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Impact of the Mental Toughness Training Circle on the psychological aspects of athletes in situational sports: a pilot experiment

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Abstract

Background and purpose

This study aims to evaluate the effect of providing Mental Toughness Training Circle mental training on athletes' mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life.

Material and methods

The randomized experimental design was used to evaluate Mental Toughness Training Circle. A total of 31 college-level athletes were involved and divided into two groups. Six important constructs related to athletes' psychological aspects, including mental toughness, performance, religiosity, anxiety, satisfaction, and athlete happiness are measured using the Mental Toughness Inventory, Self-Assessment of Athletics Performance, Spirituality in Sports Test, Sports Anxiety Scale-2, Social Validation Questionnaire, and Satisfaction with Life Scale.

Results

The research findings prove that the Mental Toughness Training Circle mental training program has a significant effect on athletes' mental toughness, performance, anxiety, religiosity, satisfaction, and life happiness. Apart from that, this study also shows that the application of Mental Toughness Training Circle can increase positive emotional dimensions (mental toughness, performance, religiosity, satisfaction, and happiness) and reduce negative emotions (anxiety) in athletes.

Conclusions

The implications of this study show that Mental Toughness Training Circle can be used by athletic trainers and mental coaches to improve the quality of athletes, especially in psychological or mental aspects.

Keywords: Mental Toughness Training Circle, psychological performance, situational sports

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Анотація

Міфтах Фаріз Пріма Путра, Суторо Суторо, Еві Сінага, Роді Русдіанто Хідаят, Тері Ванена, Йос Вандік, Мочамад Рідван, Дестріана Дестріана, Міфтахул Джанна, Анунг Пріамбодо, Джуріана Джуріана, Курнія Тахкі, Еді Сетіаван, Франсіско Хав'єр Гіл-Еспіноса. Вплив програми «Коло навчання психологічної стійкості» на психологічні аспекти спортсменів у ситуаційних видах спорту: пілотний експеримент

Обгрунтування і мета

Метою даного дослідження є оцінка впливу психологічного тренування в рамках програми «Коло навчання психологічної стійкості» на психічну стійкість, працездатність, релігійність, тривожність, задоволеність та щастя спортсменів у житті.

Матеріал та методи

Рандомізований експериментальний план використовувався з метою оцінки гуртка тренування психічної стійкості. Загалом у ньому взяв участь 31 спортсмен коледжу, які були поділені на дві групи. Шість важливих показників, пов'язаних з психологічними аспектами спортсменів, включаючи психологічну стійкість, працездатність, релігійність, тривогу, задоволеність і щастя спортсмена, вимірюються з використанням Опитувальника психічної стійкості, самооцінки спортивних результатів, тесту духовності у спорті, шкали спортивної тривожності та Шкала задоволеності життям.

Отримані результати

Результати дослідження доводять, що програма розумового тренування «Коло навчання психологічної стійкості» істотно впливає на психічну стійкість, працездатність, тривожність, релігійність, задоволеність і щастя у житті спортсменів. Крім того, це дослідження також показує, що застосування «Кола навчання психологічної стійкості» може підвищити позитивні емоційні аспекти (розумова стійкість, працездатність, релігійність, задоволення та щастя) та зменшити негативні емоції (тривогу) у спортсменів.

Висновки

Результати цього дослідження показують, що тренувальний цикл «Кола навчання психологічної стійкості» може використовуватися спортивними тренерами та тренерами з психології для покращення якостей спортсменів, особливо у психологічних чи розумових аспектах.

Ключові слова: «Коло навчання психічної стійкості», психологічний перформанс, ситуаційний спорт

Аннотация

Мифтах Фариз Прима Путра, Суторо Суторо, Эви Синага, Родхи Русдианто Хидаят, Тери Ванена, Йос Вандик, Мохамад Ридван, Дестриана Дестриана, Мифтахул Джанна, Анунг Приамбодо, Хуриана Хуриана, Курния Тахки, Эди Сетиаван, Франсиско Хавьер Хиль-Эспиноза. Влияние программы «Круг обучения психологической стойкости» на психологические аспекты спортсменов в ситуационных видах спорта: пилотный эксперимент

Обоснование и цель

Целью данного исследования является оценка влияния психологической тренировки в рамках программы «Круг обучения психологической стойкости» на психическую стойкость, работоспособность, религиозность, тревожность, удовлетворенность и счастье спортсменов в жизни.

Материал и методы

Рандомизированный экспериментальный план использовался для оценки кружка тренировки психической стойкости. Всего в нем принял участие 31 спортсмен колледжа, которые были разделены на две группы. Шесть важных показателей, связанных с психологическими аспектами спортсменов, включая психологическую стойкость, работоспособность, религиозность, тревогу, удовлетворенность и счастье спортсмена, измеряются с использованием Опросника психической стойкости, самооценки спортивных результатов, теста духовности в спорте, шкалы спортивной тревожности-2, Анкета социальной валидации и Шкала удовлетворенности жизнью.

Результаты

Результаты исследования доказывают, что программа умственной тренировки «Круг обучения психологической стойкости» оказывает существенное влияние на психическую стойкость, работоспособность, тревожность, религиозность, удовлетворенность и счастье в жизни спортсменов. Кроме того, это исследование также показывает, что применение «Круга обучения психологической стойкости» может повысить положительные эмоциональные аспекты (умственная устойчивость, работоспособность, религиозность, удовлетворение и счастье) и уменьшить отрицательные эмоции (тревогу) у спортсменов.

Выводы

Результаты этого исследования показывают, что тренировочный цикл «Круга обучения психологической стойкости» может использоваться спортивными тренерами и тренерами по психологии для улучшения качеств спортсменов, особенно в психологических или умственных аспектах.

Ключевые слова: «Круг обучения психической стойкости», психологический перформанс, ситуационный спорт

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Introduction

Sports scientists see that athlete success is determined by complex factors, but in general, there are four main factors, namely physical, technical (skill), tactical, and mental factors which contribute to it [1, 2]. However, a study conducted by world-renowned sports psychologist, Daniel Gould et al [3], found that in the world's biggest sporting event, the Olympics, the factors that contributed to determining the outcome of the match or the athlete's performance on the field were athlete's mentality. This is due to the fact that, at the world elite level, there are relatively no different physical and technical factors since athletes have been trained with various cutting-edge training methods and programs. Due to the importance of this mental aspect, experts in the field of sports psychology are trying to create a mental training program aimed at providing athletes with psychological training so that their mental quality improves. Several mental training programs created by world scientists include: Psychological Skill Training [4, 5, 6], Mental Skills Training [7, 8], Mental Training Skills [9], Mental Toughness Training [10, 11], and Mental Toughness Training Circle [12].

The Psychological Skill Training [4, 5, 6], Mental Skills Training [7, 8], Mental Training Skills [9], Mental Toughness Training [10, 11] training programs have been tested for their effects on athletes, but Mental Toughness Training Circle has not been tested directly on athletes in the field. In fact, Mental Toughness Training Circle is referred to as a set of systematic and comprehensive mental training models [12]. Mental Toughness Training Circle was developed based on the positive psychology paradigm as proposed by Seligman & Csikszentmihalyi [13]. That is why the "positive thinking" skill is in the middle and is trained at the beginning of training in this model. In other words, "positive thinking" is an important aspect and the foundation of a series of mental training programs in Mental Toughness Training Circle [12, 14].

As the name suggests, Mental Toughness Training Circle is a circle that has four parts: general preparatory (positive thinking, diary, goal setting, breathing, and relaxation), specific preparatory (concentration, self-talk, mental imagery, and dreaming), pre-competitive (managing anxiety and managing emotions), competitive (mentoring). These terms (general preparatory, specific preparatory, pre-competitive, and competitive) are deliberately chosen and used [12, 14] because they are in accordance with the usual physical training program terminology, techniques, and tactics used by sports coaches [15] so that the Mental Toughness Training Circle program model can, hopefully, be understood and implemented in harmony with other training programs.

Mental Toughness Training Circle is also equipped with an operational framework called Mental Toughness Training Circle. This component consists of three parts, namely introduction, main section, and end section. Apart from that, Mental Toughness Training Circle is also equipped with an operational framework called Mental Toughness Training Circle components is also equipped with a mental skills training plan. The mental skills training plan contains more detailed descriptions regarding the implementation of eleven mental skills exercises given to athletes [12, 14]. In terms of training programs usually made by sports coaches, mental skills training plan is equivalent to "Unit" or in the context of learning in higher education, " mental skills training plan " is equivalent to "lesson unit." mental skills training plan is structured following the pattern or framework as contained in the Mental Toughness Training Circle component. Thus, the claim that Mental Toughness Training Circle is a more systematic and comprehensive mental training model is not a figment. The development and testing of Mental Toughness Training Circle was carried out by nine experts who were competent in their fields [12, 14]. In general, there are four groups of experts involved in the Mental Toughness Training Circle validation process, namely (i) sports psychologists who have doctoral-degree education, (ii) experts in the field of sports training who have doctoral degrees, (iii) sports coaches who have international level training licenses, and (iv) athletes who excel at national and international levels [12, 14]. With the qualifications of the experts involved, Mental Toughness Training Circle is seen as a strong mental training model not only conceptually but practically as well.

Even though it has been rigorously validated by nine experts, until now there is not much information regarding the impact of implementing Mental Toughness Training Circle on the psychological aspects of athletes. This is the problem to date. To fill the gap in empirical scientific evidence, this research aims to evaluate the effect

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of providing mental training on mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in the lives of athletes. Our hypothesis is by providing mental training with Mental Toughness Training Circle has a significant effect on athletes' mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life. Thus, the knowledge resulting from this research will become leading information in the field of sports psychology, especially in the context of the application of mental training (Mental Toughness Training Circle) to athletes.

Materials and Methods

Design

The research design used in this study was a randomized experiment [16] as presented in Fig. 1. This design consists of two groups, namely the Experimental Group (EG) or those treated mental toughness training and the Control Group (CG) or a group that was not treated mental toughness training. Distribution of athletes who enter experimental group and control group is based on individual random results. Data collection regarding the athlete's mental condition and other variables was carried out three times (pretest, middle test and posttest).

R	T_1	X	T_2	X	T_3
R	T_1	C	T_2	C	T_3

Fig. 1. Study design. R = Random individual; T1 = Pretest; T2 = Middle test; T3 = Posttest; X = Treatment with Mental Toughness Training Circle; C = Controlled or not given treatment.

Participants

Research participants are sports students who have the status of athletes in different sports, including athletics, Football, Futsal, Volleyball, Basketball, Karate, Judo, and Pencak silat. The inclusion criteria used in this study are: (1) age 17-20 years, (2) studying in a sports studies program and in the first semester at Cenderawasih University, and (3) athletes who have never received treatment in the form of a mental training program. The exclusion criteria include (1) the athlete did not take part in the mental training given twice or did not take one of the tests given (pretest, middle test, or posttest), and (2) the athlete has never participated in a championship or sports competition. Based on the criteria above, 31 athlete students were randomly assigned individually to be included in the experimental group and control group (Fig. 2). To determine which athletes were included in experimental group and control group, random analysis assistance from the website: https://www.randomizer.org/ was used. The research sample size was calculated using G*Power version 3.1.9.7. By using an alpha level of 0.05 and statistical power of 0.80 (80%), a minimum sample size of 28 athletes with actual power of 0.81 was obtained. Of the 28 athletes, 22 were males and six were females with an average age of 18.43 ± 0.94 years.

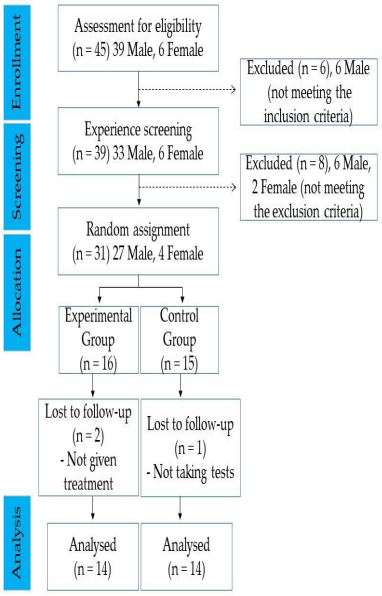

Fig. 2. Flow diagram of study

In this study, all participants signed an informed consent form and this study was approved by the health research ethics committee of Cendrawasih University with contract number: 065/KEPK-FKM UC/2023.

Psychological Intervention Procedure

The psychological intervention given to athletes is a set of mental skills training contained in the Mental Toughness Training Circle model [12]. In the Mental Toughness Training Circle model, there are 11 mental skills that are trained, namely:

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positive thinking, mental log, goal-setting, breathing, relaxation, concentration, self-talk, mental imagery, leadership, managing anxiety, and managing emotions [12], [14]. In this study, each mental skill was trained twice face to face with each face-to-face time of 75 minutes and one day of independent practice. For example, mental skills training of "positive thinking" was given to athletes on the first and second days face to face, while on the third day, athletes practiced what they had been trained for independently. The independent training was intended to give athletes time to apply what they had learned or trained. After that, the athletes again received two days of face-to-face Mental Toughness Training Circle and one day of independent training. On Sundays, athletes were not given a mental training program or this day was a rest time for athletes. That means, for one week, athletes did mental training (Mental Toughness Training Circle) six times, namely four days of face-to-face and two days of independent training. With this form of intervention, the time needed to provide mental training to athletes was six weeks.

In the initial stage, before the athletes received treatment in the form of Mental Toughness Training Circle model mental training, research subjects in experimental group and control group were given information regarding the aims, benefits, and procedures of the research. After all research subjects received this information, they were asked to sign informed consent. Then, the initial test (T1) in the study was carried out. After all subjects received the initial test, the next day they continued by providing psychological intervention in the form of Mental Toughness Training Circle mental training to the experimental group. In the middle of the treatment, namely, after the athletes in EG received five Mental Toughness Training Circle mental exercises (positive thinking, mental log, goal-setting, breathing, and relaxation), a middle test (T2) was administered in both groups (experimental group and control group). The middle test (T2) was administered one day after the experimental group received the fifth treatment (relaxation). Thus, the middle test was given three weeks after the pretest. Apart from that, the instruments used in this second test were the same as the first test but the order or arrangement of the instruments was changed. This is done to minimize threats to internal validity caused by repeated measurements [16]. On the next day, the experimental group again received further mental training intervention according to the program contained in Mental Toughness Training Circle, namely concentration, self-talk, mental imagery, leadership, managing anxiety, and managing emotions.

After all the mental skills contained in Mental Toughness Training Circle were trained on athletes in EG, on the next day, all research subjects contained in experimental group and control group were gathered to undergo a posttest (T3). In this posttest, the order of instruments used was the same as that in the pretest.

Instruments

A set of instruments was validated and used in this study. In general, there are six dependent variables measured in this study, namely mental toughness, performance, religiosity, anxiety, athlete life satisfaction, and happiness.

Mental toughness

To determine the mental toughness condition of athletes and whether Mental Toughness Training Circle had an effect on forming mental toughness, the Mental Toughness Index was used [17]. Mental Toughness Index was developed by Guciardi and colleagues with great rigor [17]. In the final stage of the development process, there were seven dimensions contained in Mental Toughness Index, namely self-belief, attention regulation, emotion regulation, successful mindset, context knowledge, buoyancy, and optimism. Of the seven dimensions, there were two versions tested, namely the 21-item version and the eight-item version. Version 8 is an advanced test based on version 21. Mental Toughness Index has a range of seven alternative answers ranging from 1 (False, 100% of the time) to 7 (True, 100% of the time). The results of Mental Toughness Index testing carried out on athletes and non-athletes found that MTI version 8 had a very good factor loading (λ= 0.56-0.80) and composite reliability moved between 0.86-0.89 which indicated very high [17].

Sports Performance

To measure athlete performance, the Self-Assessment of Athletics Performance is used [18]. Self-Assessment of Athletics Performance is a self-report that contains four items with alternative answers in the form of a five-point Likert scale with a range of 1 (low) to 5 (very high). The four items in the Self-Assessment of Athletics Performance

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are as follows: (1) How performance-oriented are you in sports? (2) How do you rate your athletic performance? (3) The satisfaction with my athletic performance (4) The level of my athletic performance is currently. Thus Self-Assessment of Athletics Performance tends to focus on the athlete's perception of his or her sporting performance. Self-Assessment of Athletics Performance reliability is reported to be 0.76 [18].

Athlete Religiosity

The dimension of athlete religiosity will be measured using the Spirituality in Sports Test which consists of 10 statement items (e.g., I use spirituality or religiosity to help me "let go" during a game) [19]. Spirituality in Sports Test initially had four alternative answers in the form of a Likert scale but was later modified into a six-point scale ranging from 1 (never) to 6 (always) [20]. The factor loading value of items in Spirituality in Sports Test moves from 0.56 to 0.83 with a Cronbach Alpha value of 0.91 [21]. Spirituality in Sports Test has been used to reveal aspects of Indonesian athletes' religiosity in previous studies [22].

Sports Anxiety

To measure the level of sports anxiety, the Sports Anxiety Scale-2 is used [23]. SAS-2 consists of 15 items and it has three subscales, namely somatic anxiety (e.g., My body feels tense), worry (e.g., I worry that I will not play well), and concentration disturbance (e.g., It is hard to concentrate on the game) with alternative answers in the form of a four-point Likert scale, ranging from 1 (not at all) to 4 (very much). This instrument is widely used internationally to measure anxiety levels in elite athletes [22]. Sports Anxiety Scale-2 testing carried out by Putra [24] found a factor loading value of 0.51-0.88 with a reliability value of 0.71-0.88.

Athlete Satisfaction

To find out how satisfied athletes are with the implementation of mental training (Mental Toughness Training Circle), the Social Validation Questionnaire was used [7]. Social Validation Questionnaire is used to measure athlete satisfaction with the provision of mental training programs and the results of these programs [7]. The social validation was designed to provide information concerning the importance of the study and the effectiveness of the program [25]. The Social Validation Questionnaire consists of five items with alternative answer choices that move on a continuum from 1 (not at all significant or not at all important or not at all satisfied) to 7 (extremely significant or extremely important or extremely satisfied) [7]. The five items in the Social Validation Questionnaire are as follows: (1) How important was an improvement in mental toughness to you? (2) Do you consider the changes in mental toughness to be significant? (3) How important was an improvement in performance to you? (4) Do you consider the changes in performance to be significant? (5) How satisfied were you with the content of the program? [7].

Happiness in Life

The construct of life satisfaction was taken using the Satisfaction with Life Scale which consists of five items that describe the respondents' satisfaction with their life in general (e.g., I am satisfied with my life) [26]. The original Satisfaction with Life Scale has seven alternative answers [26], but in the Indonesian version, these alternatives are simplified into two versions, namely four alternative answers in the form of a four-point Likert scale, ranging from 1 (very appropriate) to 4 (very inappropriate) [27] and five alternative answers [28], [29]. In this study, four alternative answers are used with consideration to emphasize the research subject's response. Satisfaction with Life Scale has been used to measure the level of life happiness of athletes in Indonesia [22], Wandik et al [29], the validity value of the Indonesian version of Satisfaction with Life Scale is 0.553 – 0.686 with a reliability level of 0.828 [28].

Statistical analysis

To understand the description of the data distribution, descriptive analysis such as mean and standard deviation is used. To determine the effect of the independent variable on the dependent variable which was measured three times (pretest, middle test, and posttest), the repeated measures ANOVA was used, meanwhile, to determine the differences between groups, the t-test was applied by using the N-gain score taken from the average test score for each group. To test data normality, the reseachers used Shapiro-Wilk, while to test homogeneity between groups, Leven's test was used. For the dependent component of the analysis, sphericity was assessed by Mauchly's test. In violation of Mauchly's test, the

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Greenhouse–Geisser correction was used [30]. In this study, the statistical significance test refers to the level $p < 0.05$, and this analysis was carried out with the IBM SPSS v.26 (IBM Corp, Armonk, NY, USA).

Results

The result of the analysis of the characteristics of research subjects shows that in the experimental group the average biological age is 18.50 ± 1.02 years, the average training age is 6.21 ± 1.89, the number of males is 12 and that of females is 2. The subjects in the control group (CG) have an average biological age of 18.46 ±0.88, a training age of 5.31±1.44, number of male athletes is 12, and that of female athletes is 2. The analysis of differences in biological age characteristics of the research subjects shows a *t*-value = 0.105, *p*-values = 0.917 while analysis of training age shows a *t*-value = 1.395, *p*-value = 0.175. These results show that there is no significant difference in the biological age and training age of athletes in the two groups. Based on gender, it appears that the number of male and female athletes in both groups is the same. Based on the type of sport the subjects in experimental group consist of seven sports, namely Athletics (n=2), Football (n=4), Futsal (n=2), Volleyball (n=2), Basketball (n=1), Karate (n=1), and Judo (n=1), while in control group there are four sports, namely Athletics (n=3), Football (n=5), Volleyball (n=5), and Pencak silat (n =1). Even though the distribution of sports types in EG and CG is different, the characteristics of the sports are the same. The three character points are measurable sports (Athletics), games (Football, Volleyball, Futsal), and martial arts (Karate, Judo, and Pencak silat). With these facts, it appears that there is no difference in the characteristics of research subjects in experimental group and control group. In addition, the result of the analysis of the initial measurement test (baseline) for each variable investigated shows that in the dimensions of mental toughness (*t-value* = 0.678, $p > 0.05$), sports performance (*t-value* = 0.589, $p > 0.05$), athlete religiosity (*t-value* = -0.1318, $p > 0.05$), sports anxiety (*t-value* = 0.173, $p > 0.05$), athlete satisfaction (*t-value* = 1.852, $p > 0.05$), and happiness in life (*t-value* = -0.379 , $p > 0.05$), showing there was no difference between the experimental group and the control group.

The research findings are descriptively presented in Table 1. The table shows an overview of the mean value and standard deviation as well as the confidence interval for each research variable, both i The main findings of this research relating to the effect of providing Mental Toughness Training Circle to athletes are presented in Table 2. In the six variables investigated, there are significant differences between experimental group and control group (*p-value* < 0.05). This indicates that there is a significant effect of providing Mental Toughness Training Circle on athletes' mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life. The results of the analysis of the differences based on the test period (pretest, middle test, and posttest) show that there are significant differences in the variables of mental toughness, sports performance, athlete satisfaction, and happiness in life (*p-value* < 0.05). For the anxiety variable, it was found that there were no significant differences based on the test period. Further analysis based on mean difference (Table 2) clarifies the results of the differences between pretest and middle test, pretest and posttest, and middle test and posttest. In general, these results indicate that Mental Toughness Training Circle mental training exerts a significant effect on the dependent variables investigated.

An illustration of the differences in average scores between groups in each measurement is presented in Fig. 3. Based on this figure, it appears that there is an increase in the five dependent variables in experimental group, namely between the pretest, middle test, and posttest, while the anxiety variable has decreased. Apart from that, from this figure, it also appears that for control group the value is relatively constant. This strengthens the results of the previous analysis (Table 2) that there is a significant effect of providing athletes with Mental Toughness Training Circle on their mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life.

In experimental group and control group, in each measurement carried out (pretest, middle test, and posttest).

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Table 1

Results of descriptive analysis based on a group (experimental group = 14, control group = 14) and three different measurement times (pretest, middle test, and posttest) and test of normality

Variable	Group	T1			T2			T3		
		Mean±SD	95% CI	S-W	Mean±SD	95% CI	S-W	Mean±SD	95% CI	S-W
MT (scores)	EG	26.29±2.76	24.84-27.01	0.915	28.36±2.10	26.45-27.83	0.954	31.07±1.38	28.95-29.91	0.926
	CG	25.57±2.82		0.899	25.93±1.38		0.853	27.79±1.05		0.919
SP (scores)	EG	9.64±0.74	9.32-9.82	0.773	11.86±1.51	10.30-11.20	0.945	13.86±0.86	11.69-12.23	0.786
	CG	9.50±0.52		0.646	9.64±0.63		0.771	10.07±0.47		0.652
AR (scores)	EG	29.14±2.60	28.78-30.79	0.955	31.78±2.12	29.86-31.42	0.950	32.57±2.27	30.16-31.84	0.846
	CG	30.43±2.56		0.916	29.50±1.87		0.903	29.43±2.06		0.969
SA (scores)	EG	35.50±8.65	32.74-37.84	0.966	31.07±9.91	29.95-36.55	0.966	28.14±6.70	30.27-35.26	0.954
	CG	35.07±3.36		0.983	35.43±6.76		0.983	37.36±6.03		0.953
AS (scores)	EG	19.21±2.12	18.01-19.28	0.945	22.57±1.70	19.25-20.12	0.874	24.71±1.98	20.81-22.15	0.872
	CG	18.07±0.92		0.874	17.36±1.95		0.933	18.21±1.31		0.788
HiL (scores)	EG	11.93±0.92	11.61-12.39	0.843	12.93±0.73	11.96-12.54	0.821	13.79±0.94	12.89-13.68	0.864
	CG	12.07±1.07		0.937	11.57±0.76		0.735	12.79±0.97		0.794

Notes: MT: Mental toughness; SP: Sports Performance; AR: Athlete Religiosity; SA: Sports Anxiety; AS: Athlete Satisfaction; HiL: Happiness in life; T1: pretest; T2: middle test; T3: posttest; S-W: Shapiro-Wilk; SD: standard deviation; 95% CI: confidence interval.

Table 2

Differences in variable values between experimental group and control group at the pre-test, middle test and post-test stages

Variable	Inter-group differences (EG Vs. CG)			Inter-test-time differences (T1, T2, T3)				
	MD (EG-EC)	*t*	*p*-value	MD (T2-T1)	MD (T3-T1)	MD (T3-T2)	*F*	*p*-value
Mental toughness (scores)	4.071	3.320	0.003	1.214*	3.500*	2.286*	47.994	0.000
Sports performance (scores)	2.048	10.524	0.000	1.179*	2.393*	1.214*	55.197	0.000
Athlete religiosity (scores)	1.381	2.112	0.044	0.857*	1.214*	0.357	4.458	0.045
Sports anxiety (scores)	-4.381	-2.351	0.027	-2.036	-2.536	-0.500	1.220	0.304
Athlete satisfaction (scores)	4.286	8.689	0.000	1.321*	2.821*	1.500*	30.149	0.000
Happiness in life (scores)	0.738	2.895	0.008	0.250	1.286*	1.036*	21.561	0.000

Notes: EG: Experimental Group; CG.: Control Group; MD: Mean Difference; T1: Pretest; T2: Middle test; T3: Posttest; *$p < 0.05$.

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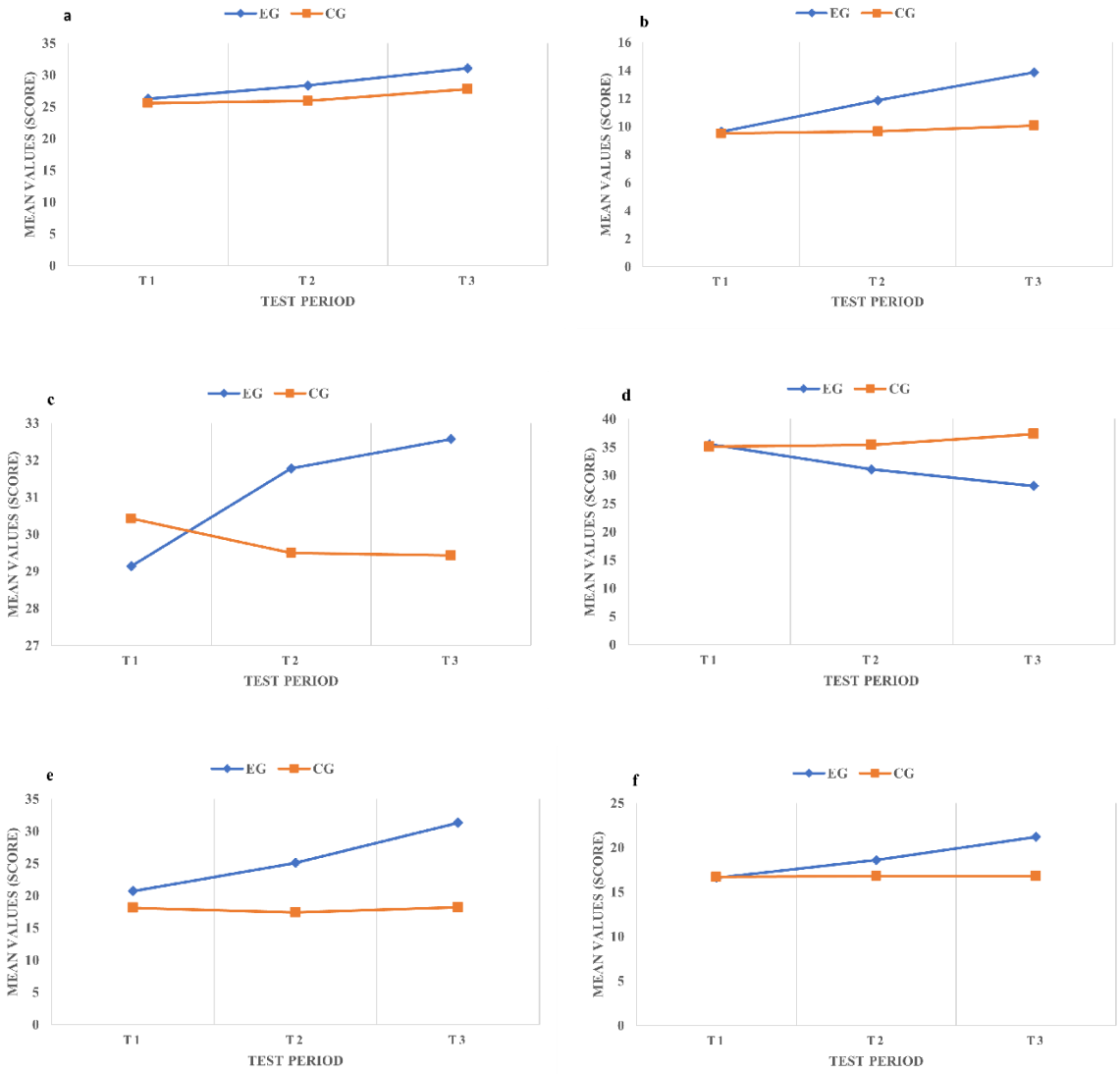

Fig. 3. Mean score differences T1 (pretest), T2 (middle test), and T3 posttest between experimental and control groups: (a) Mental Toughness; (b) Sports performance; (c) Religiosity; (d) Sports anxiety; (e) Satisfaction; (f) Happiness in life

Discussion

This study aims to evaluate the effect of providing athletes with mental training (Mental Toughness Training Circle) on their mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life. The results of the study show that the application of mental training (Mental Toughness Training Circle) has a significant effect on athletes' mental toughness ($t = 3.320$, $p = 0.003$), performance ($t = 10.524$, $p = 0.000$), religiosity ($t = 2.112$, $p = 0.044$), anxiety ($t = -2.351$, $p = 0.027$), satisfaction ($t = 8.689$, $p = 0.000$), and life happiness ($t = 2.895$, $p = 0.008$). The results above show that the proposed research hypothesis is accepted, namely that mental training with Mental Toughness Training Circle has a significant effect on athletes' mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life. This information is new (state of the art) in the context of implementing Mental Toughness Training Circle for college-level athletes. Below we will discuss in depth the findings of this research based on each variable investigated.

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The Effects of Mental Toughness Training Circle on Mental Toughness

The application of mental training (Mental Toughness Training Circle) to athletes has proven to have a significant effect on their mental toughness, so this study confirms the proposition of previous studies [12] which states that Mental Toughness Training Circle is a set of mental training programs that can increase athletes' mental toughness. In addition, the results of this study show that there is an increase in athletes' mental toughness in experimental group between before and after Mental Toughness Training Circle (M_{pre} = 26.29, M_{middle} = 28.38 M_{post} = 31.07). In contrast to the results in experimental group, the average mental toughness score for athletes in contorl group did not increase relatively (Fig. a). This finding is in line with mainstream findings that discuss and provide athletes with mental training. Golby & Wood [5], who provided athletes with mental training found that there was a significant increase in the athlete's mental toughness aspect. The same thing was found by Gucciardi et al [7], who evaluated two different mental training program models and found that athletes who were given mental training had an increase in aspects of mental toughness compared to the control group. Other studies, for example Ragab [10], Mostafa [11], are in line with the results of the study above, namely finding that providing a mental training program increases athletes' mental toughness. In other words, to date, empirical evidence tends to lead to the conclusion that providing athletes with mental training has a positive effect, namely increasing mental toughness.

Although the mental training applied by the researchers above is different from Mental Toughness Training Circle, namely Golby & Wood [5], used The Psychological Skill Training, Gucciardi et al [7], used the Mental Skills Training, Ragab [10], Mostafa [11], used Mental Toughness Training, those researchers used a set of mental training programs. This is in accordance with what is contained in Mental Toughness Training Circle, namely, Mental Toughness Training Circle is a set of mental training programs consisting of 11 mental skills [12]. So, even though there are differences in name and substance between Mental Toughness Training Circle and other mental training models, all of these mental training models contain a series of mental skills that are trained in athletes.

The results of a systematic review and meta-analysis conducted by Stamatis et al [31], show that there is a general belief that mental toughness can be increased by providing intervention in the form of mental training. In other words, mental toughness is a dimension that can be formed and improved in athletes [32]. In this context, we are of the view that mental toughness is something that can go up and down. This is the same as physical aspects (e.g., speed, strength, endurance), namely they can increase if trained and they can decrease if not trained. With such understanding, something that can change can ideally be improved by providing training. When these dimensions receive proper training, these aspects can reach a higher level. In other words, this aspect will increase in quality.

The Effects of Mental Toughness Training Circle on Sports Performance

Through this study, it is proven that the application of Mental Toughness Training Circle mental training has an effect on athletes' sports performance. In addition, the results of this study show that there is an increase in athletes' performance in experimental group between before and after Mental Toughness Training Circle (M_{pre} = 9.64, M_{middle} = 11.86, M_{post} = 13.86). In contrast to the results in experimental group, athletes in control group have a relatively constant average sports performance value (Fig. b). The results of this study are in line with those of the studies conducted by Fournier et al [4], which provided athletes with mental training. In their study, Fournier et al. found that the mental training program given to athletes improved the athlete's performance. Ragab [10], reported the same thing that mental training could improve athlete performance. Research conducted by Röthlin, Horvath, Trösch, Holtforth, & Birrer [33] confirmed the results of this study, namely that there was an effect of providing a mental training program on athlete performance. In their study, Röthlin et al., explain specifically that providing mental training has an effect on several performances, namely physical, technical, and competitive aspects. Practically, in relation to sports performance variables, this study

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is in line with other studies that examine the impact of providing mental training on athlete performance.

However, the performance objects studied between this study and the study above are different. The researchers above [4, 34, 10] measured athletes' performance based on physical aspects, techniques, and competition results, but in our study, sports performance was measured based on athletes' perceptions of his performance as an athlete. However, the Self-Assessment of Athletics Performance that we used in this study is a reliable instrument and has been used to reveal athletes' sports performance variables [18]. For this reason, even though there are differences in how to measure aspects of sports performance between our study and other studies [4, 34, 10], the sports performance that we measure is precisely directly related to psychological aspects. Thus, this will actually strengthen the findings of this study, especially regarding the psychological aspects of athletes.

The basic idea for creating the Mental Toughness Training Circle model is to form athletes' mental toughness [12]. When an athlete's mental toughness becomes better, it is of course expected that the athlete's performance will increase and optimal performance can be achieved. Thus, it can be said that increasing athletes' mental toughness is a short-term target, while the long-term target of providing Mental Toughness Training Circle model mental training is related to improving athlete performance and achievement. This is logical considering that in competitive sports, achieving achievement or winning is one of the athlete's main goals and this goal can be achieved when the athlete is able to display his best performance on the field. We are of the view that peak performance can emerge when athletes have mental toughness. This is in accordance with what American professional tennis player, Alexandra Stevenson, said that mental toughness was 90 percent of the game.

The Effect of Mental Toughness Training Circle on Athlete Religiosity

In terms of the relationship between mental training (Mental Toughness Training Circle) and athlete religiosity, this study proves that there is a significant effect of providing mental training (Mental Toughness Training Circle) on athlete religiosity. In addition, the results of this study showed that there was an increase in athlete religiosity in experimental group between before and after Mental Toughness Training Circle (M_{pre} = 29.14, M_{middle} = 29.50, M_{post} = 32.57). In contrast to the results in experimental group, athletes in control group have a relatively constant average score of religiosity (Fig. c). Even though studies related to psychology, sports, and religiosity are increasing [22], as far as we know, there are no studies that have investigated the impact of mental training on athlete religiosity. So far, studies on aspects of athlete religiosity have mostly been linked to sports injuries and mental health, stress levels, alcohol and drug use [35].

On the other hand, there is evidence that religiosity is believed to be an important aspect and is related to athletes' performance and achievements on the field [22] and even plays an important role in athletes' lives. The research results show that athletes' religiosity positively contributes to their performance and achievement [36]. Religiosity was identified as an important factor in improving athlete performance on the field [36]. Scientists see that athletes who have high religiosity tend to believe in the role of God in their lives, including in competitions [22]. From the athlete's own perspective, they believe that the aspect of religiosity is very important in relation to their career and achievements [36].

Therefore, the Mental Toughness Training Circle model attempts to include things related to aspects of religiosity in the mental training process. As is known, in the Mental Toughness Training Circle model, the introduction section begins with "Pray" [12]. This means that every mental training begins with an invitation to athletes to pray first [14]. The prayer offered is said verbally so that all athletes can hear it. Apart from that, this prayer is also directed at achieving the targets of the training given. In addition, the mental training (Mental Toughness Training Circle) ends with a prayer. With these facts, it is not surprising that providing Mental Toughness Training Circle has an effect on the athlete's religiosity level.

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The Effect of Mental Toughness Training Circle on Sports Anxiety

Mental Toughness Training Circle given to athletes has been shown to have an effect on their anxiety levels. The athletes in experimental group appeared to experience a decrease in anxiety levels compared to those in CG (M_{pre} = 35.50, M_{middle} = 31.07, M_{post} = 28.14). In contrast to the results in experimental group, the athletes in control group had a relatively increasing trend in anxiety levels (Fig. d). In other words, providing Mental Toughness Training Circle mental training can reduce negative emotions or anxiety in athletes. The findings of this study confirm other research [37], which found that mental training in athletes had an effect on athletes' anxiety levels. It was further stated that, on the one hand, mental training reduced anxiety levels (cognitive and somatic) but, on the other hand, increased athletes' self-confidence [37].

Anxiety is believed to be a determining factor in relation to performance and match results on the field [38]. Unfortunately, one of the problems that athletes often face on the field is the emergence of excessive feelings of anxiety [39], and athletes often worry about this. Therefore, in the Mental Toughness Training Circle model, several skills related to techniques for dealing with anxiety are trained in athletes. Thus, when athletes are given Mental Toughness Training Circle mental training, it is expected that problems related to anxiety, ideally, can be managed well and will no longer be a problem. This means that providing Mental Toughness Training Circle directly improves the quality of mental toughness in athletes and on the other hand, athletes can manage anxiety better. We believe that when managed well, anxiety will become a construct that has a positive impact on athlete performance and achievement. Athletes with moderate levels of anxiety tend to perform better than those with high or low levels of anxiety [40].

In the Mental Toughness Training Circle model, skills that are specifically developed in athletes and that are related to the anxiety dimension are called managing anxiety (Fig. 1). These mental skills (managing anxiety) in Mental Toughness Training Circle are at the final stage or what is called pre-competitive [12]. In other words, the provision of skills training is carried out after the athlete has acquired the five mental skills in the general preparatory phase and the four skills in the specific preparatory phase [12, 14]. We consider the skills in the general preparatory and specific preparatory phases to be a solution to overcoming and managing anxiety well. For example, breathing, relaxation, and self-talk skills can be appropriate techniques to reduce anxiety when athletes experience high anxiety before a match.

The Effect of Mental Toughness Training Circle on Athlete Satisfaction

This research proves that providing Mental Toughness Training Circle mental training to athletes has an effect on athlete satisfaction. The satisfaction expressed through the Social Validation Questionnaire is athlete satisfaction with the mental training carried out and the results they experience [7]. In this context, satisfaction refers to the Mental Toughness Training Circle application. This aspect (satisfaction), is still rarely investigated by scientists. That is why, Vealey [41], suggests that in mental training evaluation studies, it is necessary to reveal several constructs such as satisfaction, enjoyment, and athlete attitudes.

Apart from that, the results of this study showed that there was an increase in athlete satisfaction between before and after Mental Toughness Training Circle model mental training (M_{pre} = 19.21, M_{middle} = 22.57, M_{post} = 24.71). In contrast to the results in experimental group, athletes in control group's average satisfaction score with the mental training program remained relatively unchanged (Fig. e). This indicates that the series of mental exercises in Mental Toughness Training Circle are perceived positively by athletes. If we analyze the mental training program in Mental Toughness Training Circle, the program is packaged in three phases, namely, education, training, and habituation. This is in accordance with what was stated by Guntoro et al [14], that the philosophy of the Mental Toughness Training Circle mental training model uses an educational and not clinical approach. The terms philosophy and approach here refer to the explanations and divisions made by Vealey [41]. Apart from that, Röthlin et al [33], state that providing mental training programs to athletes is more appropriately directed at an

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educational approach because this approach focuses on developing various skills that athletes need to support their performance. By considering the opinion of Röthlin et al., above, the educational approach in Mental Toughness Training Circle is seen as appropriate because Mental Toughness Training Circle contains a series of mental skills that are trained in athletes.

In the education phase, the mental training material at Mental Toughness Training Circle is delivered using presentation and discussion methods by researchers. Delivery of material was carried out using text and visual media and video. In this way, it is expected that Mental Toughness Training Circle mental training will become more interesting and athletes will not get bored with the series of mental exercises in Mental Toughness Training Circle. Apart from the education phase, in Mental Toughness Training Circle, there is also a practice phase, namely athletes practice the mental skills they are trained in [12, 14]. So, athletes not only receive information or knowledge from researchers regarding Mental Toughness Training Circle mental training, but they also immediately try to put into practice what they learn. Apart from that, in Mental Toughness Training Circle, athletes are also given time to get used to it by practicing independently on what they have been trained for. Practically, with a series of methods like that, it is not surprising that this study proves that athletes who receive training using the Mental Toughness Training Circle model feel satisfied.

The Effect of Mental Toughness Training Circle on Happiness in Life

The sixth dependent variable investigated in this study is the athlete's happiness in life and this study proves that the application of Mental Toughness Training Circle model mental training has an effect on it. Apart from that, the results of this study inform that athletes in experimental group experienced an increase in happiness in life before being given Mental Toughness Training Circle mental training and after (M_{pre} = 11.93, M_{middle} = 12.93, M_{post} = 13.79). In contrast to the results in experimental group, athletes in control group have a relatively constant average value of happiness in life (Fig. f). Investigating the dimensions of athlete happiness is an important issue in the context of evaluating mental training in athletes and this is in line with Vealey's suggestion [41].

Experts believe that the dimensions of happiness contribute to athlete performance and achievement [42, 43]. When athletes have positive feelings (happiness), peak performance will be easier to achieve. That is why there is evidence showing that athletes will be able to show their best performance when they have positive (happy) feelings [42]. Apart from that, other research also shows that the happiness of athletes who win appears to be higher than that of those who lose when measured before the match [22]. This indicates that the dimension of happiness is an important factor in its relationship to athlete performance and achievement. Even though we found a positive effect of implementing Mental Toughness Training Circle on athletes' happiness, we believe that the dimensions of happiness are affected by many aspects. For example, a study conducted by Guntoro & Putra [22], proves that religiosity and anxiety contribute to athletes' happiness. A lot of research carried out in Indonesia showed that, compared to the inactive group, individuals who did physical activity regularly had a better ability to manage stress and had higher life happiness. Apart from that, we think that the availability of sports facilities of national to international standards after the implementation of the National Sports Week in Papua [44], has contributed to the emergence of a sense of happiness among the athletes because they can train and make use of these facilities.

The finding which shows a significant effect on the happiness dimension is in line with the findings on the athlete satisfaction construct. Although happiness in life in this study was measured with an instrument that measures happiness in life in general [26], while satisfaction was measured with a specific measuring instrument that measures the dimension of satisfaction with mental training [7], this makes sense considering that satisfaction and happiness are psychological dimensions related to positive emotional feelings. With these facts, this study shows us that Mental Toughness Training Circle mental training has a positive effect on positive emotional conditions (satisfaction and happiness) and on the other hand reduces the level of negative emotions (anxiety) in athletes. This indicates that the Mental

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Toughness Training Circle model is appropriate to be applied and used more widely, namely not only for athletes but also for non-athletes.

Limitations and Implications for Future Research

Even though this research has been carried out very rigorously, we see that there are limitations in this study. First, this study involved only sports student-athletes at the first level/semester, while athletes in other levels and categories (e.g., youth athletes, intermediate or final student-athletes, elite and non-elite athletes, and non-athletes) were not included in this study. With these facts, the results of this study are still a mystery regarding their effect on athletes at different levels and categories from the subjects in this study. Second, although this study has attempted to investigate six dependent variables as the impact of providing Mental Toughness Training Circle mental training, we see that there are other important variables that have not been investigated, for example, achievements on the field and academic achievements of athletes. We see this issue as very important because it relates to achievement, both on the field and outside the field (academic). In addition, physical and technical aspects were not investigated in this study.

Based on the findings of this study and its limitations, we suggest that future research should test Mental Toughness Training Circle at various levels of research subjects (e.g., elite and non-elite athletes) as well as various categories (e.g., teen-age athletes, students, and adults, and non-athletes) and adding physical variables [45] and technique. Therefore, the results of this study will be confirmed in different and broad contexts, whether the results of other studies are still in line with this study or vice versa. In addition, future investigations also need to consider aspects of athlete performance [46], both on the field and academic performance at school. It also applies to non-athletes that their work performance in their workplace needs to be investigated. With a more comprehensive and in-depth investigation, the reliability of Mental Toughness Training Circle as a set of mental training models will be further proven. When deficiencies or weaknesses are found in the application of Mental Toughness Training Circle in the field, the model needs to be improved so that studies in the discipline of sports psychology, especially those related to mental training, can develop and move forward. In addition, we also suggest that future studies test the application of Mental Toughness Training Circle with other mental training models, for example: Psychological Skill Training [4, 5, 6], Mental Skills Training [7, 8], Mental Toughness Training [9], and Mental Toughness Training [10, 11]. By testing Mental Toughness Training Circle with other mental training models, it will be possible to determine differences in the effectiveness of these models in improving aspects of mental toughness, performance, and other variables investigated.

Conclusions

Evaluation of the Mental Toughness Training Circle mental training program shows that the implementation of Mental Toughness Training Circle has a significant effect on athletes' mental toughness, performance, religiosity, anxiety, satisfaction, and happiness in life. Athletes in the experimental group responded with satisfaction with the provision of the Mental Toughness Training Circle mental training program as evidenced by a significant increase in satisfaction scores in the trial group (M_{pre} = 19.21, M_{middle} = 22.57, M_{post} = 24.71, $p < .001$). The high level of athlete satisfaction with the implementation of Mental Toughness Training Circle indicates that the model is well received by student athletes. Apart from that, this study also shows that a set of mental training programs in Mental Toughness Training Circle can increase positive emotional dimensions (mental toughness, performance, religiosity, satisfaction, and happiness) and reduce negative emotions (anxiety) in athletes. In other words, Mental Toughness Training Circle is a set of mental training programs that are effective in increasing positive emotions and reducing negative emotions in athletes. With these results, the implication of this study is that the Mental Toughness Training Circle mental training model can be used by athletic trainers and mental coaches to improve the quality of athletes, especially in psychological or mental aspects.

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Conflict of interest

The authors declare that there is no conflict of interest.

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