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The Efficacy of a Mental Skills Training Course for Collegiate Athletes

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Context: Psychological skills training improves performance in athletes. However, authors of few studies have looked at the efficacy and satisfaction of mental skills training programs for collegiate athletes.

Objective: To evaluate the satisfaction of collegiate athletes with a 6-session mental skills course and to assess changes in mental toughness and coping skills before and after the course.

Design: Cohort study.

Setting: Division I collegiate athletic teams.

Patients or Other Participants: Fifty-four Division I female athletes (mean age = 19.8 years) participated in the program, and 42 (77.7%) completed precourse assessments, which subsequent evaluations were matched to.

Main Outcome Measure(s): The Athletic Coping Skills Inventory (ACSI; range, 0–84) and Mental Toughness Index (MTI; range, 8–56) assessed coping skills and mental toughness precourse, immediately postcourse, and 4 months postcourse. Satisfaction was assessed on a 10-point scale.

Results: For participants with paired precourse and immediately postcourse data (n = 37, 68.5%), MTI scores improved by a mean 2.6 points (95% CI = 1.1, 4.1; $P = .001$), and ACSI scores improved by a mean 4.0 points (95% CI = 0.6, 7.4; $P = .02$). At the 4-month follow-up (n = 25, 46.2%), no change was detected from precourse in mean MTI score ($P = .72$), but a significant increase of 3.4 points in mean ACSI (95% CI = 0.4, 6.4; $P = .03$) occurred. Overall satisfaction had a median score of 9/10 (interquartile range, 8–10) at postcourse, and 18 participants (48.6%) shared positive free-text comments regarding course delivery, content, and impact. No negative feedback was reported.

Conclusions: Mental toughness and coping skills scores significantly improved at postcourse assessment, with coping skills scores maintaining their effect at 4 months. The improvements identified spark the question of the potential impact of mental skills training programs when studied in larger athlete populations or over more sustained periods of time. Athletes reported being highly satisfied with course content and reported overall positive experiences.

Key Words: sport psychology, student-athlete, sport performance, coping skills

Key Points

- This mental skills training program improved female collegiate athletes' mental toughness and coping skills.
- Mental skills training for collegiate female athletes is both valued and maintained beyond initial course administration.
- Mental skills training is viewed as a positive contributor to well-being and sport performance.

One objective of mental skills training (MST) is to improve athlete performance.[1] Individuals involved in collegiate sports face the challenge of balancing rigorous athletic and academic demands.[2–5] As such, an increasing need may exist for programs that help athletes develop the skills necessary to maintain optimal performance and train their mindset and psychological skills in the same way they train their tactical, technical, and physical skills. Mental skills programs teach confidence, adaptability, and resilience, among other valuable skills.[6,7]

Performance refers to the execution of an action or something accomplished.[8] Therefore, when considering the value of MST, it is important to recognize that the concept of performance can cross multiple arenas. For student-athletes, mental skills—and resulting mental toughness and resilience—can be a critical component in both areas of desired achievement. Student-athletes demonstrating these qualities often have a psychological edge in their pursuit of excellence that allows them to effectively cope with and persist against challenging demands.[9] Researchers have found that mindfulness- and psychological skills–based techniques can strengthen this part of the athlete's game, ultimately improving performance outcomes.[10–13] Authors of multiple studies have supported the use of MST in sport, noting athletes' enhanced use of imagery, self-talk, and goal setting, as well as improved psychological well-being, emotional regulation, and mental toughness.[1,10,11,13,14] In a systematic review and meta-analysis of the effect of mindfulness-based programs on elite athlete mental health, Myall et al support the fact that such skill development can improve overall well-being.[15] Mindfulness-based programs educate participants on strategies like mindfulness and acceptance as well as breath work and focus. The authors found that, across the 12 studies included in the review, elite athletes experienced

ranges in improvement regarding symptoms of anxiety and depression, psychological distress, stress, overall psychological well-being, and mindfulness.[15]

At the collegiate level, results of a survey conducted with 2400 National Collegiate Athletic Association Division I athletes spoke to the receptivity of MST.[16] Wrisberg et al reported informative differences across groups, such as the fact that female student-athletes were more interested in MST than their male counterparts, and those involved in individual sports were more receptive to MST than those who participated in team sports.[16] In a world where success and winning is at the forefront, it is crucial to recognize and capitalize on the fact that, when athletes are better equipped to face adversity, they are more likely to experience increased performance capabilities.[13]

In the pursuit of excellence, athletes are bound to encounter a multitude of challenges that test their ability to persist. More and more, professionals in the sport world are emphasizing the value of resilience, which at its root speaks to the ability to bounce back.[17] Thus, given the inherent presence of both positive and negative stress in sport, having the tools and strategies to cope is essential. Lazarus and Folkman defined *coping* as the individual's efforts to "manage specific external demands that are appraised as taxing or exceeding the person's resources."[18(p141)] Individuals may choose to engage in problem- or emotion-focused coping, where the former aims to alter the stressor and the latter addresses the emotion associated with the stressor.[18]

Strategies such as self-talk, imagery, and goal setting can help the athlete reframe potentially challenging situations to view them more positively and productively.[19–21] Given that individuals have an innate drive to demonstrate competence, MST proactively provides athletes with the resources to do just this.[22] Mental skills training, also sometimes referred to as psychological skills training, speaks to "the systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical activity self-satisfaction."[23(p250)] Several targeted outcomes have been set in MST, such as when an athlete is learning a challenging, unfamiliar skill. Self-talk and imagery have been found to improve sport performance through the mental practice of skill development, emotional regulation, and attention control.[24–28] In terms of performance output, self-talk can be used to direct the athlete's attention to instructional and motivational components of performance, and imagery serves as a form of mental repetition in that it targets parts of the brain also active during physical repetition.[27–30] Goal setting aims at better performance by increasing attentional focus on a particular task, bolstering effort and energy, and encouraging persistence.[31] While certainly not a one-size-fits-all scenario, tools like specific, measurable, achievable or action-oriented, realistic, time-bound (S.M.A.R.T.) goal setting provide a broad, overarching process by which athletes learn to develop effective roadmaps to achieve their desired outcomes.[32] Building the athlete's toolbox in regard to strategies like self-talk, imagery, and goal setting has the potential to strengthen his or her mindset to better work through difficulty to achieve optimal and consistent performance.

The COVID-19 pandemic presented a unique opportunity for the use of technology in providing continued mental skills support for collegiate athletes worldwide. While the use of technology in applied sport psychology is not necessarily new, virtual platforms must now be evaluated. The ability to deliver skills training in areas like mindfulness has the potential to improve well-being, and the accessibility and resultant potential of these programs via an online platform warrants continued exploration. In a pilot study conducted by MacDonald and Neville, it was found that mindfulness-based stress reduction (MBSR) delivered via an online format to healthy college students yielded positive results.[33] Those engaged with the MBSR intervention demonstrated a greater increase in mindfulness skills than those students who were a part of the control group. Additionally, those receiving the MBSR intervention maintained this sense of well-being beyond the program administration.

The purpose of the present study was to explore the efficacy of a 6-session virtual MST program (MSTP) in collegiate athletes and to assess the value of the course from the participants' perspective. Determining program efficacy has the potential to improve how athletes learn to integrate mental skills into their everyday sport training. In this study, we aim to add to the body of literature supporting the integration of MST into collegiate programs and demonstrate its use virtually, which has grown evermore critical and useful in our post-COVID world. We hypothesized that mental toughness and coping skills scores would improve among collegiate athletes after the 6-session MSTP.[6,7] We also hypothesized that participants would be satisfied with the course and report retained value in skills learned and that mental toughness and coping skills would be positively correlated.

METHODS

The MSTP was designed as a 6-session course led by a mental skills specialist with graduate-level training in sport and exercise psychology and a cofacilitator. The program was held from October 2000 through December 2020, with each session lasting approximately 60 minutes with time for questions and answers. Through a variety of exercises (ie, large group and small breakout discussions, individual brainstorms, games, polling), sessions addressed several mental performance concepts, including stress management, goal setting, mental toughness, positive self-talk, intentionality, and using failure as fuel. To address these concepts, athletes were instructed on strategies such as cognitive restructuring, breathing strategies, and goal setting (Supplemental Appendix A, available online at https://dx.doi.org/10.4085/1062-6050-0533.22.S1). Fifty-four Division I female collegiate athletes from 2 separate teams at the same university participated in the program. All MSTP sessions were virtual group sessions, and all athletes were a part of the same Zoom call. At the time of the course and during all survey completion, all athletes were restricted from competition due to the COVID pandemic. As part of course assessment, athletes were sent electronic surveys precourse, immediately postcourse (within 2 weeks of course completion), and at 4 months postcourse. Surveys assessed psychological skills as well as overall satisfaction and perceived value, and individual responses were linked across time points. Participants were given 2 weeks after each postcourse distribution to complete the questionnaires, after which survey links were closed to further submission. This study was institutional review board approved for the retrospective review of these prospectively collected data.

Table 1. Timeline of Data Collection

Assessment Measures	Precourse Survey	Immediate Postcourse Survey	4 Months Postcourse Survey
Demographics	X		
Mental Toughness Index	X	X	X
Athletic Coping Skills Inventory	X	X	X
Satisfaction scale		X	
Perceived value			X
Perceived improvement			X
Mental skill retention			X
Additional comments		X	X

Survey Design

The presurveys, immediate postsurveys, and 4-month postsurveys assessed demographic information, mental toughness, coping skills, and overall satisfaction and course review (Supplemental Appendices A through C). Time points of data collection for various aspects of presurvey and immediate postsurvey assessments can be seen in Table 1. Demographic information was collected in the precourse survey and assessed age, gender, sport participation patterns, injury status, and history of mental health conditions. All survey time points included the Athletic Coping Skills Inventory (ACSI) and the Mental Toughness Index (MTI), and both postcourse surveys assessed satisfaction with the course and level of retained skills.

The ACSI was used to assess athlete coping skills.[34] This is a validated assessment tool that uses a 4-point Likert scale for 28 items, yielding total scores ranging from 0 to 84.[21] The ACSI measures an athlete's psychological coping skills using 7 subscales including coping with adversity, coachability, concentration, confidence and achievement motivation, goal setting and mental preparation, peaking under pressure, and freedom from worry. Higher scores on the ACSI signify greater levels of coping skills.

The MTI was used to assess mental toughness.[35,36] This is an 8-item scale, scored on a 7-point Likert scale, with total scores ranging from 1 (*false, 100% of the time*) to 7 (*true, 100% of the time*). The MTI directly assesses unidimensional mental toughness in sport with scores ranging from 8 to 56; a higher score represents greater mental toughness. The MTI has undergone preliminary construct validation for elite athletes and continues to be tested for its validation in independent samples of athletes at varying levels of sport.

Both postcourse assessments also asked about satisfaction, the value of the course, and retained use of learned mental skills. To address program satisfaction, athletes were asked to answer on a numeric rating scale the following question: "On a scale of 0 to 10 (0 = *not at all satisfied*, 10 = *extremely satisfied*), how satisfied are you with what you learned during this course?" The athletes' perceived value of the course and personal mental skills improvement was assessed during the 4-month follow-up survey, also on 10-point numeric rating scales. At 4 months, athletes also rated their daily use of learned mental skills. To address skill retention amid varied athletic involvement due to COVID, athletes were asked on both postcourse surveys to describe the most important skill they learned during the course that they currently incorporate into their daily lives. Questions about how the course could be improved were also included to help guide future improvements to the MSTP and are shown in Table 1.

Participants who did not complete the initial precourse survey as well as those who did not complete either the immediate postcourse or the 4-month follow-up survey were excluded from the ACSI and MTI outcome calculations at different time points, and only patients with complete ACSI and MTI data points were included for this analysis.

Statistical Methods

We summarized demographic information, athletic participation, and injury characteristics for all participants and calculated descriptive total scores for the ACSI, MTI, satisfaction, course value, and skill retention. Continuous characteristics were summarized by mean ± SD or by median and interquartile range (IQR; 25th percentile, 75th percentile) when data deviated from normality. For the primary analysis, the change in MTI and ACSI scores was calculated from precourse to immediately postcourse along with 95% CIs. We used 1-sided *t* tests for the change in scores to assess if a significant improvement in mental toughness and coping scores existed from precourse to immediately postcourse. For secondary analysis, we used Pearson correlation analysis to assess the correlation between MTI and ACSI at precourse, immediately postcourse, and 4-month follow-up (where data were available). Pearson correlation coefficients were reported along with 95% CIs. Here, P values $< .05$ were considered significant.

RESULTS

Demographic and Participant Characteristics

Two Division I teams—women's ice hockey and women's lacrosse—were given the same course over a 6-week period. The course was offered to a total of 54 athletes; attendance was encouraged by coaching staff but not mandatory. Sixty-nine percent (37/54) of athletes completed both the precourse and immediate postcourse surveys. Forty-six percent (25/54) of athletes completed all surveys from precourse to 4-month follow-up.

The mean ± SD age of participants was 19.8 ± 1.3 years, and all identified as female. Table 2 summarizes patient demographics, training hours, mental health condition history, and current practice status. Here, 61% of participants reported they trained in their sport for at least 8 months out of the year. When reporting on mental health conditions, 19% of athletes reported a history of anxiety, and 7% reported a history of an eating disorder. Attention-deficit/hyperactivity disorder (ADD/ADHD) was an additional mental health condition reported by the population (4%). Injury status ranged from currently injured (9%) to recovering (13%), with 76% of the population reporting they were not injured. Due to the COVID-19 restrictions on competition, no athletes were actively competing in their sport at the time of the MSTP and postcourse surveys.

Mental Toughness and Coping Skill Scores

Forty-two participants had precourse survey responses with a mean ± SD MTI score of 45 ± 4.8 and a mean ± SD ACSI score of 49 ± 7.0. Forty-seven participants had immediate postcourse survey data with a mean ± SD MTI score of 47 ± 4.8 and a mean ± SD ACSI score of 52 ± 10.6. A moderate correlation was detected between precourse MTI and ACSI scores, with a Pearson correlation coefficient of 0.58 (95% CI =

Table 2. Cohort Summary (N = 54)

Characteristic	No. (%)
Age (y, mean ± SD)	19.8 ± 1.3
Sports specialization	
Yes	33 (61)
No	3 (6)
Unsure or unknown	18 (33)
Training for 8 mo/y	33 (61)
Training, h/wk	
0–2	1 (2)
3–5	3 (6)
6–10	8 (15)
11–14	15 (28)
15+	13 (24)
Not reported	14 (26)
History of mental health condition	
Anxiety	10 (19)
Eating disorder	4 (7)
ADD/ADHD	2 (4)
Other	2 (4)
Prefer not to answer	12 (22)
None	28 (52)
Injured	
Currently injured	5 (9)
Recovering	7 (13)
Not injured	30 (56)
Not reported	12 (22)
Currently on campus	
Yes	3 (6)
Remote	7 (13)
Taking time off	24 (44)
Not reported	20 (37)
Currently practicing	
Practice and workouts	7 (13)
Competing	2 (4)
Neither	26 (48)
Sports participation	51 (94)
Level	
Collegiate	50 (93)
High school	1 (2)
Not reported	3 (6)

Abbreviation: ADD/ADHD, attention-deficit/hyperactivity disorder.

0.34, 0.75; $P < .001$). The correlation was slightly lower at the immediate postcourse survey, with a Pearson correlation coefficient of 0.49 (95% CI = 0.24, 0.68; $P < .001$). For participants with paired precourse and immediate postcourse data, MTI scores improved by a mean ± SD of 2.6 ± 4.6 points with an effect size of 0.6 (n = 37; $P = .001$), and ACSI scores improved by a mean ± SD of 4.0 ± 10.0 points with an effect size of 0.4 (n = 36; $P = .02$; Figure; Table 3).

For participants with paired data for baseline and the 4-month postcourse follow-up, no change was detected in mean MTI score ($P = .72$). However, a mean ± SD significant increase was found from precourse to 4-month follow-up of 3.4 ± 7.2 points in mean ACSI score with an effect size of 0.5 ($P = .03$; Figure; Table 3).

Course Satisfaction and Perceived Value

Overall satisfaction had a median score of 9/10 (IQR, 8–10) at the immediate postcourse assessment (Table 4), and 18 participants (18/37, 49%) shared positive free-text comments regarding course delivery, content, and impact. No negative feedback was reported. Course satisfaction was higher in those who reported improvement in ACSI scores from precourse to postcourse (9.3 versus 7.9, $P = .003$). On the 4-month survey, participants described the most important thing they learned that they continue to incorporate in their daily lives—in and out of sport. The most mentioned skills, as previously categorized based on the subject matter of each workshop, were positive mindset and self-talk (42%), stress management (18%), mindset awareness (15%), and acceptance of circumstance and controlling the controllables (15%).

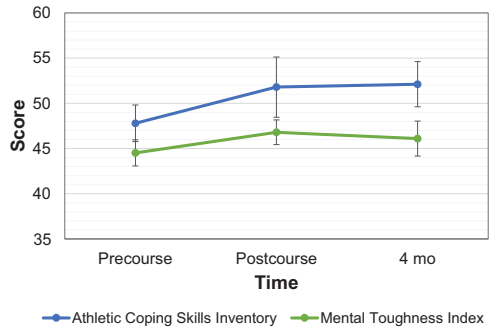

Figure. Paired Athletic Coping Skills Inventory and Mental Toughness Index scores over time.

DISCUSSION

The present study was designed to examine the efficacy of a 6-session MSTP in collegiate female athletes. As hypothesized, the findings showed that mental toughness and coping skills scores significantly improved from precourse to postcourse assessment, with coping skills retaining significance at 4 months and a moderate correlation detected between MTI and ACSI scores. Additionally, athletes reported being highly satisfied with the content of the course, expressing overall positive experiences and retention of skills at 4 months postcourse. These results add support to prior research showing the value of MST in sport.[1,10–14]

For elite-level athletes, daily physical training is simply a part of the game.[37] Most athletes readily acknowledge the ways that the mental game can affect—either positively or negatively—their performance.[38] Despite this, MST is not necessarily built into collegiate training programs. The better athletes can work through the psychological demands of sport, the more likely they are to have an edge over their opponents.[11] The goal is to encourage MST as a proactive, rather than reactive, approach to performance optimization.

Determining the efficacy of an MSTP designed for collegiate teams has the potential to improve how athletes learn to integrate mental skills into their everyday sport training. Past researchers have found that mental skills help athletes develop confidence, adaptability, and resilience.[6,7] These sorts of skills equip athletes with the ability to navigate adversity in a way that leads to increased performance capabilities.[13] From the present study, it is evident that, in only six 1-hour sessions, collegiate female athletes demonstrated increased mental toughness and coping skills as well as perceived retention of coping skills over time. Proactively addressing mental skills in the collegiate athlete population could serve to improve performance in both athletic and academic arenas. Potential for the transferability of these skills into life after college also exists.

A median score of 9/10 on course satisfaction immediately postcourse was reported, and nearly 50% of participants shared

Table 3. Paired Data for the Mental Toughness Index and Athletic Coping Skills Inventory Precourse to Immediate Postcourse and Precourse to 4 Months Postcourse

Measurement	*N*	Precourse Mean ± SD	Postcourse Mean ± SD	Change From Precourse to Postcourse	
				Mean (95% CI)	*P*
Mental Toughness Index					
Immediately postcourse	37	44.0 ± 4.5	46.6 ± 4.6	2.6 (1.1, 4.1)	.001
4 mo	25	44.6 ± 4.8	45.1 ± 5.8	0.5 (−2.3, 3.3)	.72
Athletic Coping Skills Inventory					
Immediately postcourse	36	47.8 ± 6.2	51.8 ± 10.9	4.0 (0.6, 7.4)	.02
4 mo	25	47.8 ± 6.4	51.2 ± 7.2	3.4 (0.4, 6.4)	.03

positive free-text comments regarding the course. Our follow-up surveys gave the athletes opportunities to discuss learned skills they continued to incorporate and to comment on course content for future sessions. Given that the tools and strategies that strengthen mental toughness require continued practice and intentionality, we felt it valuable to explore whether the strategies discussed were sustained beyond the MTSP sessions. Many participants expressed relatability to course content: "[I] found it very helpful during this time off," and, "[I] will definitely be implementing many of the tools." Some expressed gratitude for the course's availability, even in a virtual format due to the COVID-19 pandemic. Many comments showed an increased understanding of acceptance of circumstance: "[I am] working on the things I can control when I am feeling down;" "[I learned that] feelings are [valid], and it is okay to have an off day;" and, "controlling the controllables." The value of a positive mindset was another largely discussed skill: "celebrating the little accomplishments;" "[using a mental reset] when things aren't going [my] way;" and, "using affirmation statements to instill baseline confidence." Statements such as these indicate the ways in which skills developed from the MSTP were applicable to student-athlete performance, both on and off the field.

Considering their regular involvement with student-athletes, athletic trainers (ATs) are often a very trusted and relied upon resource.[39,40] The concept of psychologically informed practice, initially proposed by Main and George, speaks to the "integration of cognitive-behavioral and psychosocial interventions, that are within the scope of athletic training clinical practice, into patient management."[41(p687),42] This approach entails the inclusion of performance strategies like goal setting, self-talk, and imagery to optimize rehabilitation performance and improve patient outcomes. It also speaks to the knowledge base of ATs in terms of appropriate mental health referral, as they are often the first line of defense for athletes needing additional psychological support.[42] Athletic trainers may find themselves in a unique position to both use MST and promote the use of MSTPs to help athletes better navigate the many ups and downs that come with sport performance and injury rehabilitation. Researchers have shown that athletes' positive perceptions of support from ATs promote their sense of competence in recovery and overall well-being.[43,44] Therefore, while ATs are educated and equipped to assess the psychosocial component of sport injury, the demands of physically rehabilitating athletes and readying them for return to sport in some environments may limit their ability to concurrently implement MSTPs within the athletic training room.[45] However, as the value of MST continues to gain foothold in the collegiate sphere, ATs have the potential to play a significant role in encouraging MST integration within existing athletic programs.

Table 4. Perceived Satisfaction and Course Value Immediately and 4 Months Postcourse

	No.	Median (IQR)
Immediately postcourse		
How satisfied are you with what you learned? (0–10)	48	9 (8, 10)
4 Mo postcourse		
How valuable was the mental skills course? (1–10)	34	7 (5, 8)
How much do you think the course helped to improve your mental skills? (1–10)	34	7 (5, 8)

Abbreviation: IQR, interquartile range (25th percentile, 75th percentile).

The COVID-19 pandemic presented a unique challenge in assessing MSTP efficacy, as none of the athletes were competing in their respective sports at the time of the course administration. While none of the athletes were participating in competitive sport at their Division I institution, all were still engaged in practice and training. Therefore, we felt it important to provide the MSTP as a way to develop skills and strategies to navigate their current circumstances. Additionally, researchers over the last couple of years have shown that student-athlete mental health has worsened since the start of the pandemic.[46] Both male and female athletes have reported decreased motivation and happiness, along with increased tension, stress, and concern.[47–50] As such, the need for any sort of mental support—athletic or otherwise—is likely in higher demand than it was previously. While not directly measured, it is interesting to consider whether the MSTP might have served a unique purpose in helping student-athletes navigate the unusually difficult terrain of the pandemic, rather than applying directly to gamelike scenarios. The virtual format of the course allowed for all student-athletes, regardless of location at the time of the course, to participate. It has been said that with the transition to teletherapy services for a generation particularly accustomed to virtual communication, the virtual platform experience ranged from "utterly seamless. . . [to] 'awkward' and anxiety provoking."[51] Therefore, authors of future studies on MSTPs should consider the specific needs of the team to determine the most appropriate means of program administration.

While in the present study we do indicate the efficacy of an MSTP for collegiate female athletes, our results should be interpreted with some additional limitations in mind. First, our sample size was relatively small, and the course was only administered to 2 Division I collegiate women's teams. Results may not be generalizable to other populations. Additionally, self-report bias might also have influenced athlete

response, and future iterations of this study would benefit from validated satisfaction and course value questions. As mentioned above, at the time of the MSTP, athletes were not actively competing in their sport, and therefore, additional data would be helpful regarding the efficacy of the course during an active season. Finally, while we did see a significant increase in coping skill scores over time, the effect size of the change in scores was relatively small. The significance of this degree of change in score still requires further research, but it is important to note that a significant change in score was achieved in a short amount of time and through a single MSTP course in a small sample size. Future research on this intervention and study design would benefit from an attention matched control condition. Further study is warranted to examine whether scores can be further enhanced through more regular and sustained programs.

In this study, we showed that a 6-session MSTP may be helpful in building mental toughness and coping skills in collegiate female athletes. These results indicate the need to increase the accessibility of MST for student-athletes. The more athletes can navigate the mental hurdles of sport and life outside of sport, the more likely they are to experience success. Future researchers should focus on the generalizability of the findings by administering the program to a larger, more diverse group of collegiate athletes.

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SUPPLEMENTAL MATERIAL

Supplemental Appendix A. Mental Skills Training: Presurvey.
Supplemental Appendix B. Mental Skills Training: Postsurvey.
Supplemental Appendix C. Mental Skills Training: 4-Month Follow-Up Survey.

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