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Influence of martial art on self efficacy and attention time span in adults: Systematic review

Riya Agrawal and Dr. Pradeep Borkar

Abstract

Aim: To review effect of martial art on self-efficacy and attention time span in adults:-systematic review.

Objective: To explore what research suggest on the concept of martial art and its effect on self-efficacy and attention span in adults of age 18-40 years.

Material and Method: Relevant studies were included from the period of 2010 to 2021 via PubMed, Cochrane and Google Scholar. Eligibility criteria-Studies were viewed as eligible for inclusion in the systematic review if they met the following criteria: Full text article, Articles which are published in last 10 years, Systematic reviews, Cross-sectional studies, Observational studies, Population included both genders, Include age group 18-40 years.

Results: Martial art appeared to have positive effects on self-efficacy and attention time span in some adults. Conclusion: It was concluded that martial art proves to be beneficial for improving self-efficacy and attention time span in adults.

Keywords: martial arts, attention, self-efficacy, cognitive function

Introduction

Martial art is a general phrase used to describe combat arts while simultaneously emphasis on health and philosophical development to fight or war and martial arts is simplistic and lacks reference to the health and philosophical dimensions. It contains internal and external philosophies in which internal philosophies include values such as sporting character, honour, responsibility, pacifism, nationalism, sacrifice, civic responsibility and, external philosophies include religions and ethical systems^[1].

Kalarippayattu is a twentieth-century term for a distinct martial arts practice found in movies, literature and, the historical awareness of Keralites the southernmost state of India^[2].

In a wide variety of countries and region such as China, India, Israel, Brazil, Africa, Europe, Korean and mainly Japan, has variations of martial art styles.

Nowadays Martial Art is mainly used for self-improvement, but in ancient times it was used for self-defence. In the world, more than 100 million people are practicing various forms of martial arts that have been studied for various reasons including fitness, sports, self-defence, combat skills, self-cultivation (meditation), mental discipline, and alternative therapy for a medical condition^[3]. Martial art has proven to have psychological benefits and improve health and fitness and is also used in the management and rehabilitation of chronic conditions such as Parkinson's disease and reducing risk factors in the elderly^[4].

Martial art includes hundreds of other popular styles such as kalarippayattu, aikido, judo, karate, Kungfu, taekwondo, mixed martial art, and taichi. Meditation and martial arts are integrative minds and body training are known to enhance attention tasks^[5]. Fundamental to achieving our goal is to focus attentionally on a task to avoid distraction, By the coordinated activation, attention and control are achieved. Due to martial art among children and adolescent's development in terms of cognitive and behavioural improvement^[6]. In many adults with attention defect hyperactive disorder (ADHD) may find it difficult to focus and inability to control impulses, the prevalence of adult ADHD was estimated that males are generally more likely to be diagnosed with ADHD as compared with female's ratio of approximately (4:1). It has also been proved that martial art has a positive effect on improvement in ADHD symptoms^[7].

By increasing the crime rate against women in India self-defence is important. In a disagreeable scenario, it gives you consciousness and confidence to back yourself and that's the main reason for training the majority of those enrol up in martial art. According to well-known psychologists & education experts, self-efficacy plays important role in a person's understanding of different situations, and responsibility towards them. It plays a role in goals, challenges, and. In other words, it is a strong potential to assemble the cognitional, social, emotional, and behavioural skills of people to realize different goals (Bandura,1991). to sustained self-esteem and self-concept exercises creates an opportunity to self- estimate, relationship, and comparison with peers and safe competition. According to Albert Bandura Perceived, self-efficacy refers to an individual's faith about their ability to be successful in a task ^[8].

Self-efficacy and increases the choice of activities where a person participates influences the level of effort the athlete puts forth. The positive expectation in terms of sports performance leads to a high level of self-efficacy and that overcome psychological obstacles. To increase the chances of survival against violence which is faced by everyone, martial arts training provides necessary skills. For the safety and avoidance of risk, students learn and practice martial art ^[9].

2. Materials and Methods

2.1 Design

This systematic review was performed in accordance with Preferred Reporting items for Systematic Review and Meta-Analysis(PRISMA) shown in flow chat 1.

Registration- Nil

Ethical clearance exempted-IEC NO:BPT/INT/2020/02
Pravara institute of medical sciences Ioni, Maharashtra.
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2.2 Eligibility criteria

Studies which include full text articles, articles which are published in last 10 years, systematic reviews, cross-sectional

studies, observational studies, Population including both genders of age group 18-40 years.

2.3 Exclusion criteria

Studies which include Case reports, studies which have only abstracted, articles which are published prior 2009, studies which did not present specific percentage of injuries and Duplicate article.

2.4 Information sources

For the purpose of identifying relevant studies, as systematic review of literature was performed using the following database: PubMed, Google scholar Cochrane library. The literature search was conducted by two investigators independently.

2.5 Search strategy

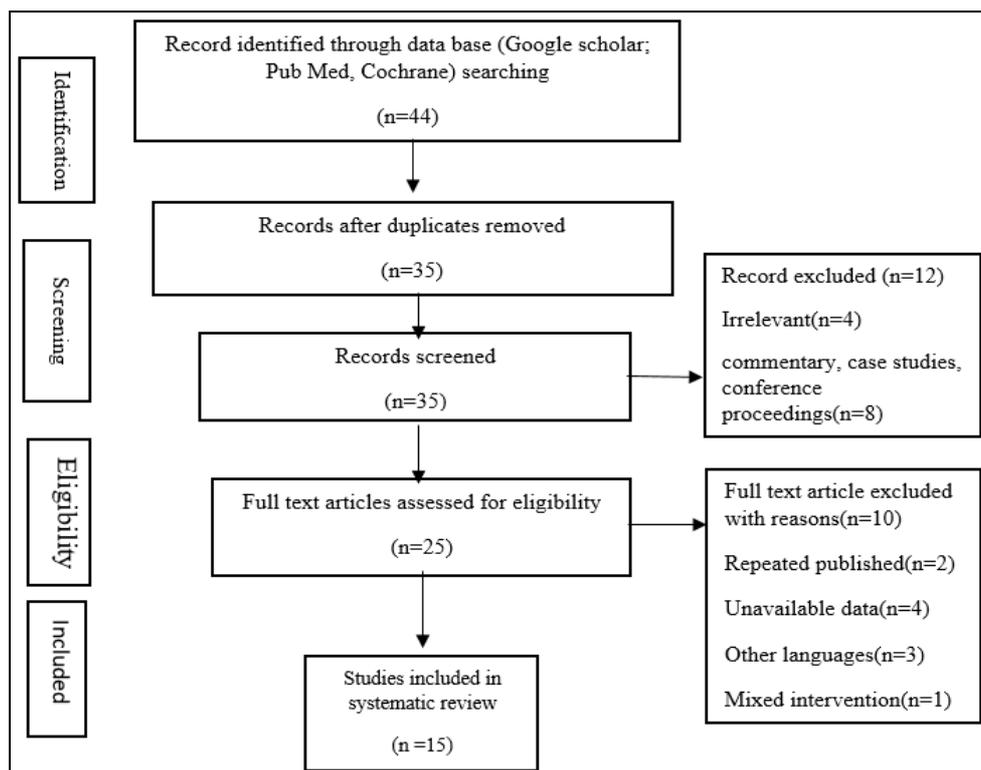
The following search terms were used-Martial art, attention, self -efficacy, cognitive function, psychology.

2.6 Study Selection and Data Extraction

We independently performed the initial selection for eligibility based in titles and abstract related to martial art training on attention and self-efficacy. Of the 40 records, we screened 35 abstracts after excluding duplicates. We excluded 12 records, among these 4 were irrelevant and another 8 articles included commentary, case studies, and conference proceedings. Two reviewers extracted data and assessed the trail quality of each study independently.

2.7 Study characteristics and outcome data

Each included trial was extracted with our data extraction form, which included (1) First author (2) year of publication (3) country (4) participant characteristics (age, sample size) (5) intervention protocol (Duration and type of martial art) (6) outcome measure, main results, and conclusion. results and primary outcome and author's conclusion shown in table no.1.



Flow chart 1: Flow diagram for studies included in the review (n=number of article)

Table 1: Summary of included studies

Sr. No	Title	Author	Year	Country	Sample	Dose (wks)	Outcome domain	Outcome measure	Result	Conclusion
1	Differences between Judo, Taekwondo and Kung-fu Athletes in Sustained Attention and Impulse Control	"Javier Sánchez-López <i>et al.</i>	June 19th, 2013	México	N=20, mean age 22yr-30yr	21.6 min	Attention	Test of Variables of Attention (TOVA) was performed, and data for the standard and Z scores of the quarters, halves and totals of each variable were analyzed	differences in the variables of attention between martial arts disciplines.	Kung-fu training improves attention ability more than the other two disciplines, and this effect can be explained by the greater dedication demanded by kung-fu training
2	Martial Art Training and Cognitive Performance in Middle-Aged Adults	Peter Douris, Christopher Douris <i>et al.</i>	2015	New York	4 women/6 men (mean age = 53.5 ± 8.6 years)	1 week	Attention	Stroop test, Word test	The improvement in executive function may be due to the increased cortical demand required by the more complex, coordinated motor tasks of martial art exercise compared to the more repetitive actions of walking.	the role of challenging complex movement types of physical activity on acutely improving cognitive performance in the aging adult other types of physical activities that involve complex movement patterns in all age groups.
3	Effect of Taekwondo Practice on Cognitive Function in Adolescents with Attention Deficit Hyperactivity Disorder	Abdelmotale b Kadri, Maamer Slimani	12-01-2019	Italy	36M/4F age = 14.5 ± 3.5 years	1 1/2 yr.	Attention	the Stroop and the Ruff 2 and 7 tests	Comparisons between the TKD group and the control group on pre-test measures did not reveal any statistically significant differences in attention performance.	the present study showed that TKD practice may increase selective attention of adolescents with ADHD
4	The effect of martial arts training on mental health outcomes: A systematic review and meta-analysis	Brian Moore <i>et al.</i>	07-Jun-20	Australia	9-75 years.	-	Mental Health	-	The effect size is the standardized mean difference the effects of martial arts training on internalizing mental health issues.	martial arts training as an efficacious sports-based mental health intervention for improving wellbeing and reducing symptoms associated with internalizing mental health.
5	Health benefits of hard martial arts in adults: a systematic review	Sandra Origua Rios, Jennifer Marks <i>et al.</i>	21-Nov-17	Spain	Above 18	-	cognitive function	-	Hard martial arts training appears to help balance and postural control, and has positive effects on cognitive function and psychological health	Positive effects were reported among young, middle-aged and older adults who were not previously involved in martial arts training
6	The effect of martial arts training on attentional network in typical adults	Ashleigh Johnstone and Paloma Mari-Beffa	08-02-2018	Isreal	N=48 (mean age = 19.63-19.68)	3-6 month	Attention	Attention Network Test	An effect of Martial Arts experience was found on the Alert network. Martial Artists showed improved performance when alert had to be sustained endogenously	interpreted in the context of the impact of training a particular attentional state in specific neurocognitive pathways
7	A Comparison study of Self concept and Self efficacy in Martial arts and non Martial arts Athletics in Iran	Allahkaram Pouladei Reishehrei Akbar pouladei Reishehrei	2013	Iran	N=357(20-31 year)	2 months	Self-Efficacy	athletic self- efficacy, self-concept tests	The results showed that there was a significant relationship between confidence and martial arts. Also, there was a significant difference between physical confidence of martial	martial arts can increase readiness and the ability of persons for more self-confidence. Therefore, the martial arts from psychological view are critical and important
8	Effects of Tai Chi on Self- Efficacy: A Systematic Review	Yingge Tong,Ling Chai, Song Lei, Miaomiao Liu, and Lei Yang	15 August 2018	China			Self-Efficacy	-	Tai Chi appears to be associated with improvements in self-efficacy	Tai Chi appears to effectively improve self- efficacy among participants with various diseases and across several populations
9	The beneficial effect of	Xueming Bao,	2015	China	N=160	1 year	self-		suggest that the Tai Chi intervention	Tai

	Tai Chi on self- concept in adolescents	and Kaimin Jin			(14.74 years)		Efficacy and attention	PHSCS scale	could improve self- concept in adolescents.	Chi could be useful as an alternative form of exercise to improve adolescents' perceptions of their cognitive image of themselves.
10	How weight regulation may influence self-efficacy in mixed martial arts athletes	Sungjun Park	01-08-2019	United State	N=51 males and 7 females age = 27.17	10-15 min	Self-efficacy	SREASS, MMA- CSES, PSE- MW	Athletes who were more capable of maintaining self-control in times of distress, anxiousness, and irritability were more likely to feel confident to be able to make weight and perform.	Self-regulation is a necessary process for adequately performing weight-regulation.
11	Self-efficacy and performance of the roundhouse kick in taekwondo	Isaac ESTEVAN, Octavio ÁLVAREZ, <i>et al.</i>	16/07/2014	Spain	43 (33 male and 10 female) (M = 24.4	3 hours/wk.	Self-efficacy	The Physical (PSE) and Specific (RKSES) self- efficacy scales	The specific self-efficacy scale has high reliability and is able to predict sport performance in males and females.	Females perceived capable to improve total response time explaining a high percentage of the mentioned performance variable
12	Self-Défense Training and Traditional Martial Arts: Influences on Self-Efficacy and Fear Related to Sexual Victimization	Kimberly Ball and Jeffrey Martin	14-11-2011	United State	(N - 69)[M] - 26.3	8-week	Self-efficacy	Multidimensional Self-Efficacy, Multidimensional Fear Scale, Marlowe Crowne Social Desirability Scale	results provided some support for the value of MSDT interventions in helping women become more confident and less fearful of sexual victimization.	curtailment of violence against women should involve both avenues for substantive change
13	The Effects of Tai Chi on Depression, Anxiety, and Psychological Well-Being: A Systematic Review and Meta- Analysis	Fang Wang & Eun- Kyoung Othelia Lee & Taixiang Wu et.al	28-sept-2014	China	18-65 yr.	-	Self-efficacy	-	The studies in this review demonstrated that tai chi interventions have beneficial effects for various populations on a range of psychological well-being measures, including depression, anxiety, general stress management, and exercise self-efficacy	efficacy of tai chi in improving psychological well-being and its potential to be used in interventions for populations with various clinical conditions.
14	Martial Arts "Kendo" and the Motivation Network During Attention Processing: An fMRI Study	Hironobu Fujiwara, Tsukasa Ueno, Sayaka Yoshimura et al	22-May-2019	United state	N=25	-	Attention	The International Physical Activity Questionnaire, fMRI acquisition	motivation network integrity at rest together with enhanced motivation network integrity during attentional demands might underlie the instantaneous concentration abilities of KPs.	the motivation network at resting state and the enhanced ones during the attentional task in KPs are indicative of a difference between KPs and NKPs in terms of motivational drive in attention processing.
15	Cognitive and personality factors in the regular practice of martial arts	Rosa A. FA BIO, Giulia E. TOWEY	2018 June	Italy	N.=146; age years M =14.88, SD =6.21) male (N.=107;) and female (N.=39)	1>7 years	Attention, Self-Efficacy	Raven's Advanced Progressive Matrices (APM), Colored Progressive Matrices, Trail Making Test, Torrance Test of Creative Thinking (TTCT) and Alternative Uses Task (AUT).	An effect of Martial Arts experience was found on the Alert network. Martial Artists showed improved performance when alert had to be sustained endogenously	Regular practice of martial arts can influence many functional aspects, leading to positive effects on both personality and cognitive factors, with implications in psychological well-being

3.Result

3.1.Study Description: After applying our inclusion and exclusion criteria to 44 articles, 12 articles are excluded and 4 were irrelevant, 8 were another type of publication such as a survey, case study, conference proceeding, or commentary. Finally, we retrieved n=25 full-text articles for detailed evaluation, and n=10 studies were eliminated as they repeat publications (n=2), were in other languages (n=3), or had unavailable data (n=4) or their intervention did not meet the inclusion criteria for a systematic review (n=1). Therefore, 15 studies in total were identified for analysis.

3.2. Study and intervention characteristics: This research includes 15 studies, Year of publication of the included study ranged from 2011-2020. These studies captured data from 969 participants and an age group 18-40 years of both genders across nine different countries. Theoretical frameworks included theories of attention, self-efficacy, mental health cognitive control, models of self-concept, and social learning theory. Martial art sessions varied in different studies, lasting from 21 minutes to 3 hours the frequency of intervention was one to eight weeks.

3.3 Effect of martial arts on attention: We reviewed 7 studies examining the effect of martial arts on attention. The study adopted Kungfu, taekwondo, hard martial art, mixed martial art, kendo, Duration of martial art intervention ranged from 21 min to 1 year. The outcomes of the seven studies were different. The first was carried out in Mexico, and the results indicate that there are variations in attention variables between martial arts disciplines. Kung-fu training increases focus capacity more than the other two disciplines, which can be explained by the fact that kung-fu training needs more focus ^[4]. Two systematic studies looked at martial arts preparation as an effective sports-based mental health intervention for improving wellbeing and minimizing symptoms related to internalizing mental health. Hard martial arts training appears to help balance and postural control and has positive effects on cognitive function and psychological health. The effect of taekwondo was studied in Italy, and the results indicate that taekwondo practice can help adolescents with ADHD improve their selective attention ^[1, 4]. Three studies in which a combination of various forms of martial art is given was conducted in New York, Spain, and Italy findings studies within this review show that The more complex, coordinated motor practices of martial art exercise require more cortical demand than the more repetitive actions of walking, which may explain the change in executive function ^[15]. The Alert network was found to have a Martial Arts impact ^[10]. On the Warning network, a Martial Arts impact was discovered. When alertness had to be maintained endogenously, martial artists performed better ^[14].

3.4 Effect of martial arts on self-Efficacy: Eight studies evaluated the effect of martial arts on self-efficacy. The study adopted mixed martial arts, tai chi, taekwondo, kendo, and a combination of various forms of martial arts. Research carried out in Iran, China, Spain, United States, and Italy. Duration of martial arts intervention ranged from 15min-7 years. In this review, three studies practice a combination of martial arts. The result reveals that there was a significant relationship between confidence and martial arts. Also, there was a significant difference between physical confidence of martial ^[13]. When alertness had to be maintained endogenously, martial artists performed better. the value of MSDT

interventions in helping women become more confident and less fearful of sexual victimization. There was a strong connection between self-assurance and martial arts. There was also a major difference in martial artists' physical confidence ^[8]. In this study, one systematic study is reviewed that Tai Chi appears to effectively improve self-efficacy among participants with various diseases and across several populations ^[16, 19]. One study reviewed the effect of tai-chi they suggested that Tai Chi intervention could improve self-concept in adolescents. Tai-Chi could be useful as an alternative form of exercise to improve adolescent's perceptions of their cognitive image of themselves ^[17]. Taekwondo practice measure: roundhouse kick The Physical Self-Efficacy Scale (PSE) and the Specific Self-Efficacy Scale (RKSES) are two self-efficacy scales. The specific self-efficacy scale has a high level of reliability and can predict male and female sports performance. Mixed martial arts can affect self-efficacy. Athletes who were better at maintaining self-control in the face of tension, anxiety, and irritability ^[8].

4. Discussion

This systematic review has been carried out and conducted to summarize and update the readers on studies that have investigated the effects of martial arts on self-efficacy and attention time span in adults.

Summary of Review- Martial arts participation has risen in recent years all over the world, especially among youth. For millions of practitioners, martial arts offer beneficial and meaningful exercise. Better physical health, concentration, self-efficacy, equilibrium, and a better sense of psychological wellness are all advantages of this practice ^[21].

Improvements in the attentional network have been linked to martial arts. This appears to be a significant benefit that increases endogenous level preparing for uncertain aims ^[10]. Because the ability to assign attention is so important in sports, it's fair to assume that athletes improve their ability to modulate attention. Skilled athletes in sports that require rapid changes in visual input, for example, may be able to improve their ability to modulate attention to concentrate their attention more effectively than others who do not participate in similar activities ^[20].

Recent results of enhanced excitability of the corticospinal motor system in Karate athletes support only a few interpretations. The Karate group had higher excitability, as shown by faster reaction times to targets in the variable interval, according to the researchers. This team's results also observed motor cortex excitability in Taekwondo athletes ^[25], implying that this phenomenon could be found in other forms of Martial Arts ^[23, 24].

Perceived self-efficacy refers to one's confidence in one's ability to achieve a certain level of success ^[13]. The current study examined the effect of martial art practice on self-efficacy, which can impact performance as well as how we see ourselves and our abilities, consistent with the observations that long-term practice leads to positive psychological benefits ^[20].

Effects of attention were assessed in seven studies with positive effects, Executive cognitive performance was improved in experienced Soo Bahk do participants, and taekwondo practice improved response time, motor time, and processing speed. Mu karate and judo participants had a quicker response time to peripheral visual input than non-athletes, as well as a delay in dynamic visual acuity decline ^[4]. To prevent cognitive decline that occurs with age by training in hard martial arts. The difficulty of the motor patterns

performed in the training programs, which require participants to change directions and demand memorization, focus, and attention, were due to the effects, resulting in increased blood flow and relaxation to the brain areas involved in cognitive function [26]. Kung-fu training characteristics boost attentional ability more than judo and taekwondo training. This influence may be attributed to kung-fu training's higher level of dedication, as well as the martial art's promotion of discipline, self-control, and meditation. When meditators are compared to non-meditators, the prefrontal cortex and anterior cingulate cortex display increased potential for self-regulation and emotional activation. As a result, this brain stimulation pattern has been linked to self-control [14]. Martial art classes were successful in improving the higher cognitive mechanism of executive function, likely because the dynamic, synchronized motor demands of martial art require more cortical recruitment than the more routine acts of walking. It has been documented that as the complexity of movement patterns increases, so does regional cerebral blood flow. As a result, the martial arts lessons may have resulted in enhanced prefrontal blood flow to the executive function areas of the brain [15]. Taekwondo training demanded more attention than standard physical education. As a consequence, it's important to note that TKD is a sophisticated activity that includes both physical and mental elements and leads to body, mind, and spirit balance and harmony. Adolescents with ADHD have higher levels of attention as a result of this factor. Also, TKD training may increase brain activity and functional connectivity which explained the improvement of cognitive function [11]. The benefits of these sports can be interpreted according to theories claiming that regular activity has a positive effect on some aspects of brain functions and cognition. There is an increasing number of studies that examine the relationship between regular physical activity, brain development, and functioning in childhood and adulthood. In particular, recent neuropsychological research, that has specifically analysed the effects of martial arts practice on different cognitive abilities (e.g., attention), referred to differences in the neural mechanisms during controlled attention, which may be directly influenced by sport expertise [20].

Within this review, martial arts have been shown to have various effects on self-efficacy. Positive effects were reported in 8 studies among adults who were not previously involved in martial arts training. Evidence suggests that self-efficacy assumptions regarding one's ability to perform various behaviors, as well as whether or not one performs these behaviors, are strong predictors (Bandura, 1991). According to t-test results, the disparity between the average self-efficacy score of martial arts and non-martial arts athletes is significant ($P < 0.04$). As a result, by comparing the average self-efficacy scores of martial arts and non-martial arts athletes, we can conclude that martial arts athletes have higher self-efficacy than non-martial arts athletes [13]. Individuals enhance self-efficacy by relying on four sources of knowledge, according to the theory: mastery encounters, vicarious learning, verbal or social persuasion, and physiological and affective states. Two of the 15 studies found that Tai Chi improved self-efficacy by providing mastery opportunities, vicarious learning, verbal or social persuasion, and physiological and psychological benefits. Two other research found that Tai Chi gave participants a sense of mastery and improved their interest in their ability to control their symptoms [16]. The Tai Chi group yielded significant gains over time in some specific subdomains of

self-concept. Empirical evidence suggests that older adults showed increased levels of global self-esteem after a 6-month Tai Chi program. Older adults who practice Tai Chi regularly have also demonstrated improvements in cognitive function including cognitive ability and life satisfaction among older adults [17]. Mixed Martial Art athletes who were confident in controlling their eating behaviors in times of distress, anxiousness, irritability, and depression (i.e., negative affect) MMA athletes in this study the subscale "negative effect" and self-efficacy to control weight had a significant positive relationship. MMA athletes may also have been able to regulate their emotional state (i.e., negative affect), which served as a source of self-efficacy to facilitate their efficacy beliefs to regulate weight (i.e., cognitive self-efficacy) [18]. In terms of the relationship between self-efficacy and success, the findings seem to support Bandura's (1997) assertion that self-efficacy is linked to athletic performance. It also claimed that self-efficacy is linked to athletic performance. Task-specific self-efficacy predicts individual success better than general self-efficacy. As a result, the practical implications of these findings point to the value of key psychological factor preparation for taekwondo athletes to enhance their success. Since, from a psychological perspective, if the male taekwondo athletes in this study want to enhance impact forces in the roundhouse kick, training should focus on improving their self-efficacy for increasing their flexed knee and managing their lower limb fall, that is, it should focus on technical aspects by working on intensifying specific procedures in that area, it should focus on technical aspects by working on intensifying specific procedures in that area. Female taekwondo athletes should be taught how to assess their own response time and how to enhance it by focusing on execution and reaction time [4]. The life-threatening fear-reduction benefits of MSDT programs. The finding that fear was decreased is consistent with SCT, given the correlation between fear and anxiety, and the reciprocal association between self-efficacy and anxiety. We also anticipated that self-defence skill development in both TMA and MSDT would not only enhance self-defence self-efficacy and reduce fear but that conceptually similar efficacy cognitions would also be affected. The various domains of self-efficacy were enhanced such as ones their intervention focused on (assertiveness and coping efficacy) and skills related to efficacy that was not directly addressed, (sport self-efficacy) [11]. Mind-body interventions such as Tai chi are effective for a variety of populations in terms of depression, anxiety, general stress management, and exercise self-efficacy. There are increasing scientific reports on the health benefits of mind-body practices such as qigong and tai chi. The findings from this study may prompt health care providers, particularly mental health professionals, to consider integrating tai chi as part of the available treatment [19].

5. Conclusion

After comparing the study done by respective authors it is concluded that martial art proves to be beneficial for improving self-efficacy and attention time span in adults.

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