



Performance and Self-Kindness in Dynamic Balance: Mindfulness as the Bridge Between Mental Toughness and Self-Compassion

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Abstract

International Journal of Exercise Science 19(5): 5009, 2026. Balancing performance demands with self-care is essential for psychological health. Mental toughness (MT) and self-compassion (SC) are often viewed as opposing constructs; yet, athlete studies suggest mindfulness (MF) may connect them. Whether this extends to non-athlete adults is unclear. This study tested whether MF mediates the MT-SC relationship in a community sample. Eighty-four adults ($M_{\text{age}} = 44.4$ years) completed measures of MT, SC excluding MF items (SC_noMF), and the MF subscale scored separately. Missing data were addressed with 20 multiple imputations, and confirmatory factor analyses supported construct separation. Mediation models adjusted for age and sex used 5,000 bootstrap resamples with pooled estimates and bias-corrected accelerated confidence intervals. MT correlated with both SC_noMF ($r = .46, p < .001$) and MF ($r = .52, p < .001$). MT predicted MF ($a = .42, p < .001$), and MF predicted SC_noMF when controlling MT ($b = .62, p < .001$). The indirect effect was significant ($a \times b = .26, 95\% \text{ CI } [.15, .39]$), while the direct MT $\rightarrow$ SC_noMF path was not ($c' = .08, p = .24$), indicating full mediation. The total effect ($.34, 95\% \text{ CI } [.20, .48]$) showed that $\sim 76\%$ of the association was mediated. A model specifying MT $\rightarrow$ MF $\rightarrow$ SC_noMF fit better than a reversed ordering. MF fully mediated the MT-SC relationship in this community sample, extending athlete-based findings and suggesting that persistence and self-kindness can coexist. MF may serve as a practical mechanism linking performance-oriented focus with compassionate self-regulation. Longitudinal research is needed to clarify causal pathways.

Keywords: Mentally tough, positive psychology, mediation, middle-adulthood, mindful, self-compassionate

Introduction

Psychological constructs such as *mental toughness* (MT), *self-compassion* (SC), and *mindfulness* (MF) have become increasingly important for understanding how individuals manage stress, regulate emotion, maintain adaptive functioning, and overall well-being across diverse settings.^{1,2} Adults in middle adulthood often navigate sustained workload demands, caregiving responsibilities, and constant adjustment, making these constructs relevant for understanding functioning in everyday life.² Clarifying how MT, SC, and MF interact in this population may offer insight into

the psychological mechanisms that support functioning under chronic everyday stressors.

Mental toughness is commonly defined as the ability to remain focused, effective, and goal-directed under stress and adversity.³ Although early debates questioned whether MT should be seen as multidimensional, recent evidence supports a unidimensional structure.^{3,4} In this view, MT has been described as part of a group of resources, a group of psychological strengths that work together to sustain effort during demanding conditions.³

Self-compassion involves responding to personal setbacks with warmth, balanced awareness, and a sense of shared humanity rather than harsh self-criticism.⁵ Through its components of self-kindness, common humanity, and MF, SC facilitates emotional regulation and adaptive recovery from stress.⁶ Specifically, self-kindness involves treating oneself with understanding and care during difficult moments, common humanity reflects recognizing that suffering and imperfection are part of the shared human experience, and balanced awareness (i.e., MF) involves staying present with one's thoughts and emotions without overreacting to them.

Historically, MT and SC were viewed as opposing constructs, with MT emphasizing persistence and SC emphasizing gentleness.^{7,8} However, qualitative research shows that individuals use both capacities depending on situational demands.^{7,8} Wilson et al. (2019) described this as a zipper effect, in which MT aids goal-directed action during periods of high demand, while SC supports emotional recalibration, recovery, and sustained engagement.

Mindfulness, characterized by open and non-reactive awareness of the present moment,⁹ may serve as the regulatory mechanism that allows MT and SC to function in harmony. Mindfulness can be cultivated through formal practice or expressed as a dispositional trait.² Conceptually, mindful awareness helps people notice their internal experiences without becoming overwhelmed, preventing MT from turning into rigid self-pressure and helping SC remain constructive rather than avoidant.¹⁰ In this way, MF may operate as an integrative mechanism that supports flexible movement between persistence and SC depending on contextual demands.¹

Empirical evidence supports this process. Among NCAA athletes, MF significantly mediated the relationship between MT and SC, suggesting that mindful awareness may help these constructs coexist effectively.¹¹ Papadakis et al. (2025)¹² replicated this pattern across different athlete groups, demonstrating that the mechanism appears robust within performance-driven environments.

Whether these relationships extend to non-athlete adults remains unknown. Middle adulthood involves ongoing cumulative stressors, including workload pressures, caregiving roles, and financial constraints,¹³ that may require both MT-related persistence and SC-related emotion regulation. These demands may also affect exercise-related behaviors and outcomes, including adherence, recovery, and the ability to sustain health-promoting routines under stress. Yet, no studies have examined whether MF similarly mediates the MT-SC relationship in general adult populations. Establishing this link may help clarify how psychological skills traditionally developed in performance settings can benefit community adults facing chronic, everyday stressors. Importantly, prior work^{14,15} suggests that both MT and SC may vary systematically by age and sex/gender, warranting statistical adjustment in observational analyses.

¹ Although MF is considered a component of self-compassion, in this study, we examine it separately to better understand its role as a potential mechanism linking MT and SC.

The purpose of this study was to test whether MF mediates the relationship between MT and SC in a community sample of middle-aged adults. Consistent with findings from athlete research, we hypothesized that higher MT would predict greater SC through higher levels of dispositional MF.

Methods

Participants

A power analysis was conducted in G*Power 3.1¹⁶ for a multiple regression model with three predictors. Consistent with Cohen's¹⁷ (1998) conventions for effect size magnitude and recommended minimum power level in behavioral research, using a medium effect size ($f^2 = 0.15$), $\alpha = .05$, and power of .80, the required sample size was 77 participants. Our final sample of 84 adults exceeded this threshold, indicating that the study was adequately powered to detect medium-sized effects in the mediation paths. Inclusion criteria were: (a) age ≥ 18 years, (b) ability to read English, and (c) current participation in a community outreach program. Individuals were excluded if they self-reported severe physical or psychological conditions that would prevent them from safely completing assessments or if they were unable to complete questionnaires. Eighty-four adults participated in the study ($M_{\text{age}} = 44.4$ years, $SD = 14.9$). The sample was 57.1% male ($n = 48$) and 42.9% female ($n = 36$). Most participants identified as White (77.4%), followed by Hispanic (9.5%), Asian (8.3%), and Black (4.8%). Sex was assessed via a single self-report item with two response options: Male and Female. All participants provided written informed consent. The study was approved by the Institutional Review Board at Baylor University and conducted in accordance with the Declaration of Helsinki and the ethical standards of the International Journal of Exercise Science.¹⁸

Protocol

Adults were recruited from a local community as part of a larger health and wellness project. Recruitment occurred through printed flyers posted at community centers, libraries, churches, fitness facilities, and partnering outreach organizations. Interested individuals contacted the research team and were scheduled for an in-person assessment visit at the university. At the assessment visit, participants provided written informed consent and completed a series of standardized assessments as part of the parent project. These assessments included blood sampling, physical activity testing, dual-energy X-ray absorptiometry (DEXA) scans, and self-report questionnaires. The present study used only the questionnaire data related to MT, MF, and SC.

Measures

We measured MT using the Mental Toughness Index (MTI),³ an 8-item scale designed for sport and general performance settings. Items are rated on a 1–7 Likert scale (1=False, 100% of the time, 7=True, 100% of the time), with higher scores reflecting greater perceived MT. The MTI has shown strong reliability and validity across performance contexts and culturally diverse samples.^{3,4}

We measured SC using the Self-Compassion Scale (SCS),⁵ a 26-item measure rated on a 1–5 Likert scale (1 = almost never, 5 = almost always). Following standard scoring procedures, all reverse-coded items were recoded before computing scale scores. In line with prior work,^{11,12} we removed the four MF items (i.e., items 9, 14, 17, and 22) and calculated the mean of the remaining 22 items

so that scores remained on the original 1–5 metric. This score, referred to as SC without the MF items (SC_noMF), served as the outcome variable in the mediation model.

In more detail, we treated those four MF items from the SCS as a separate construct representing the MF of SC. This allowed us to examine MF separately from the broader SC construct in the mediation model while replicating previous athlete-focused research. These items primarily reflect balanced awareness of distress, emotional balance, perspective-taking, and approaching difficult feelings with openness and non-judgment, rather than a broader standalone assessment of mindfulness.

All scale scores were computed by averaging their respective items so that each variable remained on its original Likert metric (MT on a 1–7 scale; SC_noMF and MF on 1–5 scales). This approach preserves interpretability and aligns with scoring procedures used in prior work.

Statistical Analysis

We ran all analyses in R (version 4.4.1). Statistical significance was set at $\alpha = .05$ (two-tailed) for all tests. Missing data were handled using item-level multiple imputation with $m = 20$ imputations and 20 iterations per imputation. The imputation model included all SCS items, all MTI items, age, sex, and race/ethnicity. Most variables had $\leq 3.6\%$ missing data, whereas a subset of SC_noMF items had up to 16.7% missingness. Predictive mean matching was used for Likert-type items and age, logistic regression for sex, and polytomous regression for race/ethnicity.

We checked reliability using Cronbach's α and McDonald's ω , averaged across imputations. We also computed descriptive statistics and zero-order correlations for all study variables. To evaluate measurement properties and test whether the constructs were statistically distinct, we fit confirmatory factor analysis (CFA). CFA model fit was evaluated using χ^2 , the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR), with acceptable fit defined as CFI/TLI $\geq .90$ and RMSEA/SRMR $\leq .08$.

Our main mediation model tested whether MF mediated the relationship between MT and SC_noMF while adjusting for age and sex. Each of the 20 imputed datasets was analyzed using 5,000 bias-corrected and accelerated (BCa) bootstrap samples to produce stable estimates and precise confidence intervals for the indirect effect. Direct effects (paths a , b , and c') were pooled across imputations using Rubin's rules to obtain combined estimates, standard errors, and degrees of freedom. Indirect effects were summarized using pooled BCa bootstrap confidence intervals, consistent with recommendations for non-normally distributed mediation estimates. We also fit a competing mediation model that reversed the order of MT and SC_noMF, and compared model fit using the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). Residual plots and model diagnostics did not indicate severe violations of linearity or homoscedasticity.

Results

Descriptive Statistics

Means and standard deviations for MT, MF, and SC_noMF are presented in Table 1. On average, participants reported moderately high MT ($M = 5.74$, $SD = 0.80$), mid-range MF scores ($M =$

3.78, SD = 0.67), and moderate levels of SC_noMF (M = 3.37, SD = 0.61). Reliability estimates (Cronbach's α and McDonald's ω) were strong for MT and SC_noMF and acceptable for the MF subscale (Table 1).

Table 1. Descriptive statistics, reliabilities (α , ω), and correlations among study variables (N = 84).

Variable	M	SD	α	ω	1	2	3
1. Mental Toughness (MTI)	5.74	0.80	0.89	0.90	—	0.521*	0.464*
2. Mindfulness (SCS subscale)	3.78	0.67	0.67	0.69	0.521	—	0.741*
3. Self-Compassion (no MF)	3.37	0.61	0.90	0.91	0.464	0.741	—

Note.* $p < .001$. MTI = Mental Toughness Index; SCS = self-compassion scale; MF = Mindfulness (SCS subscale); no MF = SCS excluding mindfulness items.

Zero-Order Correlations

Zero-order correlations among MT, MF, and SC_noMF are shown in Table 1. Higher MT scores were associated with higher MF and SC_noMF scores, and MF was strongly associated with SC_noMF.

Mediation Analysis.

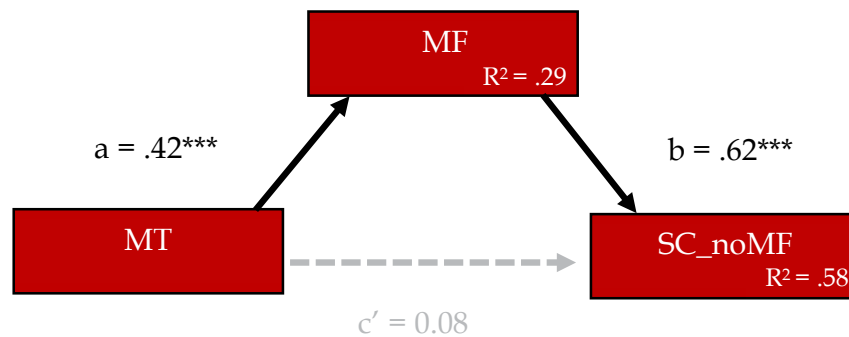


Figure 1. MF mediates the association between MT and SC_noMF in middle-aged adults. Solid arrows indicate significant paths, and the dashed gray arrow indicates a non-significant direct effect. The model adjusts for age and sex. R^2 values are shown within MF and SC_noMF.

Note. $p < .001$; n.s. = non-significant; MT = mental toughness; MF = mindfulness; SC_noMF = self-compassion excluding mindfulness items.

We tested whether MF mediated the association between MT and SC_noMF while adjusting for age and sex (see Figure 1). MT significantly predicted MF ($a = .417$, $p < .001$), and MF significantly predicted SC_noMF when controlling for MT ($b = .621$, $p < .001$). The direct path from MT to SC_noMF was not significant ($c' = .081$, $p = .24$). The indirect effect was significant ($a \times b = 0.259$), with a 95% BCa confidence interval that excluded zero (0.154 to 0.386). The total effect was also significant (0.340, 95% CI [0.197, 0.482]), and approximately 76% of the total effect was mediated. Taken together, these results indicate full mediation.

We also compared the hypothesized mediation model with a competing model in which SC_noMF predicted MT through MF. The competing model showed a smaller indirect effect and higher AIC/BIC values (287.0 / 308.9) relative to the hypothesized model (238.9 / 260.8), indicating that the MT $\rightarrow$ MF $\rightarrow$ SC_noMF ordering provided a better fit to the data (Table 2).

Table 2. Main mediation model (MT → MF → SC_noMF): unstandardized pooled estimates. Direct paths (a, b, c') include Rubin-pooled SE, t, and p. Indirect, total, and proportion mediated effects include pooled bootstrap (BCa) confidence intervals only.

Parameter	Estimate	SE	t	df	P	CI_low	CI_high
a (MT → MF)	0.417	0.082	5.09	12491	< .001	0.256	0.577
b (MF → SC_noMF)	0.621	0.081	7.68	1298	< .001	0.462	0.780
c' (MT → SC_noMF)	0.081	0.069	1.17	8859	0.240	-0.054	0.216
Indirect (a × b)	0.259	NA	NA	NA	—	0.154	0.386
Total (c' + a × b)	0.340	NA	NA	NA	—	0.197	0.482
Proportion mediated	0.762	NA	NA	NA	—	0.475	1.226

Note. MT = mental toughness; MF = mindfulness; SC_noMF = self-compassion scale excluding mindfulness items; BCa = bias-corrected and accelerated; CI = confidence interval.

Discussion

The purpose of this study was to determine whether MF mediates the association between MT and SC in a community sample of middle-aged adults. Consistent with our hypothesis, MF fully mediated this relationship: individuals higher in MT also reported higher MF, which in turn predicted greater SC. Approximately 76% of the total effect of MT on SC was accounted for by MF. Once MF was included in the model, the direct path from MT to SC was no longer significant, underscoring MF's central role as the psychological mechanism linking these constructs.

These findings extend previous athlete-focused research demonstrating that MF supports the integration of MT and SC.¹² In studies of competitive athletes, MF partially mediated this relationship, suggesting that mindful awareness may enable performers to remain both persistent and self-supportive.¹¹ Our results indicate an even stronger link in middle adulthood, where MF accounted for nearly all shared variance between MT and SC. This pattern suggests that the mechanism observed in athlete populations may be even more critical for adults navigating the diffuse, cumulative stressors of everyday life. Unlike athletes, whose environments often explicitly train attention, persistence, and emotional regulation, community adults may display greater variability in these psychological skills and rely more heavily on dispositional MF to balance persistence with self-kindness.

Conceptually, these results reinforce the idea that MT and SC are not opposing forces but may function as complementary components of a broader self-regulatory system. Consistent with this perspective, prior research demonstrates that MT and SC are positively associated and can coexist in ways that support psychological functioning rather than undermine it.¹¹ MF appears to facilitate this balance by anchoring attention in the present moment, a process characterized by heightened present-moment awareness and nonjudgmental acceptance,⁹ preventing MT from turning into rigid self-pressure and keeping SC from becoming avoidant or passive.^{9,19} Additional evidence indicates that MF is positively associated with both MT and SC, and that MF-based interventions can enhance these constructs simultaneously, underscoring MF's central regulatory role within this system.^{20,21} Through this regulatory process, adults may be better able to sustain effort during difficult tasks while responding adaptively to setbacks. This dynamic may be particularly important in middle adulthood, when individuals often face competing demands and chronic stressors.¹³ Daily-life research in middle-aged and older adults shows that state MF predicts greater affective well-being, with nonjudgmental acceptance buffering emotional reactivity to everyday stressors.²² Because stressors during this life stage tend to be ongoing rather than episodic, the ability to regulate attention and emotional responses in real time may be especially critical for sustaining effort.

At the same time, interpreting this broader conceptual pattern requires attention to how MF was operationalized in the present study. In this study, MF was assessed using the SCS subscale to examine MF and SC within the same conceptual framework. Although we separated these constructs analytically to reduce item overlap, this approach does not eliminate all conceptual relatedness. The MF items used here primarily reflect emotional balance, non-judgmental awareness, and the ability to keep things in perspective when responding to negative experiences, and therefore may capture a narrower facet of MF. At the same time, this operationalization maintained measurement consistency with prior athlete-focused MT-MF-SC research, facilitating more direct comparison across studies and populations. Prior research (e.g., the Five-Facet Mindfulness Questionnaire, Monitor and Acceptance Theory) also suggests that additional mindfulness facets, such as acceptance, non-judgment, and attentional control, may play distinct roles in supporting both MT and SC. Accordingly, the present findings are best interpreted as evidence for the importance of the MF component within the SC system, rather than definitive evidence that an entirely independent MF construct explains the MT-SC association.

Even with this more precise interpretation, these findings may have practical implications for physical activity/exercise, health promotion, and behavioral performance in the general population beyond sport, suggesting that MF may be a useful intervention target for supporting both MT and SC in applied settings. In recreational exercise settings, MF may help individuals maintain focus during challenging sessions while navigating fluctuations in motivation with less self-criticism, supported by evidence indicating that mindfulness during exercise promotes greater acceptance of physical sensations, reduces negative self-evaluation, and enhances enjoyment, pleasure, and task absorption during physical activity.²³⁻²⁷ In occupational environments that require consistent performance under stress, such as first responders, educators, or manual laborers, MF may similarly support resilience and emotional regulation under high responsibility. Studies with firefighters show that MF training leads to meaningful improvements in psychological resilience compared to relaxation-based or no-training conditions.^{28,29} More broadly, workplace MF interventions have demonstrated moderate to large benefits for stress reduction, anxiety, and overall well-being across occupational settings, highlighting their relevance for performance contexts characterized by sustained cognitive and emotional demands.^{30,31} Clinical or rehabilitation contexts may also benefit, as MF could help adults stay engaged in recovery while approaching slow progress or setbacks with greater patience and self-kindness, consistent with evidence from stroke rehabilitation indicating that MF-based interventions are feasible, acceptable, and associated with meaningful improvements in post-stroke emotional functioning.³²⁻³⁴ Together, these applications highlight MF as a potentially valuable training target across diverse performance and well-being domains, while appropriately acknowledging the need for continued research examining long-term behavioral outcomes and optimal implementation across populations.³⁵

Despite these strengths, several limitations should be acknowledged. First, the cross-sectional design prevents causal inference regarding how MT, MF, and SC relate to one another over time.³⁶ Second, the use of self-report measures introduces potential bias, including social desirability and shared-method variance.³⁷ Third, although adequately powered, the sample was modest in size and predominantly White, which limits generalizability to more diverse populations. Finally, recruitment through a community outreach program may reduce representativeness, as participants may differ from the broader adult population in adversity faced, health status, or psychosocial characteristics.

Future research would benefit from including broader measures of MF (e.g., the Mindful Attention Awareness Scale) and examining self-compassion at the component level using regression-based

approaches to determine whether facets such as self-kindness and common humanity uniquely explain variance in mental toughness and further clarify the nuance of the MT-SC relationship. In addition, future research should employ longitudinal or experimental designs to test whether increases in MF directly enhance the integration of MT and SC. Randomized MF interventions could clarify causal pathways and help determine whether MF training improves resilience across exercise, occupational, and clinical settings.³⁸ Larger and more diverse samples are also needed, including adults with varying physical activity levels, cultural backgrounds, and high-pressure occupational demands. Incorporating behavioral performance measures or physiological indicators, such as heart rate variability, cortisol, or sleep metrics, may further illuminate how MT, MF, and SC jointly influence adaptation, health, and well-being.³⁹ Expanding this work into broader health-behavior or exercise-science frameworks may also help clarify how these psychological skills relate to physical activity, recovery processes, and resilience in everyday life.^{26,40}

In summary, this study makes several unique contributions to the MT-MF-SC literature by providing the first test of the MT→MF→SC mediation pathway in a community sample of middle-aged adults, extending prior evidence largely confined to competitive athletes. By separating the MF items from the SC outcome, it evaluates the mediation model more rigorously than previous work and reduces concerns about measurement overlap. Methodologically, the use of multiple imputation, BCa bootstrapping, and covariate control strengthens confidence in the robustness of the observed effects and minimizes potential estimation bias. Collectively, the findings offer initial evidence that MF may fully mediate the relationship between MT and SC in middle-aged adults outside sport settings, highlighting MF as a key process that may support persistent, goal-directed functioning under challenge while preserving self-kindness and emotional balance. This integrated understanding may inform future interventions, particularly those that incorporate MF-based strategies to help individuals maintain persistence under stress while also supporting self-kindness and emotional balance across adulthood.

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