicidal Ideation	Non-Suicidal Self-Injury Questionnaire
Zhongyong Thinking	Zhongyong Thinking Scale	Wu Jiahui & Lin Yizheng, 2005
	Zhongyong Opinion Expression Scale	ZYW-DF (Multi-perspective deliberation), ZYW-ZH (Integration), ZYW-HX (Harmony)
	Zhongyong Belief-Value Scale	ZYH-BG (Elevated perspective), ZYH-SL (Self-restraint)
	Zhongyong Value Orientation Scale	ZYY-FX (Single dimension)
	Zhongyong Practice Self-report Scale	ZYY-SL (Post-event reflection), ZYY-KJ (Calm restraint), ZYY-FM (Confu-sion/grievance)
	College Student Zhongyong Thinking Questionnaire	ZYLQM (Cheng Yunfei, 2013, revised from Wu & Lin version)

Construct	Specific Measures	Scales
	Zhongyong Practical Thinking Scale	Zhao Zhiyu (2000) adapted from Yang & Zhao (1997)
	Enterprise Employee Behavioral Zhongyong Scale	Shao Aiguo, 2003
	Three Virtues Scale	Liu Yanan, Zhang Xun, 2022

Note: Specific measurement details were extracted from original studies. Some studies provided incomplete scale information, which is presented as originally reported.

Appendix 3: Summary of Zhongyong Thinking-Mental Health Pathways

Study	Pathway
Liu (2022)	Parents' Zhongyong thinking → Children's Zhongyong thinking → Children's psychological resilience → Mental health
Yang (2012)	Family functioning → Zhongyong thinking → Mental health
Hou (2020)	Parenting style → Zhongyong thinking → Emotional distress
Li (2023)	Family adaptability → Zhongyong thinking → Anxiety
Meng (2023)	Dispositional mindfulness → Zhongyong thinking → Subjective well-being
Chen (2021)	Zhongyong thinking → Negative cognitive emotion regulation strategies → Depression
Ding (2019)	Zhongyong thinking → Social support → Loneliness → Internet addiction
Fan (2017)	Zhongyong thinking → Cognitive reappraisal → Emotion/Well-being/Friendship satisfaction
Gao (2013B)	Zhongyong thinking self-restraint → Emotion regulation flexibility → Depression

Study	Pathway
Gong (2023)	Zhongyong thinking → Negative cognitive emotion regulation → Learning burnout
Guo (2016B)	Zhongyong thinking → Coping efficacy → Depression
Huang (2014)	Zhongyong thinking → Emotion regulation flexibility → Perceived social support
Huang (2021)	Zhongyong thinking → Negative cognitive emotion regulation → Anxiety/Aggression
Jiang (2023)	Zhongyong thinking → Cognitive reappraisal/Negative emotions → Emotional eating
Li (2016)	Zhongyong thinking → Money attitudes → Well-being
Li (2011)	Zhongyong thinking → Psychological resilience → Social adaptation (full mediation)
Li (2021)	Zhongyong thinking → Work stress → Decision inertia (counter: increased inertia)
Liao (2012)	Zhongyong thinking → Interpersonal relationships → Well-being
Liu (2022)	Parents' Zhongyong thinking → Children's Zhongyong thinking → Children's psychological resilience → Mental health (full mediation)
Tan (2012)	Zhongyong thinking → Emotion regulation → Individual adaptation
Tan (2012)	Zhongyong thinking → Emotion control values → Individual adaptation
Xu (2019)	Zhongyong thinking → Psychological capital → Subjective well-being (full mediation)
Yin (2022)	Zhongyong thinking → Work-family balance behaviors → Family/Family member satisfaction
Zhou (2023)	Zhongyong thinking → Job insecurity → Competitive attitude → Job satisfaction
Zhu (2014)	Zhongyong thinking → Interpersonal relationships → Well-being (full mediation)
Fan (2017)	Zhongyong thinking → Cognitive reappraisal → Responsiveness → Friend's emotion/Well-being/Friendship satisfaction

Study	Pathway
He (2021)	Zhongyong thinking → Rumination → Depression
Liu (2023)	Zhongyong thinking → Cyberloafing → Mental health
Yuan (2023)	Zhongyong thinking → Lurking → Emotional exhaustion
Zhou (2022)	Zhongyong thinking → Cognitive reappraisal → Positive affect
Zeng (2013)	Cognitive reappraisal → Emotion regulation
Deng (2008)	拿捏 behavior → Psychological adaptation
Guo (2012)	Emotion regulation → Positive/Negative affect
Guo (2016A)	Rumination → Negative affect
Li (2017)	Emotional labor → Job burnout
Liu (2011)	Coping style → Subjective well-being
Sun (2014)	Bad mood → Organizational citizenship behavior/Task performance behavior
Tian (2021)	Poverty perception → Anxiety
Yang (2014B)	Stressors → Work well-being
Zhang (2023)	Emotional labor surface acting → Emotional exhaustion
Zhang (2023)	Emotional intelligence → Job burnout
Chou (2014)	Stress → Job satisfaction
Cui (2022)	Expressive suppression → Negative affect/Perceived social support
Lan (2021)	Peer attachment → Adolescent adjustment
Wang (2022)	COVID-19 → Impulsive buying
Wei (2021)	Anxiety → Cyberbullying
Wei (2020)	Entrepreneurial self-efficacy → Job satisfaction
Xu (2024)	Cumulative family risk → Non-suicidal self-injury

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