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ORIGINAL

EXPLORING THE ROLE OF TRADITIONAL MARTIAL ARTS IN ENHANCING PHYSICAL FITNESS AND HEALTH MANAGEMENT

Dingwu Liu, Chunyang Guo *

School of WuShu, HeNan University, KaiFeng, HeNan, 475001, China.

E-mail: a17737847744@163.com

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ABSTRACT

In social development, due to the prevalence of a physically active lifestyle among youths, the importance of physical activities (PA), categorized as martial arts (MA) has increased. The purpose of the study is to gain knowledge about the relationships between chosen and used MA kinds and the composition of teenagers' weekly PA, taking into account gender variations. The research included 1,000 male and 1,200 female athletes. This may emphasize the connection between martial arts and physical fitness. Actively practicing martial arts, such as Karate or taekwondo, greatly enhances a variety of physical fitness facets, such as cardiovascular endurance, strength, flexibility, balance, and coordination. It helps improve general physical health by reducing body fat, building muscle, etc. A comprehensive approach to fitness is provided by martial arts training, which combines aerobic workouts, strength training, and stretching routines. Martial arts improve mental health, discipline, self-confidence, and physical benefits. As a result, martial arts help to promote general health and well-being by offering a practical way to develop and maintain physical fitness. The current study supports the existence of strong correlations between MA preference and performance and active PA in boys. Like other kinds of PA, teenagers who participate in MA throughout the year can fulfill the weekly PA recommendation. It is necessary to do further study on the correlations between participation in MA and the likelihood of adhering to the PA recommendations compared to other forms of PA.

KEYWORDS: Martial Arts (MA); Physical Activities (PA); Mental Health; Discipline; Self-Confidence

1. INTRODUCTION

Due to the prevalence of sedentary lives and modern conveniences, the quest for perfect physical fitness and effective health management has assumed critical importance. As individuals struggle to keep up with the demands of their busy lives and ever-changing health issues, many have turned to the tried-and-true methods of traditional MA and its timeless wisdom as a means to better their health management on all fronts (Sandford & Gill, 2019). Traditional martial arts have won over followers for centuries with their special blend of physical discipline, mental concentration, and spiritual wisdom. From the graceful movements of Tai Chi to the energizing techniques of Karate, the reflective philosophy of Kung Fu, and the comprehensive approach of Judo, this ancient discipline encompasses a vast range of practices (Cynarski, 2019). Within these time-honored practices, find a path to health and fitness that is both broad and deep. On a mental and physical level, the athlete may be extreme in certain circumstances. Each sport prides itself its unique blend of physical, technical, tactical, psychological, and moral attributes (Pshenychna et al., 2019). This level of performance is the culmination of a protracted period of training with ever heavier training and competition loads. Strength, speed, agility, coordination, overall performance, and endurance are some of the attributes and talents that martial artists are driven to hone. These traits are the foundation for enhancing technical proficiency and tactical prowess in one's sport of choice (Livieris, Tampakas, Karacapilidis, & Pintelas, 2019). Energy expenditure during extremely high-intensity physical exercise is one of the hallmarks of martial arts as a sport. All systems, from cardiovascular and respiratory to musculoskeletal, may benefit from martial arts training. Since the competition hinges on a competitive moment, the wrestlers will start in an identical position (Franchini, 2020).

Athletes' health, physical growth, and fitness levels must be assessed before they are given clearance for high-intensity physical activity and before they are given an appropriate option of competition (Sun, Teng, & Bao, 2022). Health, physique, and physiological capacities are at least minimum three dimensions of physical condition taken into the account by the philosophy of sports (Abdullaev, 2022). Motor function is an example of a physiological function, and it denotes technical preparedness and the degree of development of physical traits. Although these signals are theoretically linked, they are treated as autonomous phenomena and examined in isolation (Kozina et al., 2019). This research aims to illuminate the significant role that traditional martial arts have played in advancing fitness and health. The nitty-gritty of these time-honored practices improve strength, flexibility, and cardiovascular health. Learn how traditional martial arts may help with things like stress reduction, emotional fortitude, and general mental health (Boguszewski, Adamczyk, & Bialoszewski, 2019). The essence of ancient martial arts is a trip that promises to expose these disciplines' significant influence on our physical fitness and health

management, transcending generations and highlighting a path toward wellness that is relevant centuries ago (Kushwaha, Kar, & Dwivedi, 2021). The study aims to learn more about the connections between the chosen and utilized MA types and the makeup of adolescents' weekly PA, taking into account gender differences.

1.1. Contributions of the study

The study provided the link between MA and physical fitness may be highlighted by this. This study provides a useful method for achieving and maintaining physical fitness. MA aid in the promotion of general health and wellbeing. This current study confirms that boys' active PA and preferences for MA performance are strongly correlated. The rest of the paper provides the literature review for the existing study, which is shown in section 2. Section 3 shows the material and methods for physical fitness based on martial arts. Results for the output graph and their discussion are shown in sections 4 and 5. The rest of the paper was concluded in section 6.

2. Related Works

The study (Tulendiyeva, Saliev, Andassova, Issabayev, & Fakhradiyev, 2021) examined the occurrences, root causes, and methods for preventing the traumas common to ancient and contemporary martial arts. Traditional forms of martial arts are enjoying widespread popularity. The study examined the various historical aspects that martial arts have historically contributed to injury hazards. The study (Thành & Công, 2019) suggested various techniques for 2-D human posture estimation on RGB photos, highlighting the benefits of employing Convolutional Neural Network (CNN) models in speed and accuracy. The study used CNN to provide rough estimates of key points and joints of movement in traditional martial arts movies and created a small dataset to work with. The study (Lafuente, Zubiaur, & Gutiérrez-García, 2021) examined variables such as research goals and designs, samples, interventions, methodologies, and results were analyzed. A total of studies met the criteria for inclusion.

Due to poor study quality and quantity, the following findings should be interpreted with extreme care. The study (Martinkova, Parry, & Vágner, 2019) discussed many approaches to developing ethics via martial arts training. The methods use philosophical methods, including logical reasoning, to describe different moral techniques in martial arts then analyze and evaluate the literature around these topics. The article (Rassovsky, Harwood, Zagoory-Sharon, & Feldman, 2019) looked at whether OT response would follow instruction in traditional martial arts, which mixes dyadic pragmatic engagement with the health benefits of exercise. Students of all ability levels were specifically chosen from a variety of institutions that taught soft art, a Chinese-

inspired Japanese martial art. According to the research (Miyata, Kobayashi, Sonoda, Motoike, & Akatsuka, 2020) Japanese martial arts consist of various physical and mental skills that evolved from traditional forms of self-defense. Martial arts are seen as sports and ways to achieve embodiment and mind-body connection. There has been a shortage of empirical investigations, including practitioners of Japanese martial arts. The article (Blomqvist Mickelsson, 2020) examined to learn about the potential benefits of martial arts training for young people's social and psychological development. Also explored the possibility that people with certain personality qualities could prefer one sport over another. The study (Ye, 2019) provides light on this increased visibility. The essay examined the traditions surrounding Guangdong martial arts. Traditional martial arts in Guangdong are represented via several different schools and accompanying cultural manifestations. The philosophical underpinnings of Guangdong martial arts can be traced back to classical Chinese thought. The article (Nguyen, Le, Duong, Pham, & Le, 2019) reviews current high-quality research on human 3-D pose estimation. It provides a comparison study for single-image-based 3-D human posture estimation. In this research, focus on approaches that use a CNN to estimate poses in two dimensions before turning to a 3-D pose library to project those poses into the third dimension. The study (Tao, 2021) was produced to understand better the role that drive and concentration play in peak performance under pressure.

The practical importance of data analysis in concurrence for martial arts lies in their use of methods. The article (Kim & Cruz, 2021) examined the connection between self-control and exercise self-assurance, fulfillment, and commitment among Korean practitioners of both contemporary and traditional martial arts and considered people's level of experience in enthusiasm for martial arts as a moderating variable. The article (Pu & Yang, 2022) investigated the potential of using VR for martial arts instruction. The work addressed this issue by conducting research using a mix of controlled trials and surveys. Through analysis performed in advance of the experiment were able to remove any potential sources of variation between the two groups of individuals. The study (Wang & Jia, 2020) focused on using biosensor network technology to develop an intelligent martial arts sports system. The article employs a single variable technique and quantitative statistics to analyze data collected from biosensors implanted in the bodies of several martial arts athletes. The article (Skowron-Markowska & Nowakowska, 2021) examined desk research, in-depth interviews, and participant observation. A strong new China cares about cultural and natural heritage. They use these assets in cultural tourism, where UNESCO-listed tangible and intangible heritage is sure to impress. The study (Moore, Dudley, & Woodcock, 2019) suggested a cost-effective alternative to conventional psychotherapy. As a result of methodological issues and a lack of studies, it is challenging to make certain judgments regarding the trustworthiness and validity of the research that has been done so far. A therapeutic intervention based on martial arts is investigated in this study for its

potential to improve mental health outcomes. The study (Mak, Poon, & Chiu, 2022) suggested how social media might be used to teach and preserve kung fu and the elements that influence students' decisions to pursue these activities. Students were interviewed in a semi-structured fashion to collect qualitative data. Many students use social media and messaging apps like WhatsApp and Facebook to connect with peers and lecturers, share and discuss course materials, and discuss their progress. The study (Moore, Woodcock, & Dudley, 2019) suggested that treatments should focus on assisting people in building their abilities and coping better, which apply to both bullying and positive mental wellness generally and alternatives to the anti-bullying strategy. The study (Harwood-Gross, Feldman, Zagoory-Sharon, & Rassevsky, 2020) examined the high-risk adolescents who did not exhibit any significant oxytocin (OT) and cortisol (CT) reaction, in contrast to low-risk youth whose CT levels rose steadily during the training period.

The research underlines the potential for training to have varying impacts on diverse populations. It suggests that hormonal mechanisms, including increases in OT levels, may influence some of the good effects of martial arts. The study (Harwood-Gross, Lambez, Feldman, Zagoory-Sharon, & Rassevsky, 2021) determined whether providing at-risk kids with sustained program of martial arts instruction would be an effective intervention for boosting their mental health. Teenage guys at alternative schools for troubled teens trained in sports or martial arts twice a week for three months. The study (Moore, Dudley, & Woodcock, 2020) determined by performing a systematic review and meta-analysis it will be possible to determine whether martial arts instruction might be a beneficial sports-based mental health intervention. In public awareness, many people continue to reject mental health care. Despite the absence of studies on the topic, evidence suggests that martial arts training benefits mental health (Fabrizio & Alessandro, 2018; He, 2020).

3. Materials and Methods

The Mixed Martial Arts Association (MMAA) of the Czech Republic helped spread the word and recruit participants via online ads and flyers at regional MMA events and training facilities. Male MMA fighters from the Czech Republic who were active between 18 and 40 and at least two wins were considered for inclusion in the research. The research included 1,000 male and 1,200 female athletes.

The participant's statistics included age, number of MMA fights, years of MMA training, height, weight, and body mass index (BMI). The descriptive features of our sample, such as age, body height, and weight, were consistent with earlier studies (Pavelka et al., 2020) examining the physical characteristics of athletes competing in mixed MA and other combat sports. Table 1 displays sample characteristics for standard deviation and mean deviation.

Table 1: Sample characteristics

	N	HEIGHT		WEIGHT		AGE		BMI(KG.M ⁻²)	
		standard deviation	mean	standard deviation	mean	standard deviation	mean	standard deviation	mean
PA PREFERENCES									
GIRLS	1200	7.47	166.01	8.60	56.83	1.30	16.23	2.67	20.54
BOYS	1000	6.01	177.17	12.10	67.80	1.21	16.18	3.20	21.50
PA PREFERENCES AND IPAQ-LF									
GIRLS	810	7.26	166.14	8.73	57.01	0.56	16.11	2.80	20.22
BOYS	620	5.86	177.10	12.63	67.45	0.72	16.09	3.40	21.19
PREFERRING MA									
GIRLS	172	5.57	165.82	8.54	56.42	1.10	16.12	20.45	20.25
BOYS	345	7.01	177.62	12.07	68.79	1.21	16.31	21.70	21.12
INVOLVED IN MA									
GIRLS	500	5.15	165.50	9.17	55.83	1.07	16.28	20.30	20.30
BOYS	163	7.33	177.21	12.01	68.67	1.23	16.29	21.78	21.54
GENDER CHARACTERISTICS									

3.1. Procedure

Information and Communication Technology (ICT) was used to administer the survey in classrooms for a single lesson per the curriculum. The QPAQ was filled out by the 'basic sample' participants. Due to time and administration constraints, the International Physical Activity Questionnaire - Long Form (IPAQ-LF) could be completed by a portion of the sample.

3.2. International Physical Activity Questionnaire – Long Form (IPAQ-LF)

Estimates of weekly PA were entered into the "International Database for Research and Educational Support" (Indares) using the Polish version of the IPAQ-LF, an online platform. Following recommendations from the EORTC Quality of Life Group, the questionnaire was translated. The IPAQ-LF questionnaire inquires about occupational and physical activity linked to schoolwork, commuting, housework, home upkeep, and family responsibilities. Physical activity related to recreation and sports sitting time. Revised the

standard IPAQ-LF handbook in the following ways to avoid underestimating sitting time and overestimation of PA time. Because of these criteria and data gaps, 230 individuals were disqualified from further consideration. As a weekly PA prescription, adhere to the absolute minimums recommended by Healthy People 2010, Healthy People 2020, the 2008 Physical Activity Guidelines for Americans, and the EU Physical Activity Guidelines. The IPAQ-LF makes reaching the weekly PA guideline more challenging by evaluating certain forms of PA independently.

The following standards were established as minimums: For vigorous physical activity, the recommendation was at least three times weekly for twenty or more minutes (from this point on as 325 min VPA); for moderate physical activity, the request was at least five times weekly for thirty or more minutes (from this point on as 535 min MPA), for any physical activity, the suggestion was at least five times per week for sixty minutes of PA (referred to as 565 minutes of PA from this point on), with three additional times per week the most difficult concurrent meeting of two PA criteria.

3.3. Questionnaire on Physical Activity Preferences (QPAP)

The QPAP was used to measure the frequency of MA participation and the trajectory of MA preferences. There is a standardized Polish version of the questionnaire. In the QPAP, we may rate our interest in eight types of physical activity: alone, in a group, fitness-related, aquatic, outdoor, music, dance, and overall. MA encompasses a variety of sports, including wrestling (sumo), aikido, Judo, Karate, kickboxing (thai-boxing), kung fu, musado, taekwondo, and more. Emerging or lesser-known MAs are slotted into the category with the most functional analog, or they are given free rein to choose their path and a different Master of Arts. In the QPAP survey, participants are asked to select their top five choices for PA.

Each of the chosen PAs is given a score to determine their position. The PAs who weren't chosen get a score equal to the mean of the other ranks. Preferred PA is placed in order based on the total points awarded for rating and the average of those rankings. As part of the QPAP survey, participants are also asked how many hours a week they spend engaging in organized physical activity (PA). They detail the most typical PA performed in the winter and summer. For the subsequent two-year periods, 2008-2019, the rate of MA participation and trend of MA preferences are displayed.

3.4. Statistical Analysis

After gathering the dataset, methodologies for quantitative data analysis were used to explore the data. Descriptive statistics include mean, median, and standard deviation. To evaluate correlations, differences, or associations between variables of interest, statistical inference techniques, including SPSS

25.0 analysis, are used.

4. Results

Figure 1 shows that outside of MA, boys favored boxing, kickboxing, and Karate. Girls also tended to Karate and boxing, although Judo ranked third, as shown in Figure 2. The most popular types of physical activity chosen by boys were boxing (31 times), Karate (27 times), and kickboxing (27 times). Only eight percent of male students named MA as their preferred PA. Karate was chosen as the most popular PA for girls 12times, followed by kickboxing (12 times) and boxing (6 times). Only two percent of female students surveyed named MA as their preferred PA.

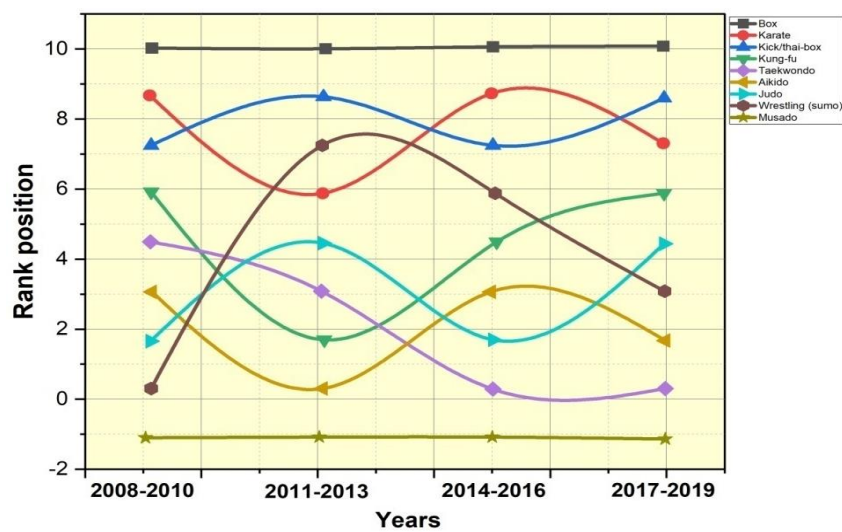


Figure 1: Ranking position for Males in martial arts

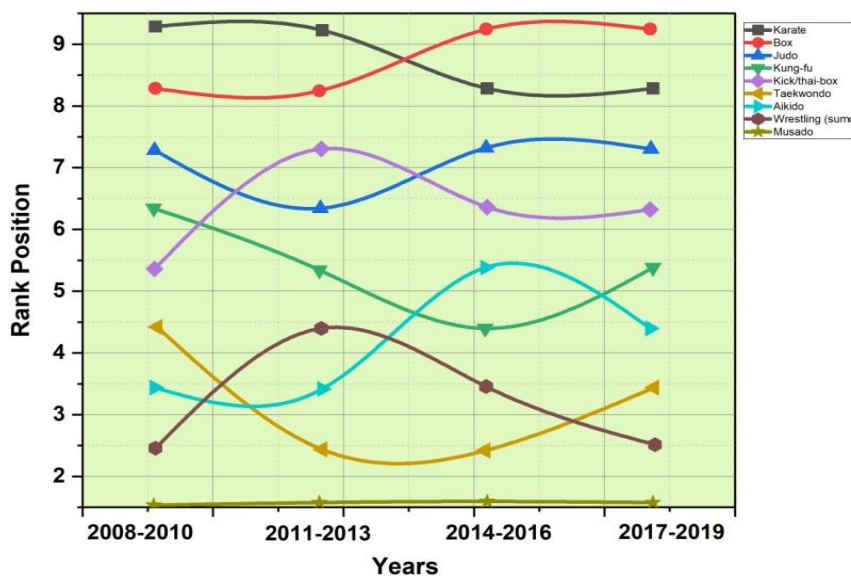


Figure 2: Ranking position for Females in martial arts

Table 2 shows a correlation between MA preferences and summer and

winter MA participation. Karate, kickboxing, and boxing attracted the most participants in the organized PA. 10 percent of boys and 2 percent of females in the 970 boys and 1110 girls participated in organized MA.

Table 2: Circumstances Performed by MA

MA	ORGANIZED		PERFORMED IN THE WINTER SEASON		SERVED IN THE SUMMER SEASON	
	GIRLS (N=25)	BOYS (N=100)	GIRLS (N=17)	BOYS(N=49)	GIRLS (N=11)	BOYS(N=25)
KICKBOXING	3	2	1	2	1	4
JUDO	5-7	4	5	6	6-3	7-4
WRESTLING	7-8	6	9-6	3	9-7	7-4
TAEKWON-DO	6-5	8	4-2	9-8	6-3	7-4
KARATE	2	1	9-6	4	6-3	2
BOXING	6	3	4-2	1	2	2
AIKIDO	4	5	4-2	5	6-3	7-4
KUNG-FU	6-4	7	9-6	7	9-7	9-8
MUSADO	9-8	9	9-6	9-8	9-7	9-8

4.1. Relationships among personal tastes, martial arts (MA) involvement, and achieving weekly physical activity goals

When compared to other forms of PA, boys who chose MA had greater degree of VPA (2337 MET-min) vs boys who preferred MA (H (3,1529) = 4368, $p < 0.001$; $\eta^2 = 0.027$). The latter provided a VPA report of 1605 MET-min. Only 1665 MET-min of VPA were found in girls who favored MA, while 1287 MET-min were found in girls who did not prefer MA of VPA ($p = 0.200$). The guys' weekly average PA similarly showed these variances (H (3,1529) = 19.39, $p < 0.001$; $\eta^2 = 0.018$) (6505 MET-min vs. 5460 MET-min).

The difference in girls (6199 MET-min vs. 5186 MET-min) was insignificant. Boys who picked MA were also likely to follow VPA's recommendation of 220 minutes (58%) than boys who did not do so (43%) ($\chi^2 = 12.74$; $p < 0.001$; $w = 0.132$). 73% of boys who preferred MA fulfilled the requirements of 5-60 minutes, and 65% of boys chose MA, as opposed to 42% of boys who liked PA and 4-20 minutes of VPA each week concurrently ($\chi^2 = 4.84$; $p = 0.027$; $w = 0.087$). Similar to the previous example, 62% of girls who favored MA met this guideline compared to 66%.

Even though this difference was not significant, more girls did not participate ($p = 0.525$). When compared to boys who did not participate in MA, those who did throughout the year showed significantly higher VPA 2413 MET-min (H (3,1525) = 33.15, $p < 0.001$; $\eta^2 = 0.022^*$), who had a VPA of 1702 MET-

min. Girls who engaged in MA all year reported 1505 MET-min, compared to other girls' 1325 MET-min ($p = 0.685$). The gender differences between individuals who participated in MA and those who did not were insignificant regarding the total PA for the week. When reaching the basic PA standards, it was discovered that there were substantial variations between boys who participated in MA and those who did not (320 min of VPA) ($\chi^2 = 5.95$; $p = 0.015$; $w = 0.096$).

No matter how older adults are, they may benefit from the vast and diverse collection of physical disciplines and combat tactics the MA offers. These help improve your self-defense skills, fitness levels, mental focus, and other areas. They are taught and performed by persons of diverse ages, ranging from children to adults, with individual techniques and instruction suited to each age group. Table 3 and Figure 3 show the age group of people doing MA.

Table 3: Values for Age group

AGE GROUP	PERCENTAGE (%)
KIDS UNDER 14 YEARS	52.4
YOUNG ADULTS 15-25	9.5
ADULTS 26-49	14.3
ADULTS OVER 50	23.8

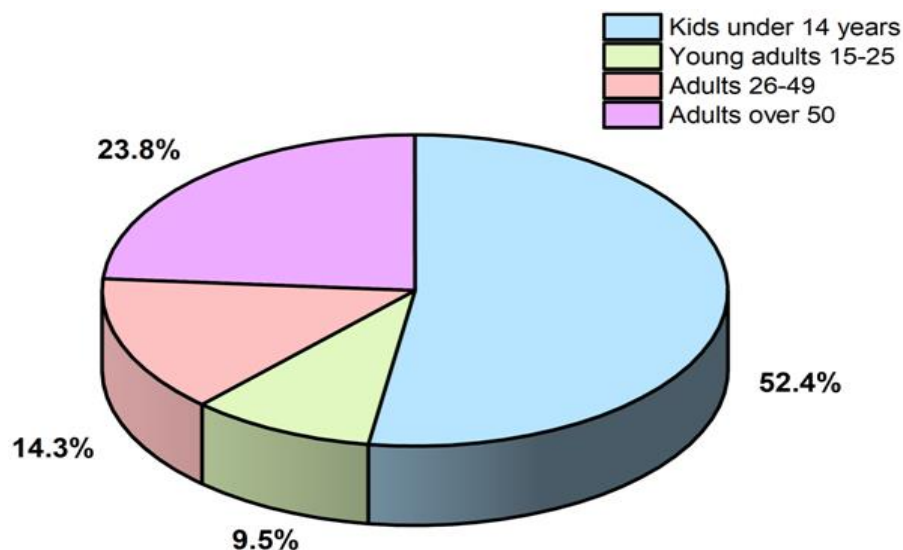


Figure 3: Age group participants for Martial arts

People practicing MA refers to the proportion of a specific population or group of people actively involved in the practice of MA disciplines, such as training and competition. This percentage is stated as a ratio or fraction of the total number of persons who participate in MA activities compared to the overall population or relevant sample. It offers a measurement of the popularity or

prevalence of the practice of MA among a certain group of people or geographical locations. Table 4 and Figure 4 show the activity levels of MA and combat athletes (amateurs, professional, and all) and the percentages that fall into each category.

Table 4: Percentage

	PERCENTAGE (%)		
	LOW	MODERATE	HIGH
AMATEUR	36	55	12
PROFESSIONAL	16.8	60.7	25.6
ALL	29	57.1	16.9

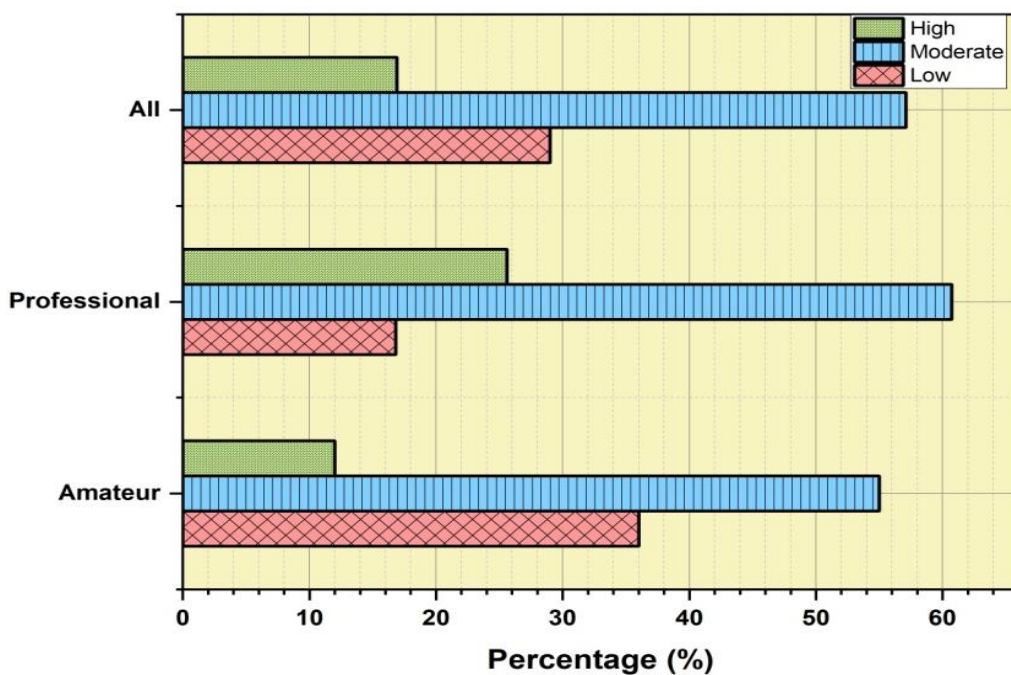


Figure 4: Activity level of MA

Over the past ten years, there has been a noticeable rise in the number of people who practice MMA for fitness. MMA has become more well-liked as a form of exercise and a competitive activity. MMA training is becoming popular among people from all walks of life for its physical and psychological advantages.

The increase in MMA fitness participants from 2012 to 2022 is summarized in Table 5 and Figure 5. By attracting a wide range of athletes seeking physical fitness, self-defense abilities, and the mental toughness of MMA training, MMA fitness has developed from a specialized interest in 2012 to a worldwide fitness trend in 2022. The expansion throughout this period reflects the fitness industry's acceptance and success with MMA-inspired training.

Table 5: Number of participants in 2012-2022

YEARS	THE NUMBER OF PARTICIPANTS IN MILLIONS
2012	1.98
2013	2.26
2014	2.46
2015	2.61
2016	2.45
2017	2.38
2018	2.37
2019	2.41
2020	2.45
2021	2.34
2022	2.52

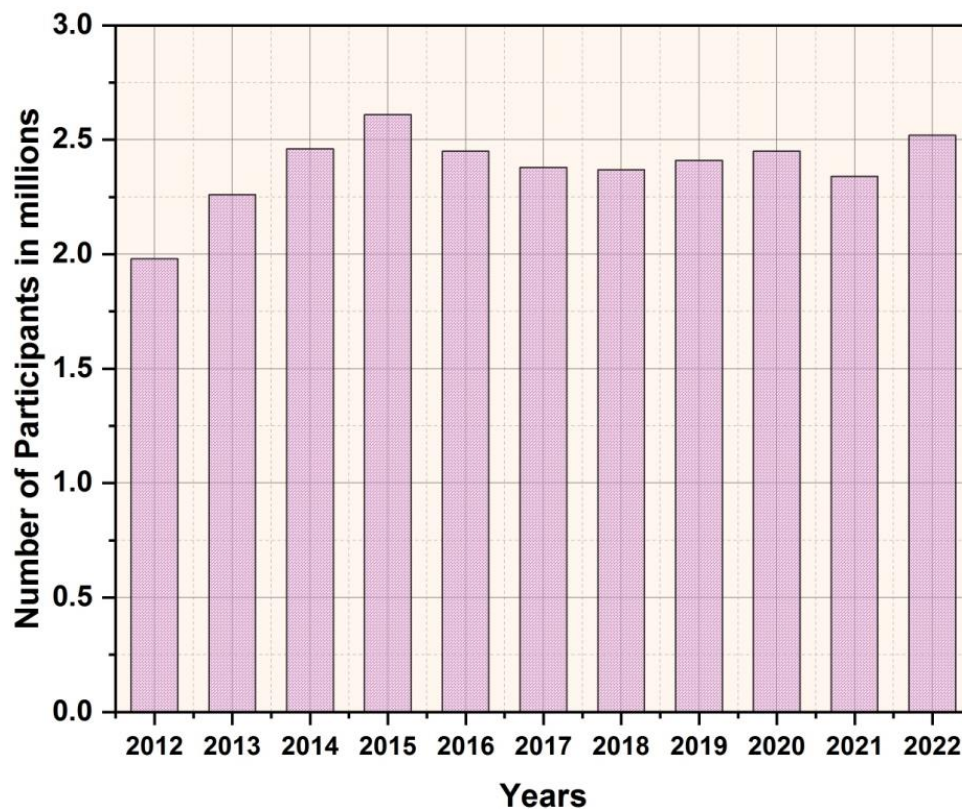


Figure 5: Number of participants in Martial Arts

5. Discussion

The present study's most important findings are the continued popularity of boxing, kickboxing, Karate, and Judo among boys and girls. These findings corroborate the widespread speculation that MA is gaining in popularity worldwide. There is a universal link between the media's and fans' adoration of famous athletes and those fans' propensity to engage in certain types of

physical exercise. In the same way, similar dependencies show up in MA. More than in other sports, the worldwide context concerns rising violence and declining personal and general safety standards, which impacts these organizations. Research showing adverse effects of MA should be taken seriously. However, looking for strategies to avoid such dangers is equally important. The Polish Society of Sports Medicine has imposed age restrictions for competing in contact sports.

Despite the rising popularity of MA and mixed MA, there is a need for more information on injuries experienced in training and competition. With excellent diagnostics of PA preferences, the ideal fusion of MA with aesthetic PA, mental training, physical activities, or social and gender benefits may be accomplished. In addition, physical education programs in schools play an important role in maximizing MA's advantages and mitigating any potential drawbacks. The SAAFE (Supportive, Active, Autonomous, Fair, and Enjoyable) criteria may be fully met when appropriate MAs are included in physical education sessions.

6. Conclusion

The current study supports the existence of strong correlations between MA preference and performance in boys and active PA. Like other kinds of PA, year-round participation in MA by both boys and girls contributes to meeting the weekly PA guidelines. It would be beneficial to do more studies, utilizing objective PA monitoring in particular, on the relationships between participation in MA and meeting PA guidelines compared to other kinds of PA. Since MA training increases and improves various physical fitness factors, physical fitness, and MA are closely related.

Exercises involving MA, such as Karate, taekwondo, or Brazilian jiu-jitsu, enhance cardiovascular endurance, strength, flexibility, balance, and coordination. Additionally, it aids in building more muscle, decreasing body fat, and improving general physical health. Activities that enhance fitness levels are frequently incorporated into MA training, such as stretching, strength training, and aerobic exercises. MA also fosters mental health, discipline, self-confidence, and physical fitness. In conclusion, learning MA is a practical and all-encompassing approach to develop and maintain physical health and vital mental and self-defense abilities. It takes a holistic

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