PHYSICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL PROFILING OF MARTIAL ARTS PRACTITIONERS IN KERALA

A Thesis
submitted to the University of Calicut through the
Department of Physical Education for the fulfillment of the
requirement for the
DOCTOR OF PHILOSOPHY IN PHYSICAL EDUCATION

By

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CERTIFICATE

This is certify that the thesis entitled **"PHYSICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL PROFILING OF MARTIAL ARTS PRACTITIONERS IN KERALA"** submitted to the University of Calicut, in fulfillment of the requirements for the award of the degree of Doctor of Philosophy in Physical Education is recorded of original research work done by **Mr. Muhammed Najeeb K.**, during the period of 2015 – 2019 of his study in the Department of Physical Education, University of Calicut, Thenjipalam, under my supervision and guidance and the thesis has not previously formed on the basis for the award of any Degree/Diploma/Associate ship/Fellowship or any other similar title and it represents entirely an independent work on the part of the candidate.

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DECLARATION

I, Mr. Muhammed Najeeb K., by declare that the thesis entitled **"PHYSICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL PROFILING OF MARTIAL ARTS PRACTITIONERS IN KERALA"** submitted to the University of Calicut, in fulfillment of the requirements for the award of the degree of Doctor of Philosophy n Physical Education is recorded of original research work done by me under the supervision and guidance of **Dr. Sakeer Hussain V.P., Director, Department of Physical Education, University of Calicut** and it has not formed before on the basis for the award of any Degree/Diploma/Associate ship/Fellowship or any other similar title.

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Dedication...

I dedicate this project to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this program and on His wings only have I soared. I also dedicate this work to my beloved parents (Late Abdul Majeed P.C. and Naseema K.) for their whole hearted support and prayers. I also dedicate this to my wife Ms. Shamna K.T. who has encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started. To my child Diya Fathima K. (Pathu) who has been affected in every way possible by this quest. Thank you. My love for you all can never be quantified. God bless you.

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Contents

Page No.

List of Tables

Page No.

List of Figures

Page No.

CHAPTER I

Introduction

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Chapter I

INTRODUCTION

According to Bruce Lee, "Martial arts also have the nature of an art, since there is emotional communication and complete emotional expression".

Martial arts cover a broad range of activities that involve fighting techniques, physical exercises, and methods of mental discipline, among other skills. Martial arts originated in the ancient cultures of Asia, and are used today around the world for self-defense, exercise, health, spiritual growth, law enforcement, and athletic competition (encyclopedia, 2017).

Martial arts are organized systems and ethnicities of combat practices. There are many reasons for practicing martial arts, such as self defense, military and war purpose, law enforcement applications, mental and spiritual development as well as entertainment, recreation and the protection of a nation's intangible cultural tradition. The term 'martial art' is associated with the fighting arts of many Asian countries it originally referred to the combat systems of Europe early in 1550s. The term martial art is derived from Latin word, which means 'arts of Mars', the Roman god of war. Some writers have claimed that fighting arts or fighting systems would be more appropriate on the basis that many martial arts were never "martial" in the sense of being used or created by professional warriors. (Clements, John 2006).

Variation of Martial Arts

Martial arts are categorized with variety of criteria, including traditional or historical arts, existing styles of folk wrestling and modern mixture martial arts. Another criteria of categorization of martial arts was techniques taught - armed and unarmed, by the type of weapon - swordsmanship, stick fighting etc., by type of combat – grappling, striking, stand up fighting, ground fighting etc. and by application or committed - self defense, combat sport, choreography or demonstration of forms, physical fitness, meditation, etc. (Chiflow, 2010).

In the modern era, many of them are practiced different kinds of martial arts for the following reasons such as self defense, physical fitness, mental development, recreation, entertainment and competition. Someone consider the martial arts as a way of achieving spiritual growth (Eva Dixon, April 16, 2014).

Indian Martial Arts

Indian martial arts refer to the fighting systems of the Indian subcontinent in South Asia. This includes what are now India, Pakistan, Bangladesh and sometimes Sri Lanka and Nepal. Although South Asian martial art is occasionally preferred for neutrality, the fighting styles of all the aforementioned countries are generally accepted as "Indian" due to shared history and culture. This article will refer to India in the historic sense to include most of southern Asia (Luijendijk, D.H. 2008).

A variety of terms are used for the English phrases "Indian martial arts" or "South Asian martial arts", usually deriving from Sanskrit or Dravidian sources. While they may seem to imply specific disciplines (e.g. archery, armed combat), in Classical times they were used generically for all fighting systems. Among the most common terms today, śastra-vidyā, is a compound of the words śastra (weapon) and vidyā (knowledge). Dhanurveda derives from the words for bow (dhanushya) and knowledge (veda), the "science of archery" in Puranic literature, later applied to martial arts in general (Luijendijk, D.H. 2008).

Different Kinds of Martial arts

Judo

Judo is a tremendous and dynamic combat sport that demands both physical prowess and great mental discipline. From a standing position, it involves techniques that allow lifting and throwing the opponents onto their backs. On the ground, it includes techniques that allow fixing the opponents down to the ground, controlling them and applying various chokeholds or joint locks until submission.

Judo originated in Japan, created by Jigoro Kano, 1860–1938 as a derivative of the various martial arts developed and used by the samurai and feudal warrior class over hundreds of years. Although many of the techniques of judo originated from arts that were designed to hurt, maim, or kill opponents in actual field battle, the techniques of judo were modified so that judo students can practice and apply these techniques safely and without hurting opponents:

Judo does not involve kicking, punching, or striking techniques of any kind. Judo does not involve the application of pressure against the joints to throw an opponent. Judo involves no equipment or weapons of any sort.

Instead, judo simply involves two individuals who, by gripping the judo uniform or judogi, use the forces of balance, power and movement to attempt to subdue each other. Thus, it is simple and basic. In its simplicity, however, lies its complexity, and mastery of even the most basic of judo techniques that often take considerable time, effort, and energy, involving rigorous physical and mental training.

The word judo consists of two Japanese characters, ju, which means "gentle", and do, which means "the way". Judo, therefore, literally means the way of gentleness. Although the gentleness may not be immediately apparent to newcomers who see bodies flying through the air and people pinned to the ground, it is this principle of gentleness, or yawara (which is the same character as the ju in judo), on which all judo techniques are based (worldjudoday, 2017).

Kalaripayattu

Kalaripayattu is a martial art, which originated as a style in Kerala, southern India. The word *kalari* first appears in Sangam literature to describe both a battlefield and combat arena. The word *kalari tatt* denoted a martial feat, while *kalari kozhai* meant a coward in war. Each warrior in the *Sangam era* received regular military training. It is considered to be one of the oldest fighting systems in existence. It was originally practiced in northern and central parts of Kerala and

southern parts of Tamil Nadu. The Sri Lankan martial art *Angampora* also exhibits strong similarities with Kalaripayattu, which explains the extent of patronage this art has enjoyed in the past. Currently many other Indian states also practice this martial art. (Suresh, P. R., 2005)

It focuses on unarmed combat, weapons training, yoga, healing techniques, etc. According to Kalaripayattu.org, "The various movements in Kalari are based on animal movements. Several poses are named after animals. Hence it is generally believed to have developed in the jungles when hunters observed the fighting techniques of various animals." (kaimuay, 2017)

Styles of Kalaripayattu

Kalaripayattu has three regional variants, which are distinguished by their attacking and defensive patterns.

Northern Kalaripayattu

Northern kalaripayattu (vadakkan kalari) is practised mainly in North Malabar. This style is distinguished by its *meippayattu* - physical training and use of full-body oil massage. The system of treatment and massage, and the assumptions about practice are closely associated with Ayurveda. The purpose of medicinal oil massage is to increase the practitioners' flexibility, to treat muscle injuries incurred during practice, or when a patient has problems related to the bone tissue, the muscles, or nerve system. The term for such massages is thirumal and the massage specifically for physical flexibility Chavutti Thirumal or Chavutti Uzhichil which literally means "stamping massage" or "foot massage". The masseur uses their feet and entire body weight to massage the person *(*Zarrilli, Phillip B.1998)

Southern Kalaripayattu

Zarrilli refers to southern kalaripayattu as *varma ati* (the law of hitting), *marma ati* (hitting the vital spots) or *varma kalai* (art of varma). The preliminary empty handed techniques of *varma ati* are known

as *adithada* (hit/defend). *Marma ati* refers specifically to the application of these techniques to vital spots. Weapons include bamboo staves, short sticks, and the double deer horns. Medical treatment in the southern styles is identified with siddha, the traditional Dravidian system of medicine distinct from north Indian ayurveda. The Siddha medical system, otherwise known as Siddha Vaidyam, is also attributed to Agastya. *(*Zarrilli, Phillip B.1998)

Central Kalaripayattu

The Madhya-Kerala Kalari (central style) of kalaripayattu is practiced mainly in the Central Kerala. Its diverse distinctive techniques, with heavy emphasis on application, are performed within floor paths known as *kalam*. The Madhya Kalari has many different styles which place heavy emphasis on lower body strength and speed through thorough practice of various *chuvadu*, only after which participants advance into weaponry and advanced studies. *(*Zarrilli, Phillip B.1998)

Karate

Ryukyu Kingdom was developed the Karate martial art technique. Under the influence of Chinese martial arts, predominantly White Crane from Fujian, Karate developed from the indigenous martial arts of Ryukyu Islands. Karate is now mainly a striking art using punching, kicking, striking and open hand techniques such as knife hands, spear hands and palm heel strikes. The karate practitioner usually taught some modern styles namely joint locking, grappling, throwing, restraints and vital-point striking etc. A karate practitioner is called a *karateka* (Higaonna, Morio,1985).

The martial art form Karate was developed from Ryukyu Islands, now known as Okinawa, Japan. In the early 20th century, Karate was brought to the Japanese mainland during the time of cultural exchanges between Chinese and Japanese. After the Taishō era, karate was systematically taught in Japan (Donn F. Draeger, 1974).

Shigeru Egami, Chief Instructor of Shotokan Dojo, opined that "the majority of followers of karate in overseas countries pursue karate only for its fighting techniques depict karate as a mysterious way of fighting capable of causing death or injury with a single blow the mass media present a pseudo art far from the real thing." (Shigeru, Egami 1976). Shōshin Nagamine said, "Karate may be considered as the conflict within oneself or as a life-long marathon which can be won only through self-discipline, hard training and one's own creative efforts."(Nagamine, Shoshin 1976)

The basic goal of karate is self-defense. It teaches practitioners to block the strikes of opponents and then disable them quickly with pinpoint strikes. When takedowns are employed within the art, these tend to be used to set up finishing strikes (Robert Rousseau, 2016)

Taekwondo

During the 1940s and 1950s, Taekwondo was developed by several martial artists by combining elements of Karate and Chinese Martial Arts with native Korean martial arts traditions such as Taekkyeon, Subak, and Gwonbeop. Taekwondo combines both self-defense and attack, as a way of sport and exercise. This kind of martial art focuses on quick hand and high kick movements. Taekwondo practitioners believe that the leg is the strongest and utmost reaching limb that a person has, thus having the highest potential to be used as a powerful weapon while keeping an attacker at a distance *(*Sik, Kang Won; Lee Kyong Myung (1999).

The martial art is very good to enhance agility, power, balance, flexibility and endurance. You may have seen these martial artists on tv breaking wood planks, cement blocks or bricks with their bare hands and legs. These athletes combine their mental focus and acuity with the strength and technique they develop through training *(*Sik, Kang Won; Lee Kyong Myung (1999).

Wrestling

Wrestling is a combat event that involves many grappling type techniques such as throws and takedowns, joint locks, clinches fighting, pins and other grappling holds. A wrestling bout is a bodily competition, between two participants, who attempt to gain and retain a higher position. Both traditional historic and modern styles of wrestling, there are wide range of styles with changing rules. Wrestling methods have been combined into other martial arts as fine as military hand to hand fight systems (dictionary.com, 2007).

Wrestling represents one of the oldest forms of combat. The origins of wrestling go back 15,000 years through cave drawings in France. Babylonian and Egyptian reliefs show wrestlers using most of the holds known in the present-day sport. Literary references to it occur as early as the Old Testament and the ancient Indian Vedas. In the Book of Genesis, the Patriarch Jacob is said to have wrestled with God or an angel. *The Iliad*, in which Homer recounts the Trojan War of the 13th or 12th century BC, also contains mentions of wrestling. Indian epics Ramayana and Mahabharata contain references to martial arts including wrestling. In ancient Greece wrestling occupied a prominent place in legend and literature; wrestling competition, brutal in many aspects, served as the focal sport of the ancient Olympic Games. The ancient Romans borrowed heavily from Greek wrestling, but eliminated much of its brutality (Salamone, Frank; 2013).

Greco-Roman wrestling and contemporary freestyle wrestling were soon regulated in formal competitions, in part resulting from the rise of gymnasiums and athletic clubs. On continental Europe, prize money was offered in large sums to the winners of Greco-Roman tournaments, and freestyle wrestling spread rapidly in the United Kingdom and in the United States after the American Civil War. Wrestling professionals soon increased the popularity of Greco-Roman and freestyle wrestling, worldwide (Michael B. Poliakoff, 1996).

Wushu

Wushu or Chinese Kungfu, is a hard and complete martial art, as well as a full-contact sport. It has a long history in reference to Chinese martial arts. It was developed in China after 1949 in an effort to standardize the practice of traditional Chinese martial arts, yet attempts to structure the various decentralized martial arts traditions date back earlier, when the Central Guoshu Institute was established at Nanking in 1928 (Fu, Zhongwen, 2006).

In 1958, the government established the All-China Wushu Association as an umbrella organization to regulate martial arts training. The Chinese State Commission for Physical Culture and Sports took the lead in creating standardized forms for most of the major arts. During this period, a national Wushu system that included standard forms, teaching curriculum, and instructor grading was established. Wushu was introduced at both the high school and university level. This new system seeks to incorporate common elements from all styles and forms as well as the general ideas associated with Chinese martial arts. Stylistic concepts such as hard, soft, internal, external, as well as classifications based on schools such as Shaolin, Taiji, Wudang and others were all integrated into one system. Wushu became the government sponsored standard for the training in martial arts in China (Lorge, Peter, 2012). The push for standardization continued leading to widespread adaptation. In 1979, the State Commission for Physical Culture and Sports created a special task force to teaching and practice of Wushu. In 1986, the Chinese National Research Institute of Wushu was established as the central authority for the research and administration of Wushu activities in China (Wu Bin, Li xingdong and Yu Gongbao, 1992).

Benefits of Martial Arts

A child's total well being, both physical and psychological, can be supported simultaneously through martial arts practices. Martial Arts training improve the child's general health, while the physical aspects of exercise, likewise improve emotional health with increased self confidence and self esteem and as fine as decreased their tension, stress, anxiety and depression (nsama, 2016).

1. Self defense – martial arts are mainly uses for self defensive purpose. For improving self defensiveness, the following technique need to improve namely; punching, kicking, blocking and evasion techniques etc. and also martial arts are used as proper exercise form.
2. Focusing and Listening –focusing and listening plays an important role in the child's mentality who has limited attention spans at this stage in their life. As a result of martial art training, the child will excel in physical activity, improve their ability to stay focused, and become an astute listener at home and in school.
3. Teamwork and Positive Social interaction – Teamwork is essential for all young children to develop. Martial art training at this stage, they develop an understanding and improve their confidence to work with others.
4. Self-Control and Good Decision Making – Self control refers to the martial art training that gives child's self accomplishment to a certain task or to accept a specific pattern of behavior, however child is unfocused or would rather be doing something else. When the child has learned to listen to their parents, pay attention in class while listening to the teacher instead of talking to friends, child has established the ability to control while making decision to do so.
5. Balance and Posture – many children needs constant work and attention for improving balance and posture, basic skills necessary for almost any activity. Poor posture leads to cramped organs, improper breathing, and a whole host of other unhealthy bodily expressions. Martial arts training help to build solid balance, healthy postures and balanced movement and daily workouts help to develop and improve fundamental skills of children.
6. Memorization and Retention –Martial arts practice apply fun and active memory and retention drills. Apart from Martial Arts protocol, skill-based and technique focused retention, our memorization requirements. It improves memorization skills essential for student development and school academics in the near future.

7. Self discipline and responsibility – The age wise martial arts techniques are used in relation with a child's family routine responsibility, their awareness to clean up and home work tasks accomplished in an appropriate manner. In martial arts, the child begins to improve their ability to initiate responsibility, follow instructions and take self-importance in doing the right thing.
8. Physical Fitness and Healthy Living – In this modern life, it is very important for children to know the significance of being healthy and physically fit at an early age. Being physically fit is an essential and more importantly for any martial artist. As children grow older, the difficult to stay physically fit.
9. Coordination and Motor Skills – Through martial arts practice, Children develop strong bodies, fine tuned motor skills and physical coordination, and also improve general health, sports performance, same as other physical activities. Martial art training will also develop the child's cardiorespiratory system, muscular strength, and improve self control and awareness which can be increased through martial arts training.
10. Self esteem and confidence building – martial arts practice improves children's self esteem through constant positive oral reinforcement and life skill stripe reward system. When child work to earn their next level, not only they are learning basic self-defense skill, but also they are building confidence and improve self esteem.
11. Respect – Respect is one of the supreme words in martial arts. Children are trained to respect their trainers, each other, and themselves. The trainers use time in training class discussing the importance of respecting teachers, parents and elders. Respect is regularly missing in many aspects of today's society.
12. Discipline, Behavior and School – Improved behavior in a martial arts class often converts into improved behavior at school. Improved behavior at school often converts into improved grades. The students those who

are practicing their martial arts technique, then improve their behavior at home, and also improve their grades at institute.

13. Great physical fitness for battling childhood obesity – we already discussed about physical fitness and martial arts practice. Martial art training routine can reduce childhood obesity. There are many ways to prevent obesity and to protect child from developing further health risks. It is important to understand that the psychological effects obesity has on children are potentially more harmful than the physical side effects.
14. Anti bullying (aggressor) education – Bullying means unwanted, aggressive behavior that contains a real or apparent power imbalance. Children those who use their power in such a way that physical strength, access to embarrassing information, or popularity to control or harm others. Bullying comprises various actions namely, spreading gossips, physical attack and verbal abuse, creating threats and deliberately avoiding someone from a group. Martial art training is called anti bullying education, practitioners are taught to manage situations without the use of violence, learning ways to measure pressures, convey verbal attacks, which is a critical factor in permitting the bully.
15. Social skills and relationship – in the childhood, making friends is an important part. Martial arts practice offer the helpful atmosphere and group based activities necessary to help children make new friends, whereas teaching them the perceptions of sharing, kindness and conflict resolution

Martial arts and physical fitness

All of the martial arts involve wide-ranging, multifaceted disciplines that involve a variety of skills and movements. They require not only speed and strength in short, explosive bursts, but also a high level of anaerobic strength endurance, flexibility and agility. Every bit of the training and diet must reflect these all-important elements. They are what constitute the physical nature of the disciplines. Often, the martial arts are very “ballistic” in nature, so recovery, tissue repair and

peak speed-strength is the training and nutrition objectives year-round. Nutritionally, that calls for an emphasis on short-term energy needs and maximizing the muscles' recovery and tissue repair processes. In the martial arts, most of the energy output is anaerobic. Without oxygen delivering blows and kicks, grappling, throwing and lightening fast reflexive movements must be performed over and over again, testing the tolerance to excruciating pain and fatigue from lactic acid buildup in the working muscles. There're the skills of specific discipline. Muscles grow stronger and faster if trainer stresses them. In the martial arts, trainer aim is to make them grow as strong and fast as possible (Frederick C. Hatfield, Ph.D. 2001).

Physiological effects

Many of the research study show that practice of martial arts or any physical activity leads to improved physical and physiological fitness and extends durability. Martial art practice should inspire the society to become more active and energetic than being inactive. Practice of martial arts and physical activity protects health problems, such as heart diseases, hypertension, obesity, diabetes mellitus, osteoporosis and depression. And also, daily practice can improve functional ability and postponement of age related disabling situations. These conditions recommend that all healthy people need to exercise regularly. According to Bryant and Peterson (1999), "The apparently healthy population is generally characterized as being both symptom-free and able to engage in relatively routine physical activity without undue cardiovascular or orthopedic risk" (p. 29). The workout programs may differ in terms of mode, frequency, duration, and intensity. Every person will respond and progress differently to a workout program based on physical activity prior to the start of the program. A person is able to adjust the level of workout based on the desires of their own body. Exercise and martial art practice can play an important role in sustaining better health and physical ability.

Martial arts and psychology

Sport psychology is an inter disciplinary science that draws on knowledge from many related fields including biomechanics, physiology, kinesiology and

psychology. It involves the study of how psychological factors affect performance and how participation in sport and exercise affect psychological and physical factors. In addition to instruction and training of psychological skills for performance improvement, applied sport psychology may include work with athletes, coaches, and parents regarding injury, rehabilitation, communication, team building, and career transitions (Weinberg, R.S. & Gould, D., 2010).

Martial arts can play a significant role in sustaining a healthy body, promoting people in better health as well as those who hurt from cognitive development and physical disabilities. In 2,000 B.C., the martial arts were evidence of practice and use was seen in many of the Asian countries (Lawler, 1996). For centuries, the martial arts were the "soldier's way", a system used to protect one's family and country. In China, some of martial arts were known as healing arts and have been used for centuries to improve physical and emotional health and improve the quality of life. In the twentieth century, the martial arts reached America at the beginning of commercialization.

Conclusion

The researchers found that the martial arts training reduced the level of aggressive behaviour in boys and girls, and found that they were more likely to step in and help someone who was being bullied than before they took part in the training. The Children aged between eight and eleven years old were tasked with traditional martial arts training that focused on respecting other people and defending themselves as part of an anti-bullying programme. The children were also taught how to maintain a level of self-control in heated situations. Significant changes were not found in the girls' behaviour, potentially because they showed much lower levels of physical aggression before the training than the boys did. Interestingly, this anti-aggression effect is not limited to young children. A different piece of research found reduced physical and verbal aggression, as well as hostility, in adolescents who practiced martial arts too (Ashleigh Johnstone, 2018).

As a result of the martial arts participation, or the person who is exercised, all nerve impulses will be more activated for better sensation resulting towards the mental balance and situational adjustments. The sensory organs and their actions for psycho physical adaptations will be effective and actively generated.

Everyone knows that regular exercise and physical activity programme can improve their physical fitness and healthy living condition, same as any regular martial art training programme can improve these qualities. Moreover, through martial art practice, many inner qualities may be developed – self awareness, self control, self confidence, focusing etc. In the modern era, increasing the number of martial art training centers in everywhere to teach and train different kind of martial arts for the following purpose namely general health, self defensive and competition. Every center keeps unique teaching and training methodology and also some technical implication.

Research scholar is trying to understand which martial art practice is more suitable for Kerala, within the nature and environmental condition of our god's own country. Research scholar selected many of the martial art forms for this study for the purpose of comparison among them to understand any differentiation on physical, physiological and especially in psychological characteristics. Within the limitation of research scholar, he confirmed that except kalaripayattu, many of the martial arts practice start with physical exercise after that they will go to teach attacking and defensive skills with and without weapon. In Kalaripayattu, there are different techniques like meipayattu (physical body exercise), vadipayattu (fight using sticks), valpayattu (fight using swords) and verumkaiprayoga (bare hand exercise).

One of the unique characteristics of Kalaripayattu, before stating body exercise, the body is well oiled. Oil massage is an integral part of body exercise. This is done to fine tune the body for the next step that is payattu (fight). Body movements together with oral instructions are practiced. The main advantage of the oil massage is fine tuning the body just like working condition of mechanical machine with well oiled. Another most advantage and uniqueness in kalaripayattu is

their own system of medicine based on Ayurveda and Kalarichikitsa (kalari treatment). It includes marmachikitsa, thirumal and vyayamachikitsa (physical exercise). There are different branches in kalarichikitsa. Marmachikitsa (treatment of vital parts) maintains a secret nature.

Many of the gurus, trainers of martial arts believed that, if children regularly practice of Kalaripayattu, then he or she cannot hit or beat or attack without any reason. They are practicing attacking and defensing skills during their practice and they understand that pain tolerance during fighting each other. Earlier research scholar understood, those who are practicing any kind of martial art, their self or inner qualities may be improved. Negative psychological characteristics like aggressive behavior, stress, loneliness etc. may be reduced. Research scholar well concentrates to understand the psychological characteristics of martial arts practitioners throughout this study.

Many of the research works are done in the effect of martial art practice on physical, physiological, psychological variables, and also done in the comparative analysis of martial art training. But research scholar understand that very few study were done in the Kerala own martial art – Kalaripayattu. With the limited martial art training background and some of the gurus and trainers suggested that to understand psychological characteristics of martial arts practitioners, first to survey practitioners those who had already learned their own practicing martial arts skills. These are the reasons why the scholar selected this study as physical, physiological and psychological profiling of martial art practitioners in Kerala.

Statement of the problem

The purpose of the study was to analyse the selected physical, physiological and psychological variables among different martial arts practitioners in Kerala.

Objectives of the study

1. To compare the selected physical fitness variables between male and female martial arts practitioners in Kerala.

2. To compare the selected physical fitness variables among different forms of martial arts practitioners in Kerala.

3. To compare of selected physiological variables between male and female martial arts practitioners in Kerala.

4. To compare of selected physiological variables among different forms of martial arts practitioners in Kerala.

5. To compare of selected psychological variables between male and female martial arts practitioners in Kerala.

6. To compare of selected psychological variables among different forms of martial arts practitioners in Kerala.

Hypotheses

Based on the research findings, the following hypotheses were drawn;

1. H_{S1} – Hypothesis - It was hypothesized that there will not be any significant difference in physical fitness, physiological and psychological variables between male and female martial arts practitioners in Kerala.

2. H_{S2} Hypothesis - It was hypothesized that there will not be any significant difference in physical fitness, physiological and psychological variables among different forms of martial arts practitioners in Kerala.

Delimitation

1. The study was delimited to a total of three hundred and sixty (N=360) martial arts practitioners from different regions of Kerala state consisting one hundred and eighty (N_m = 180) men and one hundred and eighty (N_w = 180) women subjects were selected.

2. The average age of the subjects was eighteen, 18 (±2).

3. The study was delimited to the following physical variables;
    a. Agility
    b. Arm shoulder strength and endurance
    c. Body composition
    d. Explosive leg power
    e. Flexibility
4. The study was delimited to the following physiological variables;
    a. Breath holding time
    b. Mean arterial pressure
    c. Resting pulse rate
    d. VO_2 Max.
5. The study was restricted to the following psychological variables;
    a. Aggression
    b. Athletic coping skill
    c. Emotional intelligence in sports.

Limitations

The subjects of this study were from various districts in the state of Kerala, their routine work and different training programmes based on which the following factors were considered as a limitations of the study:

1. This study was entirely based on the information provided by the concerned literature.

2. The heredity factors, which might have influenced the results of this study, could not be controlled.
3. The day-to-day activities, food habits, life styles of the subjects were not controlled.
4. Variations in meteorological status like atmospheric temperature, humidity etc., during the study period, could not be controlled.
5. The affect of uncontrollable factors such as sudden emotional disturbance of the subjects due to factors other than related to sports was considered as the limitation of the study.

Significance of the study

Martial art practice is suitable for anyone who is aware of the benefits of a healthy body and healthy mind. It boosts the energy and zeal of sportsmen, performing artists etc. The aim of the martial art is wholesome development of an individual, whose presence will benefit the family and society.

1. The study will help to compare the selected physical fitness, physiological and psychological variables between male and female martial arts practitioner in the state of Kerala.
2. The study will help to analyse significant differences if any in selected physical fitness, physiological and psychological variables among selected martial arts practitioners in the state of Kerala.
3. The result of the study may enable the male and female martial arts practitioner to understand their ability and capacities in their discipline.
4. The result of the study may enable trainers, physical education teachers and coaches to know the current capabilities and area of improvement of practitioners.
5. The result of the study may significantly help the other scholars to take up research projects in other states in India.
6. The selected physical, physiological and psychological variables will help to identify the talent, to enhance the top performance.

7. This study would be identify the best suitable martial art practice among the selected practices
8. The results of the study would benefit the physical education professionals, trainees, teachers and parents to adopt the best martial art forms in the curriculum design to improve psychomotor quality of the school children.

Working Definition and Explanation of the Terms

Martial Art

"Martial arts are codified systems and traditions of combat practices, which are practiced for a number of reasons: as self defense, military and law enforcement applications, mental and spiritual development; as well as entertainment and the preservation of a nation's intangible cultural heritage."

en.wikipedia.org

Judo

"A method of defending oneself or fighting without the use of weapons, based on jujitsu but differing from it in banning dangerous throws and blows and stressing the athletic or sport element."

dictionary.com

Kalarippayattu

"The word kalari first appears in Sangam literature to describe both a battlefield and combat arena. The word *kalari tatt* denoted a martial feat, while *kalari kozhai* meant a coward in war."

Suresh P. R. (2005)

Karate

"Karate is a Japanese martial art whose physical aspects seek the development of defensive and counterattacking body movements. The word karate is a combination of two kanji (Chinese characters): kara, meaning empty, and te, meaning hand; thus, karate means 'empty hand.'"

tulane.edu

Taekwondo

"Taekwondo is not only a combat sport, but is also a way of life for enthusiasts around the globe. The word Taekwondo itself is made up of three Chinese/Korean words: Tae, meaning to kick or jump; Kwon, meaning fist or hand; and Do, which means 'the way.'"

American Taekwondo Association

Wrestling

"A sport or contest in which two unarmed individuals struggle hand to hand with each attempting to subdue or unbalance the other"

Merriam-webster.com, 2016

Wushu

"A large classification of Chinese martial arts that exhibit flexibility, agility, and skill. It is a classified as a type of gung-fu."

Urbandictionary.com, 2017

Physical Fitness

"According to Davis, Physical Fitness refers to the ability of an athlete to perform successfully at their sport."

Davis, 2000

Agility

"Curbin defined as **'**the ability to rapidly and accurately change the direction of the movement of the entire body in space'."

Curbin,1994

Body composition

"According to Corbin and Lindsey**,** Body composition refers to the relative amount of muscle, fat, bone, and other vital parts of the body."

Corbin and Lindsey, 1994

Muscular Strength

"Muscular Strength is the maximum force that can be developed in a muscle or group of muscles during a single maximal contraction."

Elizabeth Quinn, 2007

Muscular endurance

"Muscular endurance is the ability of a muscle or group of muscles to sustain repeated contractions against a resistance for an extended period of time. Muscular endurance is one of the components of muscular fitness, along with muscular strength and power."

Elizabeth Quinn, 2016

Muscular Power

"Muscular power is the ability to generate as much force as possible, as quickly as possible. When the muscles in the body are used to perform high-intensity movements in short bursts, power is used."

Reference.com, 2016

Flexibility

"Paige Waehner says that 'a person's flexibility refers to the ability of your joints to move through a full range of motion. Having flexibility in your muscles allows for more movement around the joints'."

Paige Waehner, 2006

Physiology

"A branch of biology that deals with the functions and activities of life or of living matter (as organs, tissues, or cells) and of the physical and chemical phenomena involved"

Merriam-webster.com

Breath Holding Time

"Breath holding time is defined as the duration of time through which one can hold his/her breathe without inhaling and exhaling after a deep inhalation."

Strukic, 1981

Mean Arterial Pressure (MAP)

"MAP, or mean arterial pressure, is defined as the average pressure in a patient's arteries during one cardiac cycle. It is considered a better indicator of perfusion to vital organs than systolic blood pressure (SBP)."

www.nursingcenter.com, 2016

Resting Pulse Rate

"The total number of beats of heart per minute during rest is called resting pulse rate**."**

Shaver, 1982

VO_2 max

"It is defined as the greatest oxygen uptake obtained by an individual while breathing air at sea level during the performance of physical work."

Shaver, 1972

Sports Psychology

"Sport psychology is a proficiency that uses psychological knowledge and skills to address optimal performance and well-being of athletes, developmental and social aspects of sports participation, and systemic issues associated with sports settings and organizations."

American Psychological Association, 2000

Aggression

"Aggression is defined as any behavior directed toward intentionally harming or injuring among another living being**."**

Robert S. Weinberg and Daniel Gould, 2002

Coping

"Coping means to invest own conscious effort, to solve personal and interpersonal problems, in order to try to master, minimize or tolerate stress and conflict."

Weiten, W. & Lloyd, M.A., 2008

Emotional intelligence

"Emotional Intelligence is the innate potential to feel, use, communicate, recognize, remember, describe, identify, learn from, manage, understand, and explain emotions."

S. Hein-2007

Chapter II

Review of related Literature

2019

Department of Physical Education, University of Calicut

Chapter II

REVIEW OF RELATED LITERAURE

The Literature is alight of spirit of something. The literature in any field forms the foundation upon which all future work will be build. A study of relevant literature is an essential step to get a full picture of what has been done with regard to the problem under this study such a review brings about a deep and clear perspective of the overall field. So a number of books, journals and websites were referred.

In the following pages, an attempt has been made to present briefly a few of the important researches and studies conducted abroad and in India, as they have significant bearing on the present study. The researcher collected many reviews of the influence of different martial arts practices, but many of the martial arts practices have few literature and reviews, so the reviews of the literature have been ordered chronologically.

Donny WiraYudha Kusuma and Aris Mulyono, (2019) conducted the comparative study on Athletes Personality between Martial Art Sports in Central Java. Sports Psychology especially concerning emotional mental processes of athletes become increasingly decisive contributor in coaching and athlete performance improvement. There are differences in personality characteristics of each sport. This study compared athletes' personality characteristics in 4(four) martial art athletes in PPLOP of Central Java Province, Indonesia (Taekwondo, PencakSilat, Judo, and Karate). 31 athletes (11 taekwondo, 10 pencaksilat, 5 judo, 5 karate, 18 males, and 13 females) completed the SPQ-20 Sport Personality Questionnaire. This questionnaire is composed of four sub- scales of 20 personality traits. Data were collected by questionnaire and statistical analysis was performed with SPSS software. In order to describe the data, used descriptive for comparing the averages, used the test of MANOVA with post hoc of Games-Howell. The results revealed that karate athletes scored significantly higher on achievement, conscientiousness, visualization, intuition, goal setting, managing pressure, self-

efficacy, fear of failure, flow, emotion, self-talk, self-awareness, ethics, empathy, relationship and impression management. Pencaksilat athletes scored significantly higher on adaptability, stress management, power and aggressiveness. Taekwondo has highest average only on competitiveness variable. It can be concluded that athletes' personality characteristics are different between martial art sports.

Katarzyna Kotarska (2019) conducted this study on analysis of selected healthy behaviors and quality of life in combat events and martial arts practitioners. The main objective of the research work was to analyse the relationship between health behaviors and the quality of life of combat events and martial arts practitioners. The research scholar selected a total of 543 combat events and martial arts practitioners. Scholar further divided in to Three groups namely recreational practitioner group (n = 362), sports and game group (n = 115), and combat and martial arts competitors in master level (n = 66). The average age of the subjects was 24.49±7.82. The standardized questionnaires for healthy behavior and another questionnaire for a lifestyle survey were applied. The Kruskal-Wallis test was used to compare frequent independent samples. For the data analyses for achieving objectives, the trait frequency and the independence chi-square test were used. The effect size was calculated for each test. The p value ≤ 0.05 was assumed to be statistically significant. The peak quality of life in the physical, psychological, sociological and environmental areas was characteristic of the combat and martial arts competitors. They also showed the most health-oriented behaviors. The amazing results were: higher quality of life among people who were overweight and lower in the assessment of nondrinkers and nonsmokers. Research scholar had found positive correlations between practicing combative events and martial arts, health behaviours and higher scores in quality of life self-evaluation, predominantly where practitioners are exclusively focused on combative events and martial arts and practice these at a competitive level. So findings of the study support the promising evidence that competitive level combative events and martial arts are an effective means of enlightening people's quality of life. Future research needs to clarify whether combative events and martial arts can also be suggested to recreational and non-competitive practitioners as a means to improve their subjective quality of life.

Arvind Singh Rana and Dr. VK Shrivastava (2018), studied the Influence of selected physical variables on the performance of national level judokas. The purpose of the study was to determine the physical variables as determinants of judokas at nationallevel. The study was delimited to 50 national level male judo players between the age group of 18-27 years. The study was further delimited to the following variables: a) Physical variables: Grip Strength, Abdomen Strength, Shoulder Strength, Leg Strength, Strength Endurance, Reaction Ability and Agility. For the purpose of data analysis, researcher has used the statistical software known as SPSS version 20 and to find out the variables which are responsible for the performance of the judokas factor analysis was used to understand the structure of variables. The mean and standard deviation of all the variables were found for the selected test i.e. Abdomen strength test (56.20 + 8.88), Shoulder strength test (19.46 + 4.15), Grip strength test (44.09 + 6.69), Leg strength test (168.34 + 16.15), Strength endurance test (34.62 + 3.91), Reaction ability test (8.23 + 0.60), Agility test (9.99 + 0.60).

Ashleigh Johnstone and Paloma Marí-Beffa (2018) conducted a study entitled the influence of martial arts practice on attentional Networks in adults. There was significant evidence that the practice of martial arts is related with improvements in physical and mental abilities in children; but very few have been studied in healthy adults. Here, we studied the impact of martial arts training on cognitive function in adults. The research scholar used the test of Attention Network Test (ANT) to test two groups: first group was those who were practiced at least 2 years of martial arts and second group, those who had no experience with the sport. The scholar randomly selected 48 subjects. 21subjects in the Martial Arts group (mean age = 19.68) and 27 subjects in the Non-Martial Arts group (mean age = 19.63). The two groups were accorded on a number of demographic variables namely Age and BMI were found to significantly impact on attentional network measures. An influence of martial arts experience was found on the Alert network. In Addition, martial arts practitioners showed enhanced performance when alert had to be constant endogenously, performing more like the control group when an exogenous prompt was provided. This result was more long-established by a

negative correlation between number of years of martial arts involvement and the costs due to the lack of an exogenous cue proposing that longer the participation in the sport, the better their endogenous alert is. Results were interpreted in the context of the impact of training a particular attentional state in specific neurocognitive ways.

Fabio RA and Towey GE (2017) conducted a study on cognitive and personality factors in the regular practice of martial arts. The influence of daily practice of martial arts is measured controversial and studies in this field limited their attention to singular psychological benefits. The main objective of this study was to anlyse the relationship between the regular practice of martial arts and cognitive and personality factors, such as; attention, creativity and school performance, together with self-esteem, self-efficacy and aggression. The design consists in a factorial design with two independent variables (groups and age levels) and seven dependent variables (attention, creativity, intelligence, school performance, self-esteem, self-efficacy and aggression). The scholar selected 76 martial arts practitioners were compared with a control group with 70 participants those who were not involved in any martial arts training. Martial artists were further divided into groups of three levels of experience namely; beginners, intermediate and experts. Each subjects completed a test battery that measured all the cognitive and personality factors. Martial artists showed a better performance in the attentional and creativity tests. All the personality factors analyzed and found significant difference between the two groups, resulting in higher levels of self-esteem and self-efficacy, and decrease of aggressiveness. Regular practice of martial arts can affect many functional aspects, guiding to positive things on both personality and cognitive aspects, with implications in psychosomatic well-being, and in the academic field. The results were argued with reference to theories claiming that regular physical activity has a positive effect on many aspects of cognition.

Ardalan Shariat and et al; (2017) conducted the study entitled Kinanthropometric Attributes of Elite Male Judo, Karate and Taekwondo Athletes. This study aimed at establishing the kinanthropometric attributes of Judo, Karate, and Taekwondo athletes. The scholar selected the total of 42 elite male Judo with

average age of 21.7±2.9 years, 46 Taekwondo with average age of 21.1±2.6 years and 50 Karate with average age of 21.3±3.0 years practitioners were chosen randomly. The study determined and compared stature, body mass (BM), body mass index (BMI), fat mass (FM), lean body mass (LBM), body surface area (BSA), sum of skinfolds (∑SK3), percentage body fat (%BF), and somatotype. The findings of the present study revealed that within normal levels, the sampled Judo practitioners have significantly ($p<0.05$) higher in fat mass, particularly at the triceps and subscapular skinfold sites. This study also found that percentage of body fat and lower percentage lean body mass that either the Taekwondo and Karate athletes. In addition, the elite Judo practitioners showed a more significant ($p<0.05$) on endomorphic somatotype when compared to the Taekwondo and Karate athletes. These findings are essential in responsible the optimal kinanthropometric characteristics of elite male Judo, Karate, and Taekwondo athletes and may help in the context of talent identification.

Anna Harwood, Michal Lavidora and Yuri Rassovsky (2017) conducted a meta-analysis study on reducing aggression with martial arts of child and youth. Martial arts are suitable for energetic youth and their popularity spreads globally. Following a complete search of martial arts research, a critical review of the field and the psychological effects was conducted. The resulting meta analysis examined the effect of martial arts on problem at expressing behavior such as aggression, anger and violence. The final meta analysis included twelve studies, with 507 participants (ages 6 to 18), where study type was a moderator. For nine intervention and longitudinal studies, there was a homogenous effect size of 0.65 (95% CI: 0.11, 1.03) indicating a medium effect, where martial arts improved aggression amongst the practicing youth. The other three one time comparisons studies did not yield a homogenous effect size. Based on these analyses, it appears that martial arts has a possible to reduce externalizing behaviorism youth, although further research is needed to control the mechanisms of change and specify the most relevant population groups for targeted involvements.

Rajith, T.R and Dr. A. Mahaboobjan (2016) conducted this study and the objective of the present study was to analyse the effect of Kalaripayattu training programme on selected biochemical among intercollegiate basketball players. To achieve the purpose of the present study, twenty-four intercollegiate basketball players were selected from the Bharathidasan University, Tiruchirapalli, Tamilnadu . The subjects were randomly selected and their age ranged from 20 -25 years. The selected groups were divided in consisting of two groups, experimental and control group. The experimental group consisted of twelve basketball players and they underwent the medium of kalaripayattu selected skill training. Twelve Basketball players were not given any skill training, and they acted as control group. The duration of the training period was restricted to eight weeks and the session for alternative days in a week. Kalaripayattu training is considered as independent variables. The Biochemical variables (low density lipoprotein, total cholesterol and fasting blood sugar were measured in medical laboratory) were known as dependent variables. The statistical technique covariance ANCOVA was used to analyze the pre-test and post-test data of experimental group and control group. The results showed that the kalarpayattu training group had improved the level of all the selected biochemical variables as compared to the control group.

Leonardo Vidal Andreato and et al; (2016) conducted the study entitled Analysis of Body Composition, Somatotype and Physical Fitness of Mixed Martial Arts Practitioners. The scholars tried to pronounce the morphofunctional characteristics of elite mixed martial arts practitioners. Eight male Brazilian martial art practitioners, average aged, 31 ± 5 years with more than five training experience. The average height of the subjects was 1.77 ± 0.05 m, body mass leis in 82.1 ± 9.6 kg. the subjects is asked to evaluate the anthropometric variables namely; estimate body composition and somatotype and maximal strength (1 RM) in squat and bench press, abdominal and upper limb endurance and lower limb power. Results of the study revealed that body fat levels of 13.4 ± 5.6 %, lean mass levels of 69.6 ± 4.6 %, and mesomorphic component (6.4 ± 0.8) were observed. Practitioners completed 42 ± 14 sit-ups and 37 ± 9 push-ups, and remained for 35 ± 10 s in the flexed-arm hang test. Practitioners also reached 2.19 ± 0.31 m in the horizontal jump test and

obtained absolute 1-RM values of 80 ± 15 kg and 68.5 ± 6.0 kg and relative values of 1.00 ± 0.2 kg/kg and 0.84 ± 0.10 kg/kg in bench press and squat tests, respectively. Results indicated that body fat levels in agreement with other studies, high lean body mass, and a predominantly mesomorphic component. Abdominal and upper limb endurance were categorized as excellent, while results of the flexed-arm hang test were similar. Mixed martial arts practitioners' lower limb performance in the horizontal jump was classified as feeble. Lower levels of maximal strength were found in squat and bench press tests.

K. Jothi and Suji, (2016) conducted this study and the purpose of this study was to find out the effects of Tai Chi and reflexology on selected psychomotor variables among autistic children. 45 autistic children (N = 45) were randomly selected for this study. The selected subjects were divided into three groups, namely, experimental group I to undergo Tai Chi training, experimental group II to undergo reflexology and third group was considered as control group, which did not undergo any special treatment. Pre and post tests were conducted on all the 45 children before and immediately after experimental treatments on selected psycho motor variables, static balance and dynamic balance. The differences between the initial and final scores of the selected dependent variables were considered as the effect of experimental treatments using statistical tool ANCOVA. Results proved that tai chi and reflexology for 12 weeks, significantly improved psycho motor variables, static balance and dynamic balance compared to control group at 0.05 level. Comparisons between the treatment groups proved that there was no significant difference on static balance and tai chi was found to be superior than reflexology on dynamic balance. It was concluded that tai chi can be better used than reflexology to improve selected psychomotor variables, static balance and dynamic balance among autistic children.

Arghaya Mondal and Alauddin Shaikh (2015), studies a Comparison on Selected Physical Fitness Components among the Physical Education Students of Different Universities in West Bengal State. The main objective of the study was to compare the selected physical fitness variables among the physical education

students among different universities in the state of West Bengal. The scholar adopted random group design for the present study. The scholar also selected the equal numbers and assigned randomly to three groups of twenty subjects each. The first group was selected from Visva-Bharati University, second group from Calcutta University and third group was selected from Kalayani University. Analysis of variance (ANOVA) was used for comparing this study as statistical treatment. The result of the study clearly observed that the results showed that there was significant difference among different universities in agility and cardio vascular efficiency. The study further revealed that the mean differences in other variables studied, explosive power, were not significantly. The following conclusions were drawn on comparison of physical fitness variable agility and cardio vascular efficiency among Visva Bharati University, Kalyani University and Calcutta University proved that there was a significant difference between the students of Visva Bharati was significantly higher than other two university students. Also, there was mean differences between the groups in explosive power, the mean difference was not statistically significant and it was concluded that there was no significant differences between physical education students of all the universities.

Dr. Xavier Maria Raj (2015), conducted the study of comparison on selected physical fitness of male boxers, wrestlers and judokas. The result of the study revealed that statistically significant difference on selected physical fitness variables (speed, agility, power, flexibility and endurance) among boxers, wrestlers and judokas. A total of ninety sportsmen were selected from Uttar Pradesh and futher divided in to following category such as boxers, wrestlers, and judokas. The age group of the subjects was ranged between 18 to 23 years. The selected physical fitness variables were measures by using 50 meters dash, shuttle run, jump and reach, sit and reach and Harward step test. The data was analyzed by applying Analysis of variance and pair wise comparison analysis, Scheffe S post hoc test. The result of the study showed that there was found significant difference in all selected physical fitness variables among selected subjects. The following findings were drawn; the boxers showed a better capability in speed, agility and power, while wrestlers were better endurance and judokas with greater flexibility.

Fabricio Del Vecchio and et al; (2015) conducted the study entitled Health-related physical fitness in martial arts and combat sports practitioners. Purpose of the study was to evaluate health-related physical fitness in martial arts and combat sports practitioners. The scholar selected a total of 935 male practitioners of Brazilian jiujitsu, judo, karate, kung-fu, and taekwondo. They were evaluated using the fitness assessment tests recommended by the American College of Sports Medicine. Data were analyzed using descriptive statistics, correspondence analysis, and analysis of variance, with a significance level of 5 % in all analyses. Results Most subjects had a body mass index between overweight (karate, Brazilian jiujitsu and judo) and normal (kung-fu and taekwondo). The result of the study indicated that moderate risks in Waist–hip ratio and body fat percentage for all groups. Regarding VO_2 max, the kung-fu practitioners exposed lower scores compared to the Brazilian jiujitsu and judo practitioners, and also all groups were laid above average in comparison with the standard population. Moreover, most of the practitioners were categorized as below average regarding muscle strength in all styles, while the kung-fu practitioners were graded as poor. Concerning strength endurance all groups were classified as above average and the Brazilian jiujitsu group showed higher scores when compared to taekwondo and judo groups, the latter showing lower scores than the kung-fu group. Flexibility was classified as average in all groups, and the Brazilian jiujitsu group had lower scores when compared to the karate, taekwondo, and kung-fu groups. The following conclusion drawn based on the finding of the study, Trainers should create plans to improve muscle strength and body composition or practitioners should involve in other physical activities to attain a better result in these components, the only ones not above average.

Howard Z. Zeng, (2015) conducted this study and this study explored what reasons/factors can truly motivate athletes/students to continually participate in taekwondo practices and competitions in New York City (NYC). Participants were 85 taekwondo athletes (51 Boys, 34 Girls; age range 10-22 years) from seven taekwondo schools or clubs in NYC. Data collection was done by the standardized questionnaire of Taekwondo Student's Motivation. This questionnaire consist of 18

motivation factors (MF) and each motivation factor allows the participant responding in a 5-points Likert type scale (5 represents "Strongly-fit" and 1 represents "Not-it"). Data analyses included descriptive statistics and multivariate analysis of variance. Finding of the study revealed that, the top three factors were 'Technical content and unique value', 'For fun' and 'Shape body'; these three motivation factor obsessed the highest impact power on their motivation. The results of MANOVA revealed that significant differences were found in both 'Gender' and 'Belt-colors'; it indicates that males scored more than females in 'Shape body' and 'Become a professional'; females scored more than males in 'Establish prestige' and 'Self-defense'. As to Belt-Colors comparisons, Black scored more than Red in 'technical content and unique value'; blue better than Yellow in 'For fun' and Black scored more than Red in 'Make new friends'. The scholar concluded the study with following; the most important intrinsic motivation factors are; 'Value', 'Enjoyment', 'Self-esteem', and 'Physical needs' and extrinsic motivations are 'Develop skills', 'Establish prestige', 'Build-up friendship', and 'Contest winners'.

P Douris, and etal; (2015) conducted a study on Fitness levels of middle aged martial art practitioners. The main aim of the study was to quantify and compare fitness levels of middle aged practitioners of soo bahk do with those of sedentary subjects. The scholar selected 18 volunteers, 14 men and four women, aged between 40 and 60 years. All subjects joined in a one day for fitness tests. The following fitness variables were tested, namely; body composition, balance, flexibility, quadriceps strength, grip strength, muscle endurance, and aerobic capacity. All variables were analysed using dependent t tests. The result of the study revealed that SBD group was dominating Body composition than sedentary group ($p = 0.004$). The SBD group was able to balance than sedentary group ($p = 0.02$). The result of the study showed that sbd also more flexible than the sedentary group ($p = 0.01$). The number of push ups completed in one minute was 47.0 for the SBD group but 18.6 for the sedentary group ($p = 0.0003$), and the number of sit ups completed was 66.1 for the SBD group and 37.3 for the sedentary group ($p = 0.00006$). In the case Aerobic capacity, SBD group leaded ($p = 0.04$). Quadriceps strength was better in SBD than the sedentary group ($p = 0.02$). The result of the study revealed that Only

grip strength was found not significantly different. The result of the study found that there were significant differences between the groups for most of the physical fitness tests. The SBD practitioners showed better less body fat, flexibility, balance, aerobic capacity, muscle strength and endurance than the sedentary group. SBD can be reflected an excellent form of exercise for the promotion of fitness in adults. Health specialists should be alert that there are different methods to exercise that can increase the physical fitness and health of the middle aged population.

Samir Qasim, John Ravenscroft and John Sproule (2014) conducted this study and aimed to investigate whether karate practice improves the self-esteem of young adults with VI. The sub purpose of the study was to discover the exercise and self-esteem model on young adults with VI. The scholar selected the four males and one female (age range 19-40 years) with VI participated in this study. Self-Perception Profile for College Students was completed by four undergraduate students and Adult Self-Perception Profile completed one postgraduate student. But all the participants were completed the Physical Self- Perception Profile and the Exercise Self-Efficacy Scale. When the score constancy was achieved the interference was introduced. Each participant joined a 60-minute karate session twice a week for 10 weeks at the University of Edinburgh. The students finished all questionnaires every two weeks during the karate training program and a visual examination approach was used for data analysis. Visual examination showed that four participants improved their comprehensive self-esteem. Self efficiency was enhanced in three participants whereas the other two had great self efficiency before participation in the karate program. Most of the physical self awareness purviews were improved for all five participants while one participant did not develop one domain of the physical self awareness. Findings suggest that karate martial art practice may develop self esteem, physical self awareness and exercise self efficiency in young adults with VI.

Satpal Yadav, (2013) conducted on a comparison between male judokas and karatekas within body composition and physical fitness. The main aim of the study was to compare the physical fitness and body composition between male judo and

karate practitioners. The subjects were selected from the male Judokas and Karatekas of different colleges and training centers, who had participated last 2 years at Punjab state level competitions for this study. Ten (10) male Judokas and Karatekas from three different weight categories namely light weight, middle weight and heavy weight were selected as the subject for the study. The scholar selected the following Physical fitness variables such as 50 meter Dash, Shuttle Run, Shot Put, 600 yards Run or Walk and Bend and Reach Test and the following body composition namely; Standing Height, Weight, Humerus Biepicondylar, Wrist Diameter, Femur Biepicondylar, Ankle Diameter, Upper arm Circumference, Forearm Circumference, Thigh Circumference, Calf Circumference, Bicep Skinfold, Forearm Skinfold, Suprailiac Skinfold, Subscapular Skinfold, Thigh Skinfold, Calf Skinfold were presented to compare the male Judo and Karate practitioners from three different weight categories namely light weight, middle weight and heavy weight. To compare the significant difference of selected and physical fitness and body composition variables among the male Judo and Karate practitioners from three different weight categories namely light weight, middle weight and heavy weight, the analysis of "mean, standard deviation and t test" was applied with 0.05 level of significance. The judo practitioners were found to be taller and greater in diameters and circumferences and leaner in all skinfolds except suprailiac skinfold. The karate practitioners found to be heavier and greater in upper arm and forearm circumferences and leaner in suprailiac skinfold than judo practitioners. However, the Judo practitioners found greater in bone mass, muscle mass and less fat percentage than Karate practitioners. Moreover Judo practitioners have more speed, coordinative ability and endurance than Karate practitioners.

Shirley S. M. Fong, Shamay S. M. Ng and Louisa M. Y. Chung (2013), conducted the study on Health through martial arts training: Physical fitness and reaction time in adolescent Taekwondo practitioners. The main aim of study was to compare flexibility, muscular endurance, body composition, and simple reaction time between trained adolescents and controls. The scholar selected a total of 20 trained adolescents aged between 10 and 14 and 20 healthy control group, and asked to perform five physical fitness tests: a sit and reach test, leg split test,

skinfold measurement, one minute curl up test and ruler drop reaction time test. The results of the study revealed that there was no significance differences between two group in sit-and-reach distance ($p = 0.690$), leg split angle ($p = 0.789$), percentage of body fat ($p = 0.342$) and number of repetitions in the one minute curl up test ($p = 0.250$). Whereas, the TKD group had significantly faster reaction times in the ruler drop test than the control group ($p = 0.005$). The results again suggested that TKD training may improve reaction times in adolescents, it may have tiny effect on flexibility, muscular endurance and body composition. It may be concluded that TKD may be suitable exercise for enlightening simple reaction time, but it may not be appropriate for improving general physical fitness in adolescents.

N. Anilkumar (2013) conducted a study on comparison of selected fitness components of male combative athletes. Most of the skill execution and applying techniques in the sports such as boxing, wrestling and judo were based on the basic fitness components. The purpose of the study was to analyse the existence of significant difference on selected fitness components namely; agility, endurance flexibility, power and speed among combative athletes. For this purpose, ninety athletes from different combative event namely boxers, judokas and wrestlers were selected and further divided into each category, 30 athletes were selected. Their age group ranged between 18 to 23 years. The selected variables were measures by using appropriate test such as; shuttle run, Harward step test, sit and reach, jump and reach and 50 metres dash. The data were analyzed by applying one way ANOVA and Scheffe post hoc test. The result showed that there was significant difference in all the selected physical fitness components among combative athletes. In the case of agility, power and speed, the boxers showed a better capability whereas better endurance showed in wrestlers and greater flexibility with judokas.

Emerson Franchini and et al; (2012) conducted this study and this study focuses on the most important physical and physiological characteristics of karate athletes from the available scientific research. It has been recognized that top level karate performer require a high fitness level. The scholar selected the Top level male

karate practitioners were characterized by low body fat and mesomorphic and ectomorphic somatotype characteristics. This result of the study deals that the body composition and somatotype of females were uncommon. In the case of aerobic capacity, the results reported that it was play a major role in karate performance. It avoids fatigue during training and promises the recovery processes during rest periods between two succeeding bouts of fighting activity within a fight and between two consecutive matches. The study has been established that there was no significant difference between male and female kata and kumite practitioners with regard to aerobic performance. However, further studies were needed to support these findings. Regarding anaerobic performance, there was a significant difference was found in maximal power explored by the force velocity test between national and international level karate practitioners whereas, for the extreme accumulated oxygen deficit test there is no difference between them. The study revealed that muscle explosive power plays a key role in a karate practitioner's capacity for high level performance. However, it has been revealed that vertical jump performance, maximal power and maximal velocity differed between national and international level karate practitioners. Furthermore, the study has been reported that karate performance trusts more on muscle power at lower loads rather than higher ones. Therefore, karate practitioner decisive actions are basically dependent on muscle explosive power in both the upper and lower limbs. With respect to active strength, few researches have been conducted. More research is required regarding the physiological characteristics of female karate practitioners, the differences between kata and kumite practitioners and variations based on weight categories.

Mieczysław Radochoński and etal; (2011) conducted the study on relationship of anxiety and coping strategies and martial arts and track and field performance. The scholar selected 72 track and field athletes and 60 karate practitioners, those who had been practicing their own event for more than six years. The average age group of the subject was 20.5 years (±3). The scholar collected the data by using the following instruments namely; Competitive State Anxiety Inventory-2 (CSAI-2) and the Coping Inventory for Stressful Situations (CISS). The Results of the study shows that martial arts practitioners found a significantly higher

level of self-confidence and lower levels of cognitive and somatic anxiety compared to track and field athletes. The martial art practitioners were found more effective strategies such as task-oriented coping. They also had higher scores on less effective coping subscales, e.g. emotion-oriented and avoidance-oriented. The result of the study also revealed that the significant positive relationship between anxiety and performance level in competitive stress situations.

Kimberley D. Lakes and William T. Hoyt (2010) conducted a study on the impact of school level Tae Kwon Do training on self governing abilities was examined. In this study the scholar presented a self governing context including three domains (physical, cognitive and affective). A total of two hundred and seven students from nursery and standard 5 were randomly selected and further divided in to following ways; the martial arts group and traditional physical education group. The results of the study revealed that after three month of training indicated that the martial arts group found better developments than the traditional physical education group in the following areas, Namely; cognitive and affective self governing, pro social behavior and performance of math test. In intervention analysis, there was a significant difference was found for cognitive self governing and classroom conduct. It concluded that boy students showing better developments than girl students. This interaction result suggested that, for the improvement of self governing in school level children, three months of martial arts training are considered.

Jikkemien Vertonghen and Marc Theeboom, (2010) conducted this study. The main objective of the study was to deliver an outline of the major findings of studies concerning the psycho social outcomes of martial arts practice. Research scholar collected more than three hundred and fifty papers and around twenty five papers encountered to this study. This study revealed that a considerable quantity of investigation on psycho social outcomes of martial arts practice has been conducted. The research scholar revealed that there was no much clarity in the existing dichotomy concerning the probable effects of martial arts participation. It was also proposed that a well understanding could be provided if specific important following aspects in the future research are taken into account; social framework and

operational potentials of the sport, characteristics of participants and type of leadership.

Thomas W. Woodward, MD (2009) conducted this study and the purpose of the study was to find out the effects of Martial arts practice on Health aspects. In ancient age, martial arts were practiced for combat and war purpose and in the modern era, the different forms of martial arts are modified for sport competitive and exercise purpose. Now a days, Increasing the participation in the martial arts especially from youth. It offers significant and health encouraging exercise for many of practitioners. Benefits of martial arts practice include better complete health and balance, and also improved sense of psychosomatic wellbeing. They didn't endorse aggression. The martial arts might be used as dealing modality for violated youth. This study provides a summary of martial arts for doctors assess injuries during their practice. Doctors were recommending martial arts to injured patients as a rehabilitation form of exercise. The result of the study revealed that there was a significant difference on comparison between martial arts other sports, and thus it concluded that most of the martial art forms injuries were comparatively lesser than the other sports.

Joseph M Strayhorn and Jillian C Strayhorn (2009) conducted this study. The major significance of the martial arts practice for children was to improve their mental health skills namely; concentration, self confidence, self esteem and self discipline. Many of the parents are ready to join their children in martial arts for above said development of mental health skill. This was a longitudinal Study and collected data from early childhood to evaluate the effects of martial art form on selected mental health variables. The research scholar was collected data from kindergarten, first standard and second standard. Teachers were measured classroom behavior by rating scale; by parent's interview, participation in martial arts was measured. To estimate the connotation between martial arts participation and change in classroom behavior from one measurement occasion to the next, multiple regressions was used. The analysis was revealed that significant change in behavior from first to second standard. In this study, null hypothesis was rejected and

effective size of the population varies from zero. The data fail the children to maintain joining in martial arts for improving mental health skills.

Vrije (2009) conducted the study entitled ‘effect of martial arts involvement in general and with special reference to youth. The main aim of the study was focus to assume negative effects of martial arts to personal and social well being. The super purpose of the study was to find out the association between martial arts and positive socio psychological outcomes. For the study, forty young children in five different martial art forms were interviewed about their experiences and views on training, competition, behavior and participation motives. The age group of the subjects ranged between eight and twelve years. Findings of the study revealed that significant relationship between martial arts practice and positive socio psychological factors. This study concluded that the experiences of martial arts in children would take different approaches of martial arts practice into account.

Dr. Richard C. Bell (2008) conducted this study and he stated the objective of the study was to find out the effects of taekwondo training on personality. The scholar found that participants of taekwondo showed that the taekwondo training highlighted participants’ self control, self discipline and concentration. The research scholar also suggested that many of the psychological benefits were noticed; such as improved self-concept, enhanced self-esteem, reduced anxiety and aggressiveness and improved leadership quality. This research scholar also revealed that taekwondo training might be used as a therapeutic program

Mark A. Wargo and etal; (2007) conducted a study on personality characteristics of martial artist. In this study, MM personality inventory - II was used to collected date on the personalities of yellow colored and black colored belt martial artists. To achieve the purpose of the study, the scholar selected forty martial art practitioners and they were completed the MM personality inventory – II and a questionnaire of demographic status. Black colored belt female martial art practitioners tend to less defensive than were other martial art practitioners. Female martial art practitioners of both ranks described that a higher level of anxiety and health concerns than the male martial art practitioners, and also found that black belt

female athletes have more family problems than other groups. Lastly, the result of the study revealed that black belt martial art practitioners have more health worries than yellow belts.

Richard A. Martin (2002) conducted the research study entitled the physical and psychological benefits of martial art practicing for individuals with disabilities. The purpose of this study was to analyse the physical and emotional aids of martial arts training for persons with disabilities. Three specific research objectives placed: To find out martial arts training lead to a reduction in the functional limitations caused by an individual's disability. To find out the martial arts practice improve self-esteem, and instill confidence in people with cognitive, developmental, and/or physical disabilities. To find out the improvement of martial arts an individual's perceived quality of life through the development of physical and mental fitness. A survey based questionnaire was used to collect related information. Results suggested that martial art training does help improve physical functioning, especially in the areas of increased strength, balance, and stamina. In addition, survey respondents reported an increased sense of well being and overall improvement quality of life. Inference for inclusion of individuals with disabilities in martial arts training was discussed

Szabo, A., Parkin, A. M conducted a study that effect of martial art training on the psychological variables. The main objective of the study was to findout the impact of one week deprivation period from martial art training at black colored and brown colored belt levels in Shotokan karate and also to find out in the gender wise comparison whether any difference in training effects. The research scholar randomly selected 20 martial arts practitioners were selected and tested in two main divisions – one containing of before training, during training and deprivation periods after training and the second of a starting period. Each division continued for two weeks. The selected subjects filled the questionnaire of Well Being and the Inventory of Mood States. Each participant involved in both main divisions of the study and during the deprivation period, they abstained from all physical activity. The results of the study were shows that in tension, depression, anger, negative affect and total mood disturbance significant growths were realized. During the

deprivation period, those variables increased more. In the case of positive affect and vigour, there was a significant reductions were observed. In the gender wise comparison, there was no significant differences were found. Scholar was drawn following conclusion - severe mood disturbance during one week abstinence from training of advanced martial art practitioners in Shotokan karate and that was self determining of the gender of the individual.

Terry PC and Slade A conducted a study on significant effect of psychological condition in predicting performance in competition. A total of two hunred and eight Male Shotokan karate players were selected for the study and filled the CSAI – 2 (Competitive State Anxiety Inventory-2) and the PMS (Profile of Mood States) during 40 minutes before the competition. MANOVA was used and result of pre performance mood and anxiety showed significant differences between winning and losing competitors. Winners scored higher on Vigor, Anger, and sureness, and lower on Tension, Depression, Fatigue, Confusion, psychological feature Anxiety, and physical Anxiety. Discriminant perform analysis showed that 91.96% of participants may be properly classified as winners or losers on the idea of pre-performance mood scores. This figure rose to 93.47% once scores on the anxiety subscales were additionally enclosed within the discriminant perform analysis. Anxiety scores alone made 78.89% discrimination. Mood profiles for winning karateka were in line with the "mental health" profile of Morgan aside from above-average scores on Anger. This result supports the read of McGowan and Miller that anger might facilitate performance in martial art competition. The capability of measures of mental state to discriminate performance exceeds previous reports, suggesting that martial art performance could also be exceptionally mood-dependent. These results counsel that interventions that increase scores on Vigor and Anger and scale back scores on Tension, Depression, Fatigue, and Confusion could also be significantly efficacious for Shotokan martial art performance.

Summary of literature

All the research studies presented in the chapter proves that above mentioned training packages contributed significantly in improving the selected

variables. The research studies were reviewed from many journals available in the websites.

It is also observed from the review of related literature that there is no research was done on the analysis of physical physiological and psychological variables of martial arts practitioners of Kerala. The studies were done in different types of martial arts especially Judo, Karate, Teakwondo, wrestling etc., but very few studies are done in the traditional Kerala forms of martial arts, Kalaripayattu martial arts. This inference has motivated the researcher to take up the study.

CHAPTER III

Methodology

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METHODOLOGY

In this chapter, the research scholar prepared and explained the methods and procedures adopted in the study. It has been explained under the headlines of selection criteria of subjects, selection of variables and appropriate test items, data collection procedure, reliability of data, instrument and subject, orientation procedure of subjects, administration of selected test and questionnaires, and statistical tools used for the study.

Selection of Subjects

To achieve the purpose of the study, the investigator randomly selected a total of three hundred and sixty (N = 360) different martial arts practitioners from northern region of Kerala stat; Kannur, Calicut, Malappuram, Palakkad and Thrissur districts. The average age was 18 (±2) years. The training age of subjects was a minimum of two years in their respective form of martial art. The total subjects were equally divided (n = 180) into male and female group. The break up of the subject is given in the following figure.

a. Judo (male – 30 and female – 30)

b. Kalaripayattu (male – 30 and female – 30)

c. Karate (male – 30 and female – 30)

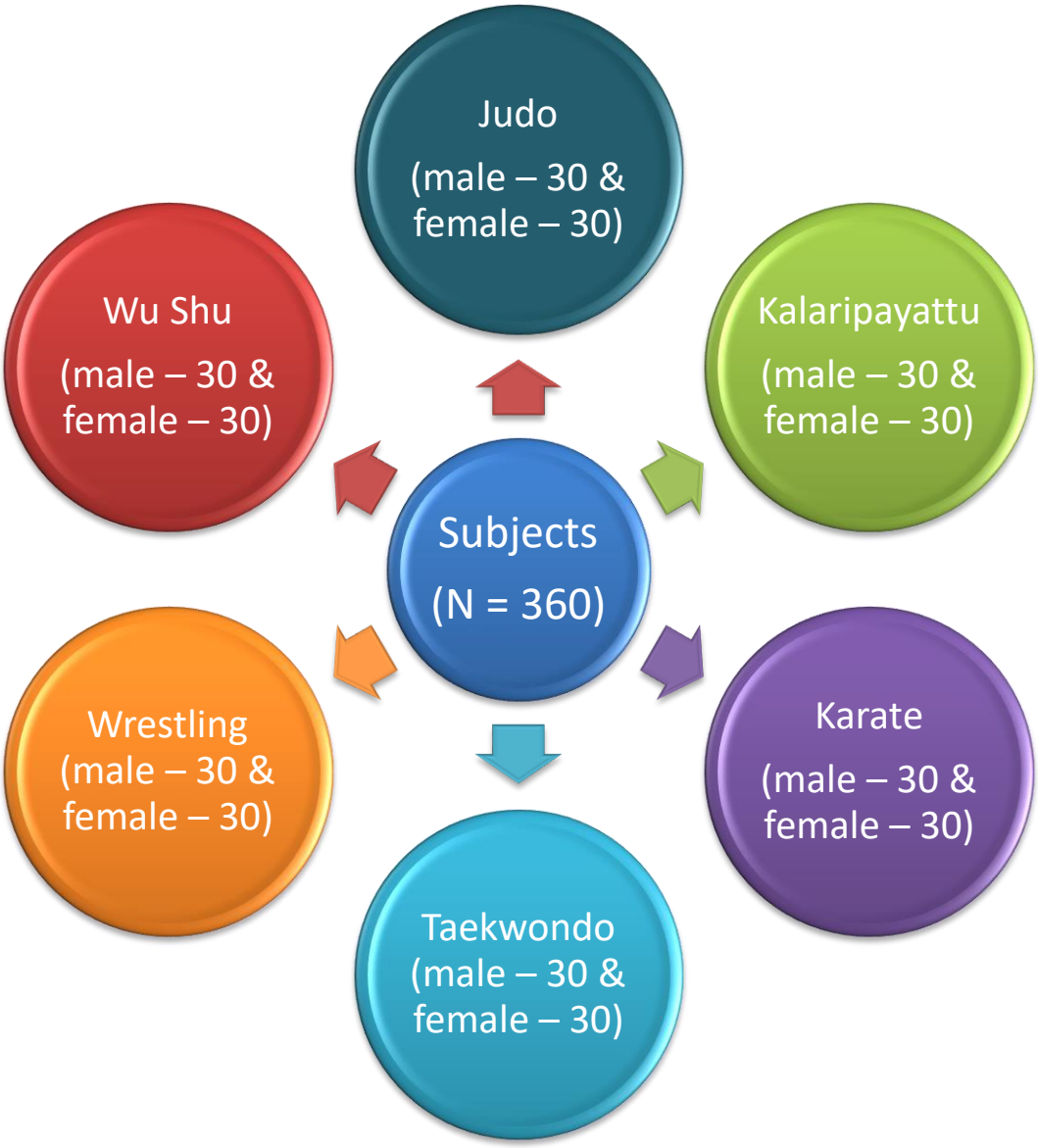
d. Taekwondo (male – 30 and female – 30)

e. Wrestling (male – 30 and female – 30)

f. Wu Shu (male – 30 and female – 30)

Figure 3.1

Selection of subjects



Selection of variable

I. Physical fitness variables

1. Agility
2. Arm shoulder strength and endurance
3. Body composition
4. Explosive leg power
5. Flexibility

II. Physiological variables

1. Breath holding time
2. Mean arterial pressure
3. Resting pulse rate
4. VO_2 Max

III. Psychological variables

1. Aggression
2. Athletic Coping Skill
    a. Coping with adversity
    b. Coachability
    c. Concentration
    d. Confidence and achievement motivation
    e. Goal setting and mental preparation
    f. Peaking under pressure
    g. Freedom from worry
3. Emotional intelligence in sports
    a. Self confidence
    b. Self awareness
    c. Self control
    d. Motivation
    e. Empathy
    f. Social competence

Selection of tests

Table 3.1

Test items

No.	Variable	Tool	Unit of Measurement
I. Physical			
1	Agility	9 mts X 4 Agility test	In second
2	Arm shoulder strength and endurance	Push-ups for male and Modified push-ups for female	In numbers
3	Body composition	Using Skin fold caliper	In millimeter
4	Explosive leg power	Standing broad jump	In meters
5	Flexibility	Sit and reach test	In centimeters
II. Physiological			
1	Breath holding time	Stop watch, Holding time	In second
2	Mean arterial pressure	BP monitor	In mm of hg
3	Resting pulse rate	Stop watch, No. of pulse/ min	Beats per Minute
4	VO_2 Max	"Astrand – Rhyming Nomogram Chart" method	In liters per minute
III. Psychological			
1.	Aggression	Dr. Tiwari and Chouhan (1971)	In numerical Score
2.	Athletic Coping Skill Inventory a. Coping with adversity b. Coachability c. Concentration d. Confidence and achievement motivation e. Goal setting and mental preparation f. Peaking under pressure g. Freedom from worry	Dr. Smith et al. (1994)	In numerical Score

3	Emotional intelligence in sports a. Self confidence b. Self awareness c. Self control d. Motivation e. Empathy f. Social competence	Dr. Lalit Sharma (2014)	In numerical Score

Collection of data

The data pertaining to the selected physical fitness variables such as Agility, Arm shoulder strength and endurance, Body composition, Explosive leg power and Flexibility; selected Physiological variables namely Breath holding time, Mean arterial pressure and Resting pulse rate, VO_2 Max; selected Psychological variables; namely aggression, athletic coping skill (Coping with adversity, Coachability, Concentration, Confidence and achievement motivation, Goal setting and mental preparation and Peaking under pressure and freedom from worry) and Emotional intelligence in sports (Self confidence, Self awareness, Self control, Motivation, Empathy and Social competence) were collected by utilizing standardized tests and questionnaires.

Reliability of data

The reliability of data was entered by establishing the instrument reliability, tester reliability, tester competency and reliability of tests.

Instrument reliability

Stop watches, measuring tape, fitness equipment and standardized questionnaires were used to collect the data for this study. They were obtained from standard firms. In all occasions, the measurements showed the same reading and therefore the instruments were considered reliable.

Orientation of the subject

The investigator explained the objectives of the study to the subjects after their regular martial art training program. He also explained the testing procedure for selected variables and gave instruction to the subject about the procedure of measurement.

Subject reliability

The subject reliability was established by test and retest coefficient of correlation for this scores in each of the criterion measures. Retesting was done with in a period of a week of final test in each of the criterion measures to get data for calculating test and retest coefficient of correlation for reliability of the subjects.

Table 3.2

The Coefficient of correlation obtained for test re test scores

Sl. No	Dependent Variables	Co-eff. of Correlation
Physical variables		
1	Agility	0.93*
2	Arm shoulder strength and endurance	0.92*
3	Body composition	0.90*
4	Explosive leg power	0.85*
5	Flexibility	0.92*
Physiological variables		
6	Breath holding time	0.93*
7	Mean arterial pressure	0.92*
8	Resting pulse rate	0.90*
9	VO_2 Max	
Psychological variables		
10	Aggression	
11	Athletic Coping Skill Inventory i. Coping with adversity	0.90*
	ii. Coachability	0.92*
	iii. Concentration	0.89*
	iv. Confidence and achievement motivation	0.86*
	v. Goal setting and mental preparation	0.92*
	vi. Peaking under pressure	0.88*
	vii. Freedom from worry	0.90*

12	Emotional intelligence in sports i. Self confidence	0.85*
	ii. Self awareness	0.92*
	iii. Self control	0.88*
	iv. Motivation	0.85*
	v. Empathy	0.92*
	vi. Social competence	

** Significance at 0.05 level of confidence (∞ r0.05 with df of 358 (0.09)*

Test Administration

I. Physical variables

1. Agility

Test: *Shuttle Run test*

Purpose: to measure agility

Equipment and Facilities: 2 wooden blocks, a stopwatch and marking powder

Procedure: Tester marked two lines, one line for stating and second line marked 10 mtr apart from the starting line and parallel to them for the test. The two wooden blocks were placed behind the starting line. The subject (martial art practitioner) was asked to stand from behind the starting line. On the command` ready` and 'Go`, the tester started the watch and the martial art practitioner ran towards the blocks, picked up one block, ran back to the starting line, placed the block behind the starting line. Suddenly ran again towards the block and picked second block. As soon as the second block was placed on the ground the tester stops the watch and records the time.

Scoring: Two trials were allowed to each subject with some rest in between. The best time of two trials recorded as the score of the agility test item.

2. Arm shoulder strength and endurance

Test: *Push Up for Men*

Purpose: To measures upper body strength and endurance.

Equipment required: a floor mat and stopwatch

Procedure: The martial art practitioner asked to place their hand and toes on the floor, the body and legs keeps in a straight line, feet slightly apart from each other, the arms keeps at shoulder width apart and fully extended and at a right angle to the body. Keep the back and knees straight, the martial art practitioner lowered the body to 90-degree angle at the elbows and then go back to the starting position with the arms extended. This action was repeated, and push up continues until tiredness or had reached the target number of push-ups.

Scoring: Record the number of correctly completed push-ups.

Test: *Bent Knee Push Up for Women*

Purpose: To measures upper body strength and endurance.

Equipment required: a floor mat and stopwatch

Procedure: The subject asked to lie on floor in prone position with hands was placed slightly wider than shoulder width. The subject Bent the knees and body rose up from the floor with extended arms and keep body straight. Bent their knees and lower body set to the floor by bended arms. From that position, the subject asked to push body up until arms were extended. This action was continued, and test continued until tiredness or had reached the target number of push-ups.

Scoring: Record the number of correctly completed push-ups.

3. Body composition

Test: *Skin fold measurement by using skin fold caliper*

Purpose: To assess the level of percent body fat (%BF) can be determined using the following Siri Equation.

Male

4-Site Skin fold Equation (for calculating % body fat)

% Body Fat = **(0.29288 x sum of skin folds) – (0.0005 x square of the sum of skin folds) + (0.15845 x age) – 5.76377, where the skin fold sites (measured in mm) are abdominal, triceps, thigh and suprailiac**

Female

4-Site Skin fold Equation (for calculating % body fat)

% Body Fat = **(0.29669 x sum of skin folds) – (0.00043 x square of the sum of skin folds) + (0.02963 x age) + 1.4072, where the skin fold sites (measured in mm) are abdominal, triceps, thigh and suprailiac**

Skin fold sites

1. Abdominal Skin fold

The abdominal skin fold site was very common location used for the assessment of body fat using skin fold calipers.

Landmark: a mark was made 5 cm adjacent to the umbilicus (belly-button), to the right side.

Pinch: The vertical pinch was made at the marked site, and the calipers placed just below the pinch. Be careful not to place the caliper or fingers inside the navel.

2. Triceps Skin fold

In the assessment of body fat by using skin fold caliper, the triceps skin fold site was very important location.

Landmark: At the level of the mid-point between the acromial and the radial, on the middle point of the back surface of the arm in excess of the triceps muscle.

Pinch: The arm should be relaxed with the palm of the hand facing forwards (supinated). A vertical pinch, parallel to the long axis of the arm, was made at the landmark.

3. Thigh Skin folds

Another most common skin fold location used for the assessment of body fat was anterior thigh skin fold site.

Anterior Thigh Landmark: Tester marked the middle point of the anterior surface of the thigh, halfway between patella and inguinal fold.

Pinch: the subject was asked to sit and asked to bend the knees at right angles. Then tester was pinch vertically was taken.

4. Supraspinal Skin fold

The forth site of skin fold site for assessing body fat was supraspinal site.

Landmark: The connection of a line linking the spinal and the front part of the axilla and a horizontal line at the level of the iliac crest.

Pinch: The pinch was directed towards the centerline and downward, following the natural fold of the skin (at an approximate angle of 45 degrees).

4. Explosive Leg Power

Test: *Standing broad jump*

Purpose: To measure leg muscular strength.

Equipment and facilities: Marking powder, Jumping pit and steel tape.

Administration: The subjects were asked to stand behind the starting line with the feet parallel to each other. He was instructed to jump as far as possible by bending knees, swinging arms to take off for the jump in the forward direction. There trails were allowed in each subject.

Scoring: The score of the test was measured the distance between the starting line and nearest point of landing provided by subject. The best trial was used as the final score of the test.

5. Flexibility

Test: *Sit and reach test*

Purpose: To measure flexibility of the lower back

Equipment: A sit and reach test apparatus.

Administration: The subject was asked to remove her shoes and sit on the floor with feet against the testing apparatus. The apparatus was placed against a wall to prevent it from sliding. The subject fully extended the legs, with the feet about shoulder width apart; tester held subject's knees to ensure the bending of knee her arms forward with hands placed on top of each other bending forward along the measuring maximal position for 1-2 seconds on the fourth trail.

Scoring: the maximum distance reach was recorded to the nearest $1/10^{th}$ of a cm.

II. Physiological variables

1. Breath Holding Time

Purpose: Used to measure the ability of the subject to hold the breath for longer time duration.

Equipment and facilities: Stop watch with calibration of nearest tenth of a second.

Procedure: The subject stood at ease and in-hailed deeply after which he or she held his or her breath for a length of time that was possible to him or her. The index finger of the respondent was served as an indicator for the researcher to know the start and end of the recorded time. Thumb and the center finger were used to hold the nose to avoid letting the air through the nostrils. Subjects were requested not to let the air out by opening the mouth while recording the breath holding time.

Scoring: The time of maximum holding the breath was clocked by using the stop watch. This was considered as the breath holding time.

2. Mean arterial Pressure

Purpose: To measure the blood pressure.

Equipment: BP Monitor

Administration: The individual was seated quietly in a chair with his feet flat on the floor and his arm at heart level for at least 5 min before his blood pressure is measured. Two measurements were performed. Systolic blood pressure was determined the point at which the first of two or more sound are heard, and Diastolic blood pressure was determined by the point right before those sounds disappear.

For evaluating blood pressure the investigator took blood pressure test at the time recovery period after martial arts training programme. So that the investigator could know how much effected to the subject, doing martial arts workout

Scoring: The values were recorded in mm of hg

$$\textbf{Mean arterial pressure} = DBP + \frac{SBP - DBP}{3}$$

3. Resting Pulse Rate

Purpose: To measure the heart rate during the resting time.

Equipment: A stop watch.

Description: The subjects were informed about taking their pulse rate the day before. On the next day morning before the subject woke up the researcher counted the pulse rate on the radial artery for 15 seconds.

Scoring: The total number counted for 15 seconds were multiplied by the resting pulse rate for 1 minute.

4. Vo_2 Max

Purpose: To measure the maximum volume of oxygen that an individual can use.

Equipment and facilities: Motorized treadmill to ascertain submaximal heart rate, platform balance to ascertain body weight.

Procedure: The subject was asked to stand on the treadmill facing the monitor with his feet on either side of the conveyor belt. The pulse detector was fixed on his right ear-lobe. The monitor was switched on and all the readings showed '0' except the resting pulse rate of 72 beats/minute. The treadmill conveyor belt was switched on and speed showed 3 kmph. The subject stepped on the conveyor belt and started walking. In one and a half minutes, the speed was raised to 7 kmph. The subject was now required to walk briskly to cope with the increased speed. At the end of 10 minutes of brisk walking at a speed of 7 kmph, the treadmill was stopped and while the subject stood still, his submaximal heart rate as shown on the digital monitor was recorded. The maximum heart rate attained soon after 10 minutes of submaximal exercise was recorded as the submaximal heart rate of the subject. Unit of measurement was number of beats per minute.

While the subject stood still facing the scale of the platform balance, the investigator adjusted the weight plates and measured their body weight as accurately as possible to the nearest hundredth of a gram. Unit of measurement was kilograms.

The VO_2 max of each subject was predicted from the Astrand – Rhyming nomogram by drawing a diagonal across their submaximal heart rates and corresponding body weights on the chart. Unit of measurement was liters per minute. (Astrand and Rhyming, 1954).

III. Psychological Test

1. Aggression

One dimension of the frustration test was selected which is, devised by Dr. Tiwari and Chauhan (1971) to measure the general aggression level, it consist of ten statement each items had five answers.

Scoring: The aggression test has ten statements. Each of the ten items has five answers from very much to not at all. A score of five was given to the response very much, four for much, three for ordinary, two for less, one for very less and zero for not at all. The high score indicate that the score present of more aggression and the lowest score indicate no aggression.

The score obtained for the aggression were added together and consider for statistical treatment.

2. Athletic Coping skill

The Athletic Coping Skills Inventory (ACSI) was measured of an athlete's psychological skills, developed by Dr. Smith et al. (1994). Determine the score on the following subscales by adding the scores on the question numbers identified. Also, note the following numerical scales associated with the ratings.

0 = almost never

1 = sometimes

2 = often

3 = almost always

There were some reverse scored items in this questionnaire, that was indicated with * after a question number, which means 0 = almost always, 3 = almost never and so on).

a. Coping with adversity: This subscale of ACSI, measures if an athlete remains positive and excited even when things are going badly, remains calm and controlled, and can quickly bounce back from mistakes and setbacks. The score of coping with adversity was the sum total of the following question numbers - 5, 17, 21, and 24.
b. Coachability: coachability evaluates if an athlete is open to and learns from instruction, and accepts constructive criticism without taking it personally and becoming upset. The score of coachability was the sum total of the following question numbers - 3*, 10*, 15, and 27
c. Concentration: This subscale reflects whether an athlete becomes easily distracted, and is able to focus on the task at hand in both practice and game situations, even when adverse or unexpected situations occur. The score of this sub scale was the sum total of the following question numbers - 4, 11, 16, and 25.
d. Confidence and achievement motivation: Measures if an athlete is confident and positively motivated, consistently gives 100% during practices and games, and works hard to improve his or her skills. The score of concentration and achievement motivation was the sum total of the following question numbers - 2, 9, 14, and 26.
e. Goal setting and mental preparation: Assesses whether an athlete sets and works toward specific performance goals, plans and mentally prepares for games, and clearly has a game plan for performing well. The score of goal setting and mental practice was the sum total of the following question numbers - 1, 8, 13, and 20.
f. Peaking under pressure: Measures if an athlete is challenged rather than threatened by pressure situations and performs well under pressure. The score of this sub scale was the sum total of the following question numbers - 6, 18, 22, and 28.
g. Freedom from worry: Assesses whether an athlete puts pressure on him or herself by worrying about performing poorly or making mistakes; worries about what others will think if he or she performs poorly. The score of freedom from

worry was the sum total of the following question numbers - 7*, 12*, 19*, and 23)

Scores range from a low of 0 to a high of 12 on each subscale, with higher scores indicating greater strengths on that subscale.

3. Emotional Intelligence in Sports

The Emotional intelligence in sports was developed by Dr. Lalit Sharma (2014). In the questionnaire, the question number 1, 7, 13, 18, 24 and 30 represents the self confidence; the question number 2, 8, 14, 19, 25 and 31 represents the self awareness; the question number 3, 9, 15, 20, 26 and 32 represents self control; the question number 5, 11, 16, 22, 28 and 34 represents the Motivation; the question number 4, 10, 12, 21, 27 and 33 represents the Empathy and the question number 6, 17, 23, 29, 35 and 36 represents the Social competence.

The subjects were requested to put (√) mark in appropriate box. Each statement represents one's own emotional reaction.

Scoring Key

Grading	Never	Seldom	Some time	Often	Always
Points of statement	1	2	3	4	5

Statistical techniques

The data on the selected variables were analysed with suitable statistical techniques.

1. The descriptive statistics such as mean, median, mode, standard deviation, kurtosis, skweness, co-efficient of variance, minimum, maximum range, 25th percentile score , 50th percentile score and , 75th percentile score were employed to get the basic idea of the data distribution on selected physical, physiological and psychological variables.

2. MANOVA 2×6 was applied used to compare the mean of the two groups for main effects and interactions of gender (male and female) and between selected martial arts forms (judo, kalaripayattu, karate, taekwondo, wrestling and wushu).

3. In all cases, the criterion for statistical significance was set at 0.05 level of confidence ($P < 0.05$)

4. All the data were anaysed with the help of SPSS version 23

Chapter IV

Analysis of data and result of study

2019

Department of Physical Education, University of Calicut

Chapter IV

ANALYSIS OF DATA RESULT OF STUDY

In this chapter, the research scholar presented analysis of collected data pertaining to the study.

The purpose of the study was to analyse the selected physical, physiological and psychological variables among different martial arts practices. The data on physical fitness variables namely; Agility, Arm shoulder strength and endurance, Body composition, Explosive leg power and Flexibility; were collected from the subjects by using standardized test procedures. The scholar also collected the data on selected Physiological variables namely Breath holding time, Mean arterial pressure, Resting pulse rate and VO_2 Max; by using appropriate measuring tools. By using standardized questionnaires, the scholar collected the data on selected Psychological variables; namely aggression, athletic coping skill (Coping with adversity, Coachability, Concentration, Confidence and achievement motivation, Goal setting and mental preparation and Peaking under pressure and freedom from worry) and Emotional intelligence in sports (Self confidence, Self awareness, Self control, Motivation, Empathy and Social competence).

Research scholar drawn the following objectives for the study; to compare the selected physical fitness variables between male and female different martial arts practitioners in Kerala, to compare the selected physical fitness variables among different martial arts practitioners in Kerala, to compare of selected physiological variables between male and female different martial arts practitioners in Kerala, to compare of selected physiological variables among different martial arts practitioners in Kerala, to compare of selected psychological variables between male and female different martial arts practitioners in Kerala and to compare of selected psychological variables among different martial arts practitioners in Kerala.

Findings

For the purpose of finding out the comparison of selected physical (Agility, Arm shoulder strength and endurance, Body composition, Explosive leg power and Flexibility), physiological (Breath holding time, Mean arterial pressure, Resting pulse rate and VO_2 Max) and psychological (aggression, athletic coping skill (Coping with adversity, Coachability, Concentration, Confidence and achievement motivation, Goal setting and mental preparation and Peaking under pressure and freedom from worry) and Emotional intelligence in sports (Self confidence, Self awareness, Self control, Motivation, Empathy and Social competence)) variables of male and female different kinds of martial arts namely Judo, Kalarippayattu, Karate, Taekwondo, Wrestling and Wu shu, 2 way factorial design (MANOVA 2X6) was used. Whenever the 'F' ratio was found to be significant, the Least Significant Different test was applied as post-hoc test to determine the paired mean differences.

Level of significance

The level of significance chosen was 0.05 through out the study to determine the significant difference between groups and significant relationship between the martial art performance score and selected variables.

The scholar started the analysis with the comparison of physical, physiological and psychological variables among male and female different kinds of martial art practitioners.

I. Physical fitness variables

The scholar compare selected the following physical variables namely; agility, arm shoulder strength and endurance, body composition, explosive leg power and flexibility.

1. Agility

The comparison of the agility among male and female martial arts practitioners were calculated in table 1

Table 4.1

Description of agility scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		13.85	14.83	14.34
Std. Error of Mean		0.08	0.05	0.05
Median		14.03	14.89	14.30
Std. Deviation		1.01	0.73	1.01
Variance		1.02	0.53	1.02
Skewness		-0.14	-0.22	-0.46
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.41	0.17	0.34
Std. Error of Kurtosis		0.36	0.36	0.26
Range		6.42	4.00	6.42
Minimum		11.00	12.40	11.00
Maximum		17.42	16.40	17.42
Percentiles	25^{th}	13.19	14.30	13.86
	50^{th}	14.03	14.89	14.30
	75^{th}	14.49	15.29	15.05

The means and standard deviation of agility of male and female different kind of martial art practitioners have been shown in table 4.1.

Table 4.2

Two way ANOVA on agility among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	86.37	1	86.37	109.72	0.00*
Martial Arts	2.72	5	0.54	0.69	0.63
Interaction (Gender*Martial art)	1.29	5	0.26	0.33	0.90
Error	273.94	348	0.79		
Total	364.32	359			

** The mean difference is significant at the .05 level. (∞ r0.05 with df of 358 (0.09)*

Above table Shows that, the calculated f value of row (gender) was 109.72, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348 where as, in the case of computed F value (0.54) for column (martial arts) and interaction (0.33) were not significant since p values (0.63 and 0.90 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.3

Estimates of agility scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	13.85	0.07	13.72	13.98
Female	14.83	0.07	14.70	14.96

The mean scores and standard error for the agility in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.3.

Table 4.4

Pairwise Comparisons of agility between male and female martial art practitioners

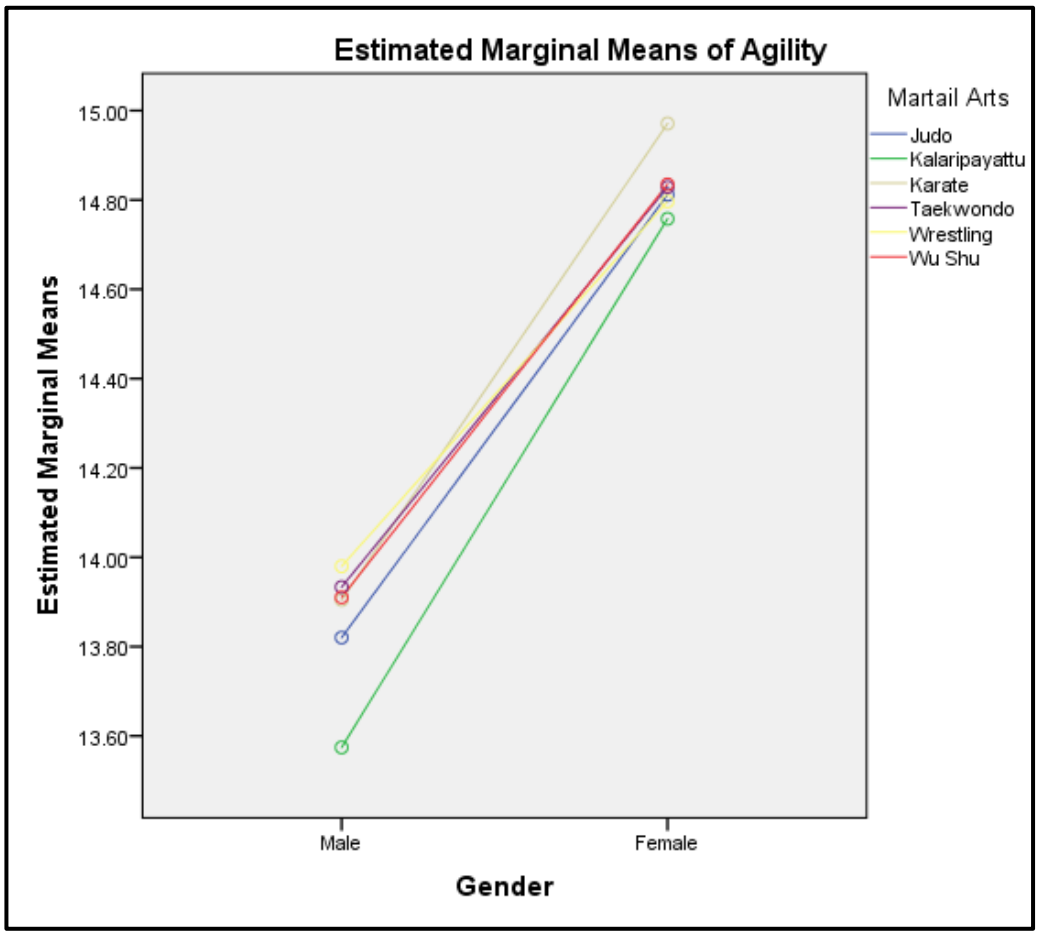
Male	**Female**	**M.D.**	**Sig. level**
13.85	14.83	0.98*	0.00

** The mean difference is significant at the .05 level.*

In table 4.2, difference between the mean scores of male and female on agility 0.98, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that male martial art practitioners are more agile than female martial art practitioners.

Figure 4.1

Pair wise comparison of agility scores



2. Arm shoulder strength and endurance

The comparison of the arm shoulder strength and endurance among male and female martial arts practitioners were calculated in table 4.5

Table 4.5

Description of arm shoulder strength and endurance scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		19.17	17.66	18.41
Std. Error of Mean		0.23	0.25	0.17
Median		20.00	18.00	18.00
Std. Deviation		3.07	3.37	3.31
Variance		9.41	11.38	10.93
Skewness		0.02	0.05	-0.03
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.31	-0.27	-0.27
Std. Error of Kurtosis		0.36	0.36	0.26
Range		16.00	16.00	16.00
Minimum		10.00	10.00	10.00
Maximum		26.00	26.00	26.00
Percentiles	25^{th}	17.00	15.00	16.00
	50^{th}	20.00	18.00	18.00
	75^{th}	21.00	20.00	21.00

The means and standard deviation of arm shoulder strength and endurance scores of male and female different kind of martial art practitioners have been shown in table 4.5.

Table 4.6

Two way ANOVA on arm shoulder strength and endurance among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	204.00	1	204.00	20.27*	0.00
Martial Arts	158.75	5	31.75	3.15*	0.01
Interaction (Gender*Martial art)	60.21	5	12.04	1.20	0.31
Error	3502.37	348	10.06		
Total	3925.33	359			

** The mean difference is significant at the .05 level.*

Above table shows that, the calculated f value of row (gender) was 20.27, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348 and the calculated f value of column (martial art) was 3.15, which was also significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. whereas, in the case of computed F value (1.20) for interaction was not significant since p values (0.31>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) and column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row and column analysis by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.7

Estimates of arm shoulder strength and endurance scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	19.17	0.24	18.70	19.63
Female	17.66	0.24	17.20	18.13

The mean scores and standard error for the arm shoulder strength and endurance in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.7.

Table 4.8

Pairwise Comparisons of arm shoulder strength and endurance between male and female martial art practitioners

Male	**Female**	**M.D.**	**Sig. level**
19.17	17.66	1.51*	0.00

** The mean difference is significant at the .05 level.*

In table 4.8, difference between the mean scores of male and female on arm shoulder strength and endurance 1.51, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that mean score on arm shoulder strength and endurance is higher than in male practitioners in comparison to that of female subjects.

Column analysis (Martial arts wise)

Table 4.9

Estimates of arm shoulder strength and endurance scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	18.55	0.41	17.74	19.36
Kalaripayattu	17.88	0.41	17.08	18.69
Karate	18.17	0.41	17.36	18.97
Taekwondo	18.15	0.41	17.34	18.96
Wrestling	19.82	0.41	19.01	20.62
Wu Shu	17.92	0.41	17.11	18.72

The mean scores and standard error for the arm shoulder strength and endurance in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.9.

Table 4.10

Pairwise Comparisons of arm shoulder strength and endurance martial art practitioners

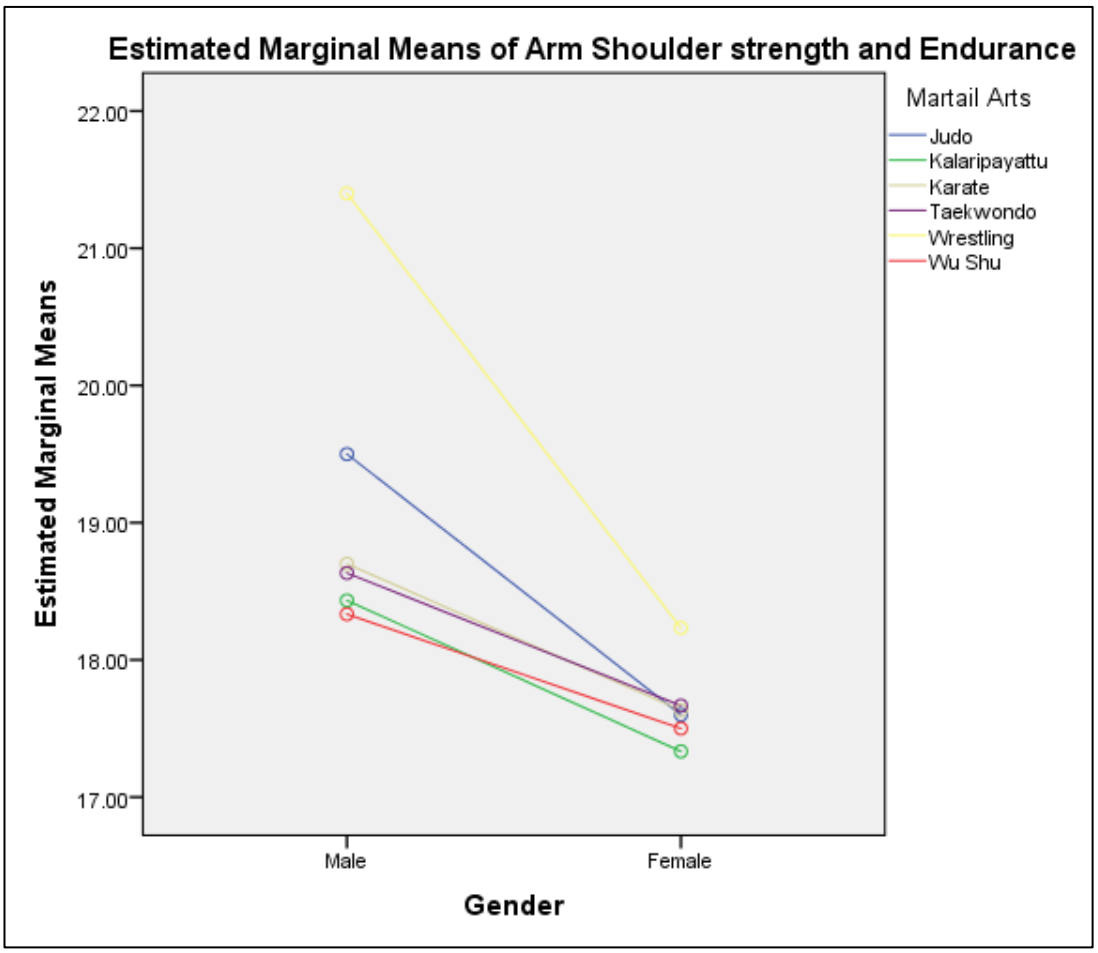
Mean score						M.D.	Sig level
Judo	**Kalari**	**Karate**	**Taekw**	**Wrest**	**Wu sh**		
18.55	17.88					0.67	0.25
18.55		18.17				0.38	0.51
18.55			18.15			0.40	0.49
18.55				19.82		1.27*	0.03
18.55					17.92	0.63	0.27
	17.88	18.17				0.28	0.63
	17.88		18.15			0.27	0.65
	17.88			19.82		1.93*	0.00
	17.88				17.92	0.33	0.95
		18.17	18.15			0.17	0.98
		18.17		19.82		1.65*	0.01
		18.17			17.92	0.25	0.67
			18.15	19.82		1.67*	0.00
			18.15		17.92	0.23	0.69
				19.82	17.92	1.90*	0.00

** The mean difference is significant at the .05 level.*

Table 4.10 shows that mean difference scores of muscular strength and endurance of wrestling practitioners when compared with judo, kalaripayattu, karate, taekwondo and wu shu practitioners were 1.27, 1.93, 1.65, 1.67 and 1.90 respectively were significant differences since critical differences were 0.03, 0.00, 0.01, 0.00 and 0.00 respectively lesser than at 0.05 level It may be concluded that the mean value of muscular strength and endurance was higher in wrestling practitioners than other martial arts practitioners.

Figure 4.2

Pair wise comparison of arm shoulder strength and endurance



scores

3. Body composition

The comparison of the body composition among male and female martial arts practitioners were calculated in table 4.11

Table 4.11

Description of Body composition scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		9.73	15.75	12.74
Std. Error of Mean		0.34	0.23	0.26
Median		10.39	15.23	13.34
Std. Deviation		4.58	3.11	4.94
Variance		20.96	9.67	24.36
Skewness		1.02	0.88	0.09
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		2.28	0.51	0.02
Std. Error of Kurtosis		0.36	0.36	0.26
Range		23.80	14.86	23.80
Minimum		3.56	10.12	3.56
Maximum		27.36	24.98	27.36
Percentiles	25^{th}	6.24	13.63	13.86
	50^{th}	10.39	15.23	14.30
	75^{th}	13.09	17.21	15.05

The means and standard deviation of body composition of male and female different kind of martial art practitioners have been shown in table 4.11.

Table 4.12

Two way ANOVA on body composition among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	3262.18	1	3262.18	210.89*	0.00
Martial Arts	69.58	5	13.92	0.90	0.48
Interaction (Gender*Martial art)	28.76	5	5.75	0.37	0.87
Error	5383.10	348	15.47		
Total	8743.62	359			

** The mean difference is significant at the .05 level.*

Above table Shows that, the calculated f value of row (gender) was 210.89, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (1.20) for column (martial art) and for interaction (0.37) was not significant since p values (0.48 and 0.87>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.13

Estimates of body composition scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	9.73	0.29	9.15	10.31
Female	15.75	0.29	15.17	16.33

The mean scores and standard error for the body composition in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.13.

Table 4.14

Pairwise Comparisons of body composition between male and female martial art practitioners

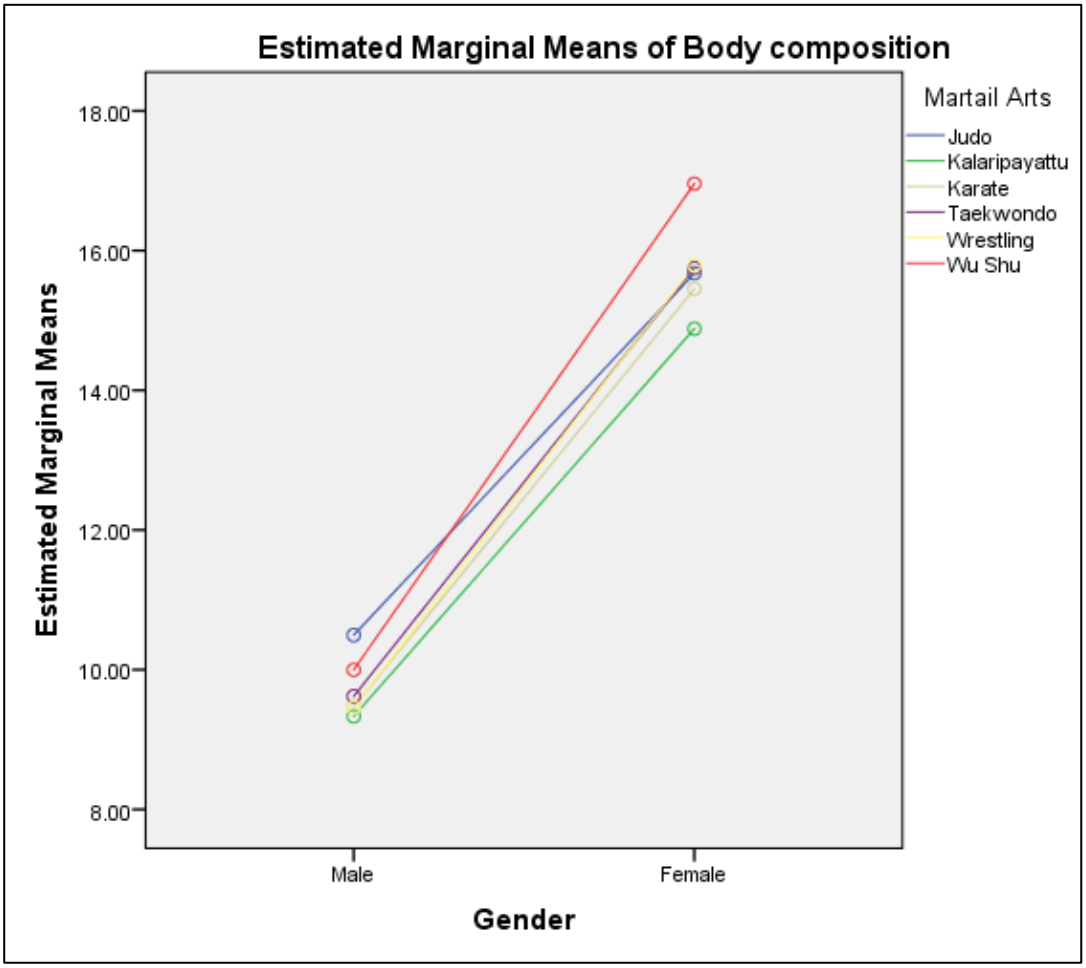
Male	**Female**	**M.D.**	**Sig. level**
9.73	15.75	6.02*	0.00

** The mean difference is significant at the .05 level.*

In table 4.14, difference between the mean scores of male and female on body composition 6.02, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that mean score on fat percentage is higher in female practitioners when compared to that of male subjects.

Figure 4.3

Pair wise comparison of body composition scores



4. Explosive leg power

The comparison of the explosive leg power among male and female martial arts practitioners were calculated in table 4.15

Table 4.15

Description of Explosive leg power scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		2.03	1.74	1.89
Std. Error of Mean		0.03	0.02	0.02
Median		1.88	1.70	1.79
Std. Deviation		0.42	0.25	0.38
Variance		0.18	0.06	0.14
Skewness		0.98	0.50	1.23
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.15	0.57	1.32
Std. Error of Kurtosis		0.36	0.36	0.26
Range		1.56	1.55	1.93
Minimum		1.42	1.05	1.05
Maximum		2.98	2.60	2.98
Percentiles	25^{th}	1.75	1.59	13.86
	50^{th}	1.88	1.70	14.30
	75^{th}	2.30	1.89	15.05

The means and standard deviation of explosive leg power of male and female different kind of martial art practitioners have been shown in table 4.15.

Table 4.16

Two way ANOVA on explosive leg power among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	7.62	1	7.62	63.42*	0.00
Martial Arts	1.23	5	0.25	2.04	0.07
Interaction (Gender*Martial art)	0.25	5	0.05	0.42	0.84
Error	41.79	348	0.12		
Total	50.88	359			

** The mean difference is significant at the .05 level.*

Above table Shows that, the calculated f value of row (gender) was 63.42, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (2.04) for column (martial art) and for interaction (0.42) was not significant since p values (0.07 and 0.84>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.17

Estimates of explosive leg power scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	2.03	0.03	1.98	2.08
Female	1.74	0.03	1.69	1.79

The mean scores and standard error for the explosive leg power in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.17.

Table 4.18

Pairwise Comparisons of explosive leg power between male and female martial art practitioners

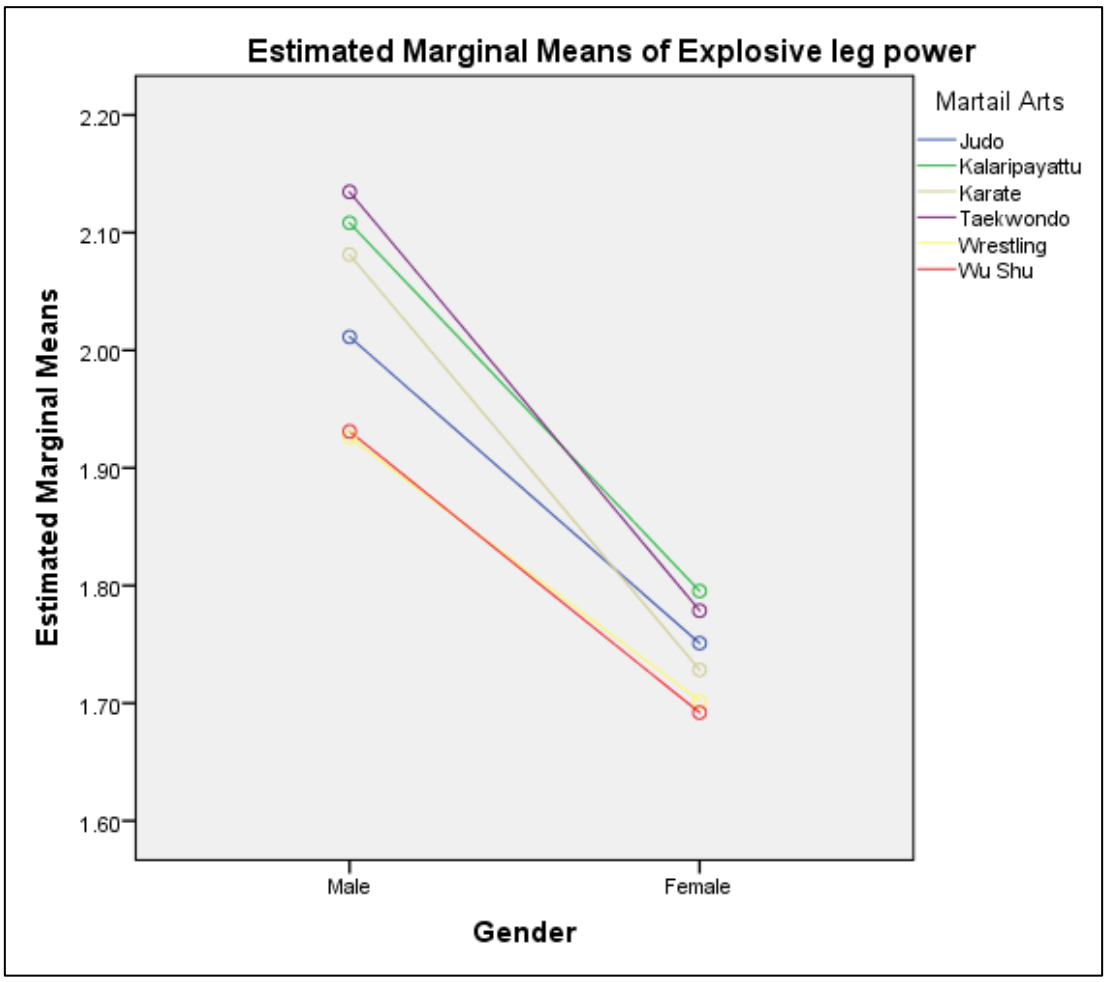
Male	**Female**	**M.D.**	**Sig. level**
2.03	1.74	0.29*	0.00

** The mean difference is significant at the .05 level.*

In table 4.18, difference between the mean scores of male and female on explosive leg power was 0.29, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that mean score on explosive leg power is higher in male practitioners when compared to that of female subjects.

Figure 4.4

Pair wise comparison of explosive leg power scores



5. Flexibility

The comparison of the flexibility among male and female martial arts practitioners were calculated in table 4.19

Table 4.19

Description of flexibility scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		19.99	19.11	19.55
Std. Error of Mean		0.18	0.18	0.13
Median		20.00	19.00	20.00
Std. Deviation		2.36	2.43	2.43
Variance		5.58	5.91	5.92
Skewness		-0.07	0.02	-0.04
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.39	-0.60	-0.51
Std. Error of Kurtosis		0.36	0.36	0.26
Range		10.00	11.00	11.00
Minimum		15.00	14.00	14.00
Maximum		25.00	25.00	25.00
Percentiles	25^{th}	18.00	17.00	18.00
	50^{th}	20.00	19.00	20.00
	75^{th}	21.00	21.00	21.00

The means and standard deviation of flexibility of male and female different kind of martial art practitioners have been shown in table 4.19.

Table 4.20

Two way ANOVA on flexibility among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	69.34	1	69.34	12.77*	0.00
Martial Arts	164.00	5	32.80	6.04*	0.00
Interaction (Gender*Martial art)	2.49	5	0.50	0.09	0.99
Error	1889.27	348	5.43		
Total	2125.10	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 12.77, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. The calculated f value of column (martial art) was 6.04, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 5, 348. Whereas, in the case of computed F value for interaction (0.09) was not significant since p values (0.99>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) and column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row and column by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.21

Estimates of flexibility scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	19.11	0.17	18.77	19.45
Female	19.99	0.17	19.65	20.33

The mean scores and standard error for the flexibility in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.21.

Table 4.22

Pairwise Comparisons of flexibility between male and female martial art practitioners

Male	**Female**	**M.D.**	**Sig. level**
19.11	19.99	0.88*	0.00

** The mean difference is significant at the .05 level.*

In table 4.22, difference between the mean scores of male and female on flexibility was 0.88, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that female practitioners are more flexible than the male subjects.

Column analysis (Martial arts wise)

Table 4.23

Estimates of flexibility scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	19.35	0.30	18.76	19.94
Kalaripayattu	21.05	0.30	20.46	21.64
Karate	19.32	0.30	18.73	19.91
Taekwondo	19.22	0.30	18.63	19.81
Wrestling	19.12	0.30	18.53	19.71
Wu Shu	19.25	0.30	18.66	19.84

The mean scores and standard error for the flexibility in physical fitness variable of male and female different kind of martial art practitioners have been shown in table 4.23.

Table 4.24

Pairwise Comparisons of flexibility martial art practitioners

Mean score						M.D.	Sig level
Judo	**Kalari**	**Karate**	**Taekw**	**Wrest**	**Wu sh**		
19.35	21.05					1.70*	0.00
19.35		19.32				0.03	0.94
19.35			19.22			0.13	0.75
19.35				19.12		0.23	0.58
19.35					19.25	0.10	0.81
	21.05	19.32				1.73*	0.00
	21.05		19.22			1.83*	0.00
	21.05			19.12		1.93*	0.00
	21.05				19.25	1.80*	0.00
		19.32	19.22			0.10	0.81
		19.32		19.12		0.20	0.64
		19.32			19.25	0.07	0.88
			19.22	19.12		0.10	0.81
			19.22		19.25	0.03	0.94
				19.12	19.25	0.13	0.75

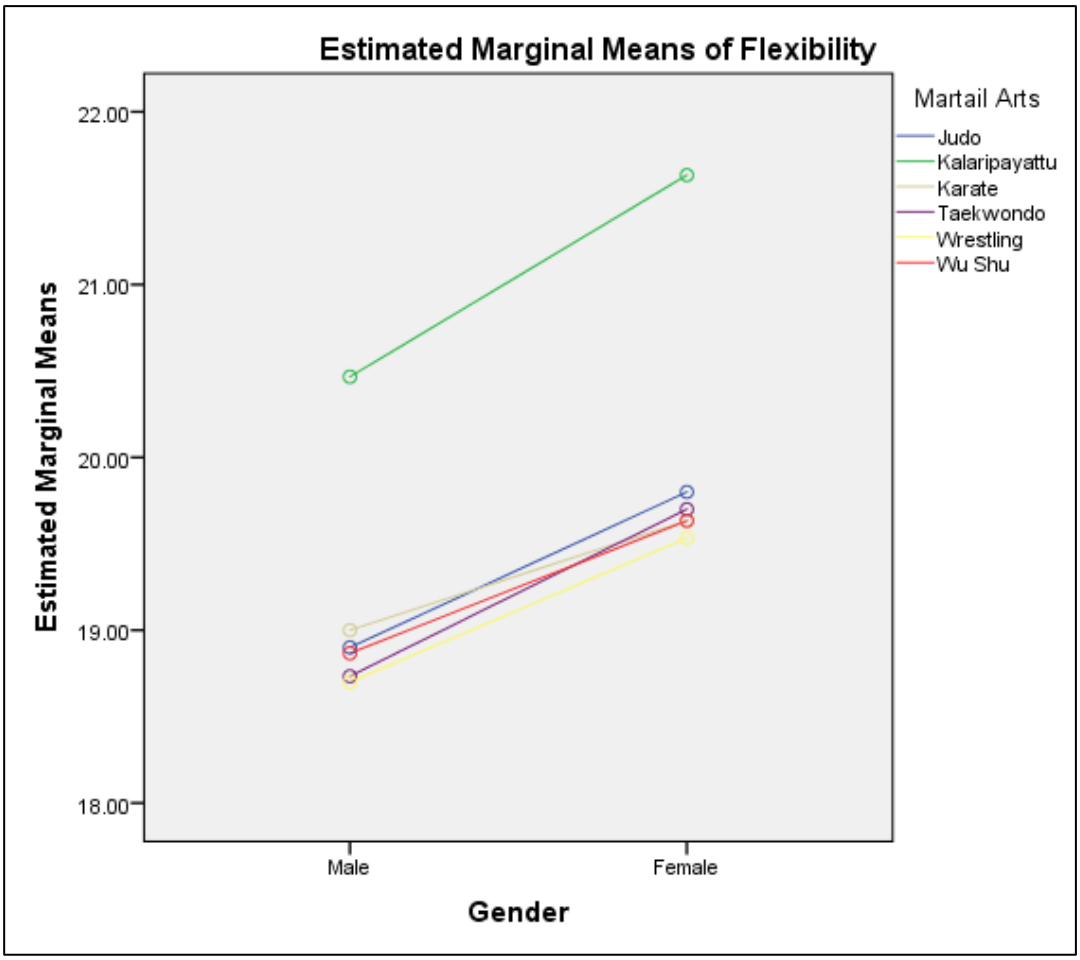
** The mean difference is significant at the .05 level.*

Table 4.24 shows that mean difference scores of flexibility of kalaripayattu practitioners when compared with judo, karate, taekwondo wrestling and wu shu practitioners were 1.70, 1.73, 1.83, 1.93 and 1.80 respectively were significant differences since critical differences were 0.00, 0.00, 0.00, 0.00 and 0.00 respectively lesser than at 0.05 level It may be concluded that the mean value of

flexibility was higher in kalaripayattu practitioners than other martial arts practitioners.

Figure 4.5

Pair wise comparison of flexibility scores



II. Physiological variables

The following physiological variables such as; breath holding time, mean arterial pressure, resting heart rate and vo2 max were analysed and tabulated in the following tables.

1. Breath holding time

The comparison of the breath holding time among male and female martial arts practitioners were calculated in table 4.25

Table 4.25

Description of breath holding time scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		24.82	24.55	24.69
Std. Error of Mean		0.06	0.22	0.12
Median		24.63	24.22	24.39
Std. Deviation		0.85	2.97	2.18
Variance		0.73	8.79	4.77
Skewness		0.43	7.34	8.99
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.90	77.13	128.71
Std. Error of Kurtosis		0.36	0.36	0.26
Range		5.25	35.28	35.28
Minimum		22.25	21.42	21.42
Maximum		27.50	56.70	56.70
Percentiles	25^{th}	24.30	23.25	24.01
	50^{th}	24.63	24.22	24.39
	75^{th}	25.24	25.20	25.20

The means and standard deviation of breath holding time of male and female different kind of martial art practitioners have been shown in table 4.25.

Table 4.26

Two way ANOVA on breath holding time among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	6.48	1	6.48	1.34	0.25
Martial Arts	18.42	5	3.68	0.76	0.58
Interaction (Gender*Martial art)	4.01	5	0.80	0.17	0.97
Error	1681.57	348	4.83		
Total	1710.48	359			

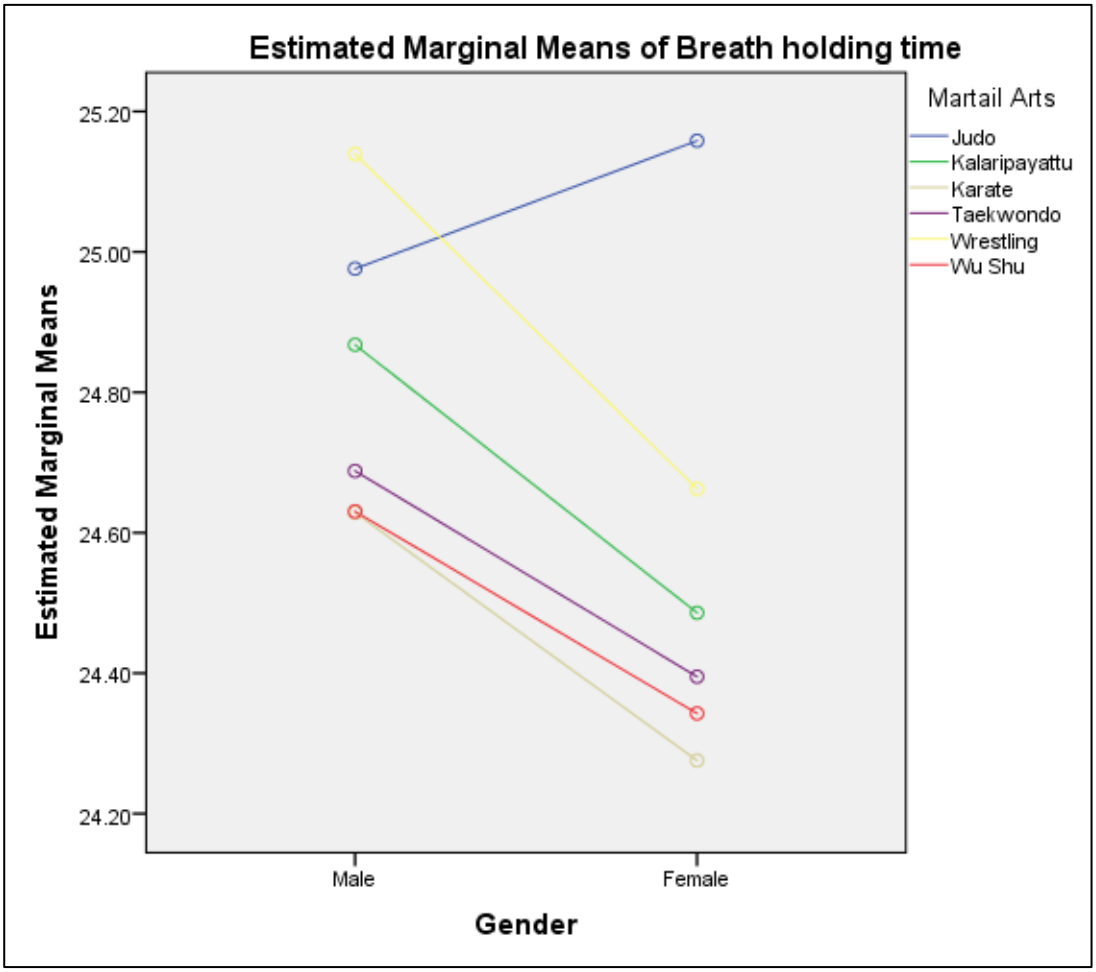
** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 119.48, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. The calculated f value of column (martial art) was 2.78, which was significant since p value (0.02<0.05) at 0.05 level with df equal to 5, 348. Whereas, in the case of computed F value for interaction (0.06) was not significant since p values (1.00>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) and column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row and column by using Least Significant Difference, LSD test (Post hoc test).

The above table shows that, calculated F values of row (gender), column (martial art) and interaction were 1.34, 0.76 and 0.17, which were no significant since p value (0.25, 0.58 and 0.97 < 0.05) at 0.05 level with df equal to 1, 348 and 5, 348. Therefore H_0 row (gender), column (martial art) and interaction may be accepted at 0.05 level of significance. It may be concluded that the all martial art practitioners are similar breath holding time level.

Figure 4.6

Pair wise comparison of breath holding time scores



2. Mean arterial pressure

The comparison of the mean arterial pressure among male and female martial arts practitioners were calculated in table 4.27

Table 4.27

Description of mean arterial pressure scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		86.69	90.50	88.60
Std. Error of Mean		0.20	0.15	0.16
Median		86.33	90.06	89.33
Std. Deviation		2.63	2.02	3.02
Variance		6.92	4.07	9.12
Skewness		-0.02	0.10	-0.29
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.61	1.14	-0.26
Std. Error of Kurtosis		0.36	0.36	0.26
Range		13.67	12.00	15.00
Minimum		80.33	83.33	80.33
Maximum		94.00	95.33	95.33
Percentiles	25^{th}	85.08	89.33	86.33
	50^{th}	86.33	90.06	89.33
	75^{th}	89.00	91.59	90.33

The means and standard deviation of mean arterial pressure of male and female different kind of martial art practitioners have been shown in table 4.27.

Table 4.28

Two way ANOVA on mean arterial pressure among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	1306.64	1	1306.64	232.48*	0.00
Martial Arts	4.33	5	0.87	0.15	0.98
Interaction (Gender*Martial art)	6.77	5	1.35	0.24	0.94
Error	1955.90	348	5.62		
Total	3273.64	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 232.48, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (0.15) for column (martial art) and interaction (0.24) was not significant since p values (0.98 and 0.94>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.29

Estimates of mean arterial pressure scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	90.50	0.18	90.15	90.85
Female	86.69	0.18	86.34	87.04

The mean scores and standard error for the mean arterial pressure in physiological variable of male and female different kind of martial art practitioners have been shown in table 4.29.

Table 4.30

Pairwise Comparisons of mean arterial pressure between male and female martial art practitioners

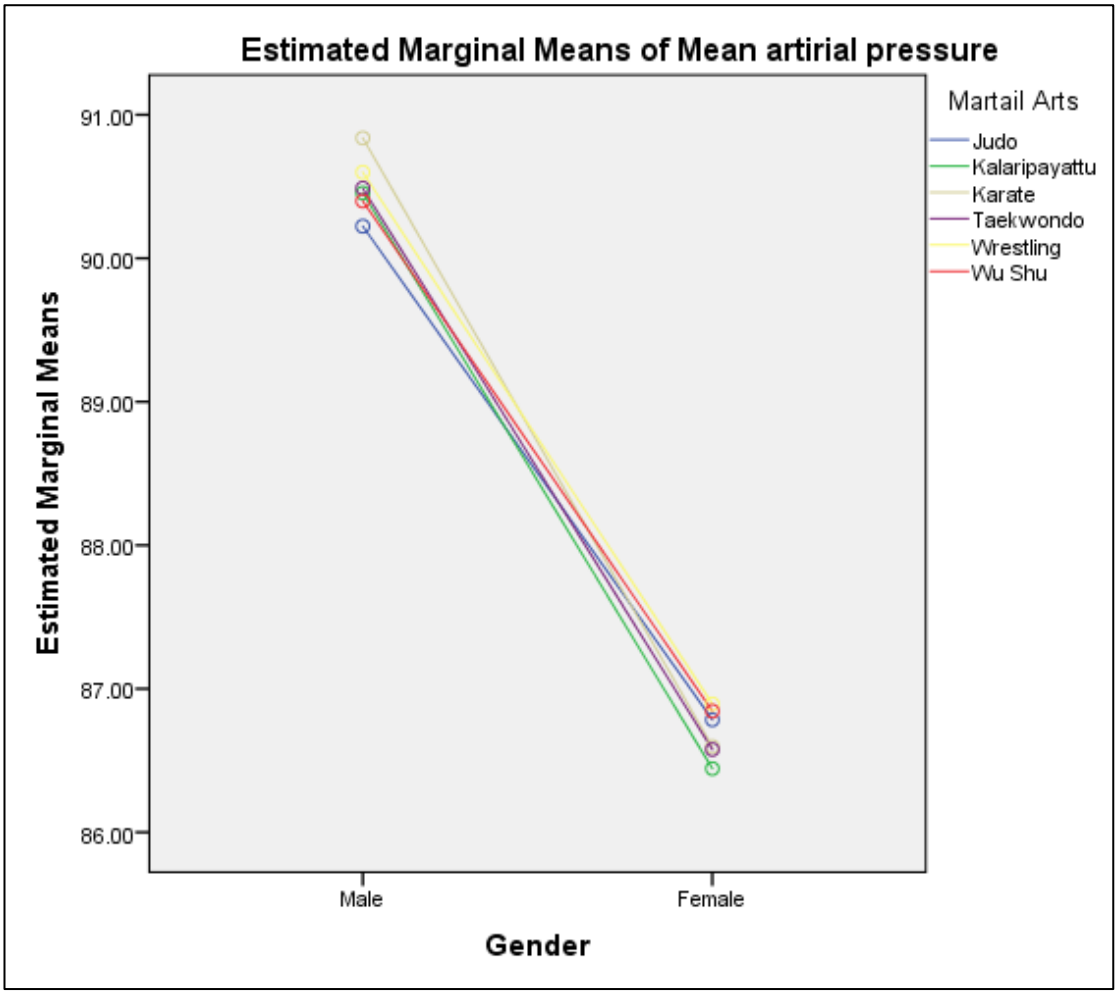
Male	**Female**	**M.D.**	**Sig. level**
90.50	86.69	3.81*	0.00

** The mean difference is significant at the .05 level.*

In table 4.30, difference between the mean scores of male and female on mean arterial pressure was 3.81, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that female practitioners have better blood pressure than the male subjects.

Figure 4.7

Pair wise comparison of mean arterial pressure scores



3. Resting heart rate

The comparison of the resting heart rate among male and female martial arts practitioners were calculated in table 4.31.

Table 4.31

Description of resting heart rate scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		70.68	71.59	71.13
Std. Error of Mean		0.23	0.18	0.15
Median		70.00	71.00	71.00
Std. Deviation		3.06	2.44	2.80
Variance		9.36	5.95	7.84
Skewness		0.93	0.34	0.61
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.83	-0.14	0.34
Std. Error of Kurtosis		0.36	0.36	0.26
Range		15.00	11.00	15.00
Minimum		65.00	67.00	65.00
Maximum		80.00	78.00	80.00
Percentiles	25^{th}	68.00	70.00	69.00
	50^{th}	70.00	71.00	71.00
	75^{th}	72.75	72.00	72.00

The means and standard deviation of resting heart rate of male and female different kind of martial art practitioners have been shown in table 4.31.

Table 4.32

Two way ANOVA on resting heart rate among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	74.71	1	74.71	9.61*	0.00
Martial Arts	17.37	5	3.47	0.45	0.82
Interaction (Gender*Martial art)	16.59	5	3.32	0.43	0.83
Error	2706.93	348	7.78		
Total	2815.60	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 9.61, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (0.45) for column (martial art) and interaction (0.43) was not significant since p values (0.82 and 0.83>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.33

Estimates of resting heart rate scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	70.68	0.21	70.27	71.09
Female	71.59	0.21	71.18	72.00

The mean scores and standard error for the resting heart rate in physiological variable of male and female different kind of martial art practitioners have been shown in table 4.33.

Table 4.34

Pairwise Comparisons of resting heart rate between male and female martial art practitioners

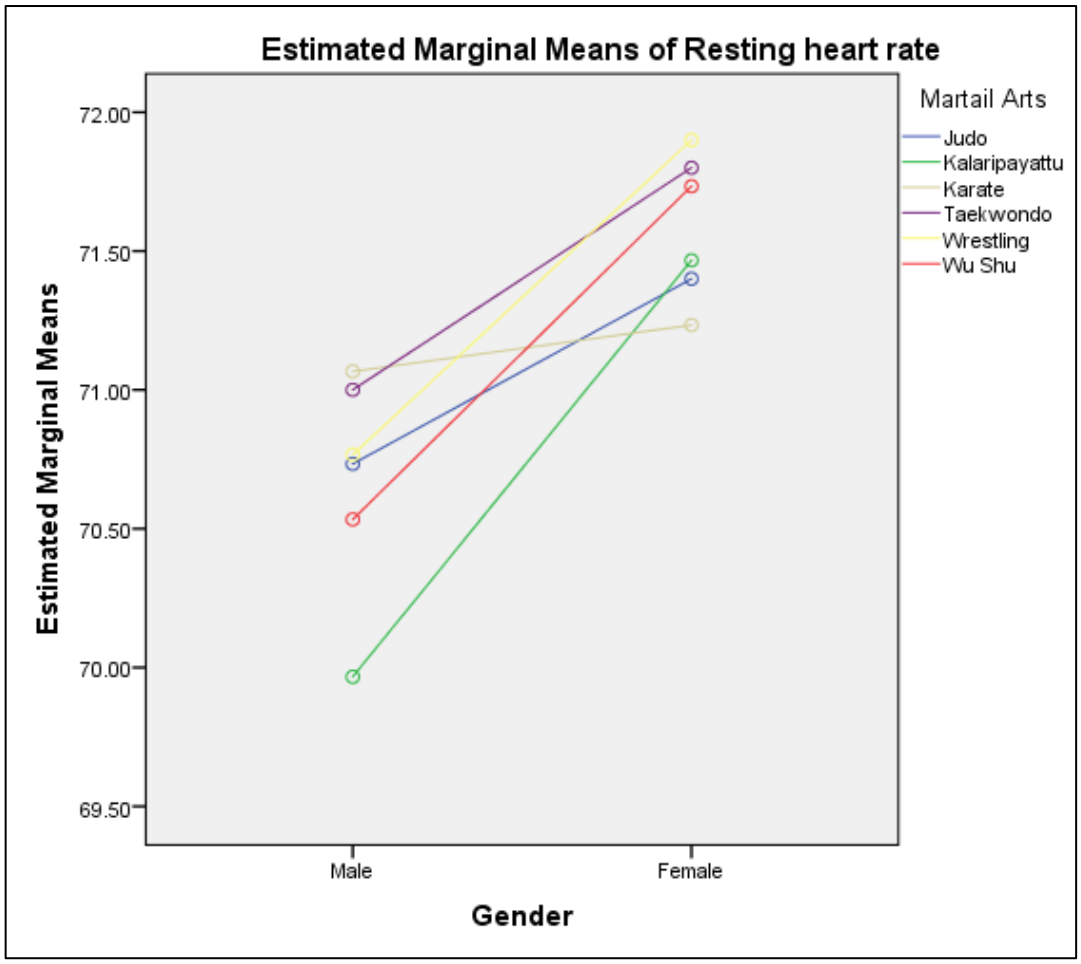
Male	**Female**	**M.D.**	**Sig. level**
70.68	71.59	0.91*	0.00

** The mean difference is significant at the .05 level.*

In table 4.34, difference between the mean scores of male and female on resting heart rate was 0.91, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that the mean score of resting heart rate of male practitioners is better than the female practitioners.

Figure 4.8

Pair wise comparison of resting heart rate scores



4. Vo_2 max

The comparison of the vo_2 max among male and female martial arts practitioners were calculated in table 4.35.

Table 4.35

Description of vo_2 max scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		3.52	3.21	3.36
Std. Error of Mean		0.03	0.04	0.03
Median		3.55	3.25	3.45
Std. Deviation		0.46	0.53	0.52
Variance		0.21	0.28	0.27
Skewness		0.09	-0.04	-0.10
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.28	-0.53	-0.28
Std. Error of Kurtosis		0.36	0.36	0.26
Range		2.35	2.30	2.55
Minimum		2.15	1.95	1.95
Maximum		4.50	4.25	4.50
Percentiles	25^{th}	3.20	2.76	3.00
	50^{th}	3.55	3.25	3.45
	75^{th}	3.70	3.50	3.70

The means and standard deviation of agility of male and female different kind of martial art practitioners have been shown in table 4.35.

Table 4.36

Two way ANOVA on vo_2 max among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	8.20	1	8.20	33.02*	0.00
Martial Arts	0.70	5	0.14	0.57	0.73
Interaction (Gender*Martial art)	0.35	5	0.07	0.28	0.92
Error	86.39	348	0.25		
Total	95.64	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 33.02, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (0.57) for column (martial art) and interaction (0.28) was not significant since p values (0.73 and 0.92 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.37

Estimates of vo_2 max scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	13.854	.066	13.724	13.984
Female	14.833	.066	14.703	14.963

The mean scores and standard error for the vo_2 max in physiological variable of male and female different kind of martial art practitioners have been shown in table 4.37.

Table 4.38

Pairwise Comparisons of vo_2 max between male and female martial art practitioners

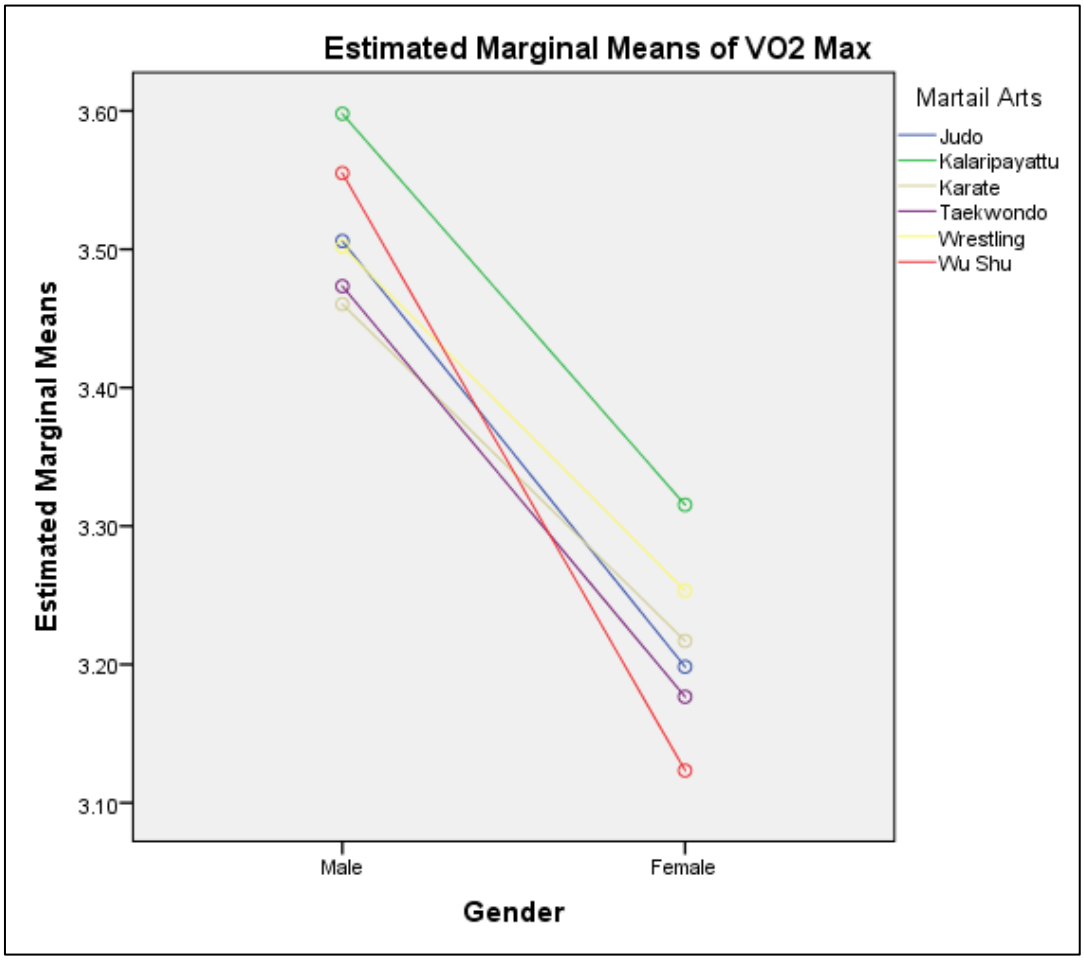
Male	Female	M.D.	Sig. level
3.52	3.21	0.30*	0.00

** The mean difference is significant at the .05 level.*

In table 4.38, difference between the mean scores of male and female on vo_2 max was 0.30, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that the mean score of vo2 max of male practitioners is better than the female practitioners.

Figure 4.9

Pair wise comparison of vo_2 max scores



III. Psychological variables

The scholar selected and analysed the following Psychological variables; namely aggression, athletic coping skill (Coping with adversity, Coachability, Concentration, Confidence and achievement motivation, Goal setting and mental preparation, Peak under pressure and freedom from worry) and Emotional intelligence in sports (Self confidence, Self awareness, Self control, Motivation, Empathy and Social competence) and tabulated in the following tables.

1. Aggression

The comparison of the aggression among male and female martial arts practitioners were calculated in table 4.39.

Table 4.39

Description of aggression scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		30.24	29.09	29.67
Std. Error of Mean		0.36	0.34	0.25
Median		31.00	29.00	30.00
Std. Deviation		4.77	4.54	4.69
Variance		22.80	20.62	21.98
Skewness		-0.06	0.25	0.10
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.11	0.51	0.08
Std. Error of Kurtosis		0.36	0.36	0.26
Range		22.00	22.00	22.00
Minimum		18.00	18.00	18.00
Maximum		40.00	40.00	40.00
Percentiles	25^{th}	26.25	26.00	26.00
	50^{th}	31.00	29.00	30.00
	75^{th}	33.00	31.00	32.00

The means and standard deviation of aggression of male and female different kind of martial art practitioners have been shown in table 4.39.

Table 4.40

Two way ANOVA on aggression among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	119.03	1	119.03	5.44*	0.02
Martial Arts	152.91	5	30.58	1.40	0.23
Interaction (Gender*Martial art)	2.29	5	0.46	0.02	1.00
Error	7617.43	348	21.89		
Total	7891.66	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 5.44, which was significant since p value (0.02<0.05) at 0.05 level with df equal to 1, 348.. Whereas, in the case of computed F value (1.40) for column (martial art) and for interaction (0.02) was not significant since p values (1.00>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.441

Estimates of aggression scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	30.24	0.35	29.56	30.93
Female	29.09	0.35	28.41	29.78

The mean scores and standard error for the aggression in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.41.

Table 4.42

Pairwise Comparisons of aggression between male and female martial art practitioners

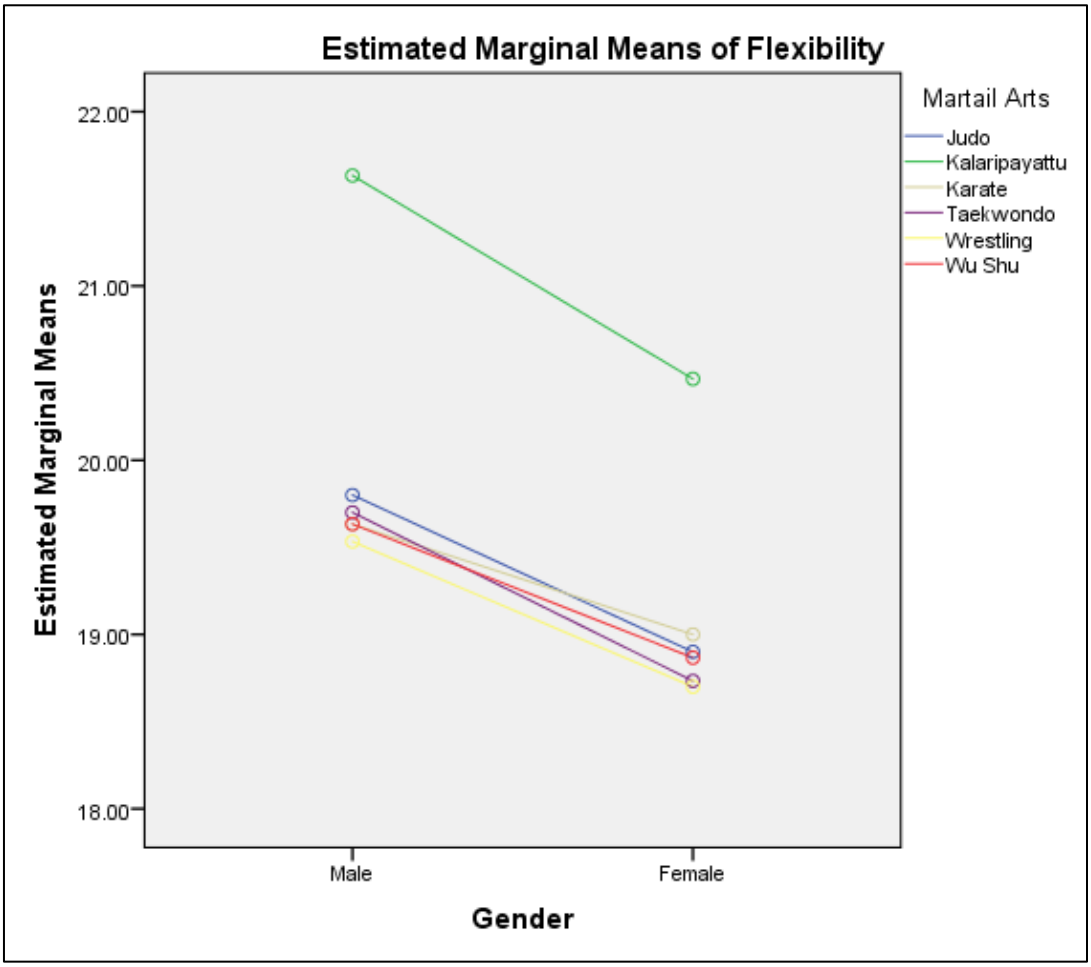
Male	**Female**	**M.D.**	**Sig. level**
30.24	29.09	1.15*	0.02

** The mean difference is significant at the .05 level.*

In table 4.42, difference between the mean scores of male and female on aggression was 0.88, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that male practitioners are more aggressive than the female subjects.

Figure 4.10

Pair wise comparison of aggression scores



2. Athletic coping skill

a. Coping with adversity

The comparison of the coping with adversity among male and female martial arts practitioners were calculated in table 4.43.

Table 4.43

Description of coping with adversity scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		6.95	7.41	7.18
Std. Error of Mean		0.15	0.16	0.11
Median		7.00	8.00	7.00
Std. Deviation		1.98	2.11	2.06
Variance		3.94	4.44	4.23
Skewness		-0.46	0.08	-0.14
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.87	0.64	0.82
Std. Error of Kurtosis		0.36	0.36	0.26
Range		12.00	10.00	12.00
Minimum		0.00	2.00	0.00
Maximum		12.00	12.00	12.00
Percentiles	25^{th}	6.00	6.00	6.00
	50^{th}	7.00	8.00	7.00
	75^{th}	8.00	8.00	8.00

The means and standard deviation of coping with adversity of male and female different kind of martial art practitioners have been shown in table 4.43.

Table 4.44

Two way ANOVA on coping with adversity among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	18.68	1	18.68	4.38*	0.04
Martial Arts	16.09	5	3.22	0.76	0.58
Interaction (Gender*Martial art)	0.79	5	0.16	0.04	1.00
Error	1483.07	348	4.26		
Total	1518.62	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 4.38, which was significant since p value (0.04<0.05) at 0.05 level with df equal to 1, 348.. Whereas, in the case of computed F value (0.76) for column (martial art) and for interaction (0.04) was not significant since p values (0.58 and 1.00 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.45

Estimates of coping with adversity scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	6.95	0.15	6.65	7.25
Female	7.41	0.15	7.10	7.71

The mean scores and standard error for the coping with adversity in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.45.

Table 4.46

Pairwise Comparisons of coping with adversity between male and female martial art practitioners

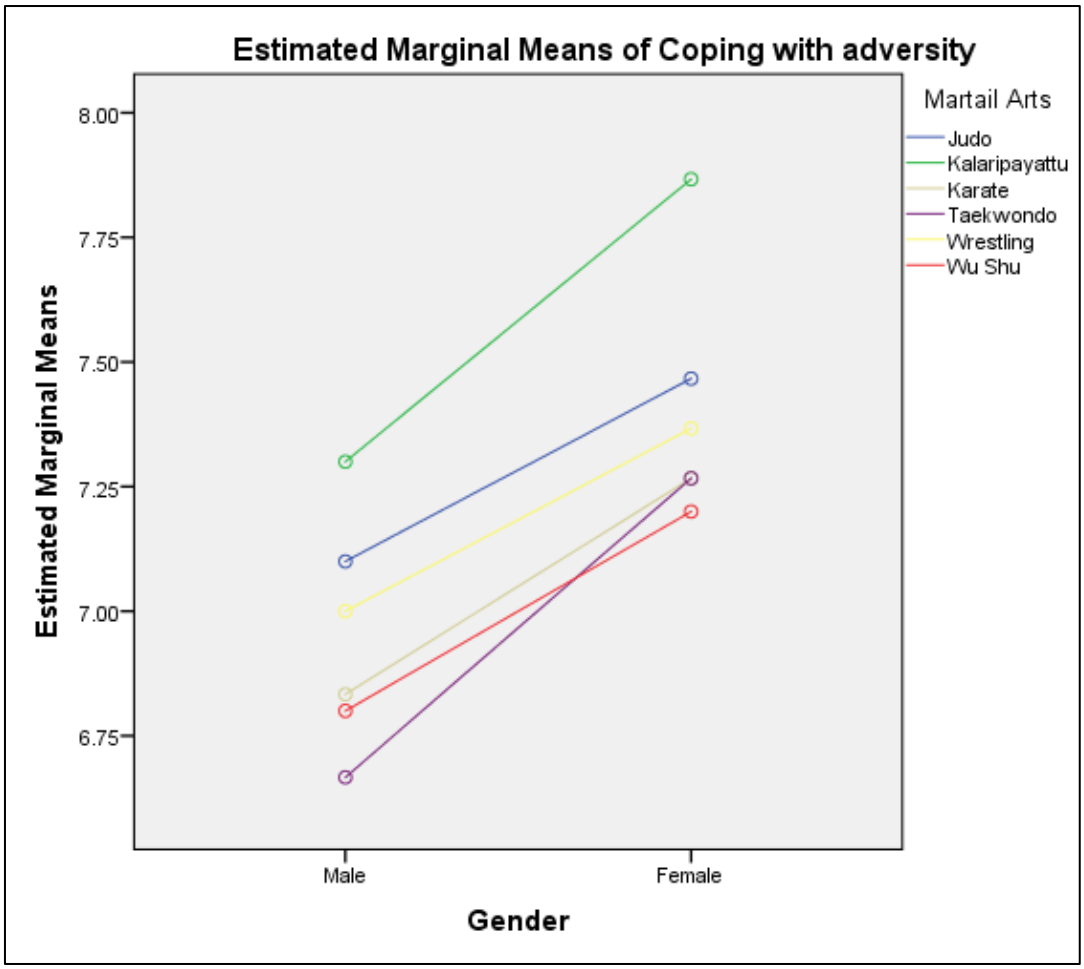
Male	**Female**	**M.D.**	**Sig. level**
6.95	7.41	0.46*	0.04

** The mean difference is significant at the .05 level.*

In table 4.46, difference between the mean scores of male and female on coping with adversity was 0.46, which was significant since p value (0.04<0.05) at 0.05. Thus it may be concluded that the mean score of coping with adversity of female practitioners are higher than the male subjects.

Figure 4.11

Pair wise comparison of coping with adversity scores



b. Coachability

The comparison of the coachability among male and female martial arts practitioners were calculated in table 4.47.

Table 4.47

Description of coachability scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		7.33	8.02	7.68
Std. Error of Mean		0.16	0.14	0.11
Median		7.00	8.00	8.00
Std. Deviation		2.17	1.86	2.05
Variance		4.70	3.45	4.19
Skewness		0.34	0.09	0.16
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.35	-0.41	-0.42
Std. Error of Kurtosis		0.36	0.36	0.26
Range		9.00	9.00	9.00
Minimum		3.00	3.00	3.00
Maximum		12.00	12.00	12.00
Percentiles	25^{th}	6.00	6.00	6.00
	50^{th}	7.00	8.00	8.00
	75^{th}	9.00	9.00	9.00

The means and standard deviation of coachability of male and female different kind of martial art practitioners have been shown in table 4.47.

Table 4.48

Two way ANOVA on coachability among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	43.40	1	43.40	10.76*	0.00
Martial Arts	35.99	5	7.20	1.79	0.12
Interaction (Gender*Martial art)	20.21	5	4.04	1.00	0.42
Error	1403.37	348	4.03		
Total	1502.98	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of row (gender) was 10.76, which was significant since p value (0.00<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (1.79) for column (martial art) and for interaction (1.00) was not significant since p values (0.12 and 0.42 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for row (gender) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for row by using Least Significant Difference, LSD test (Post hoc test).

Raw analysis (Gender wise)

Table 4.49

Estimates of coachability scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	7.33	0.15	7.03	7.62
Female	8.02	0.15	7.73	8.32

The mean scores and standard error for the coachability of athletic coping skill in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.49.

Table 4.50

Pairwise Comparisons of coachability between male and female martial art practitioners

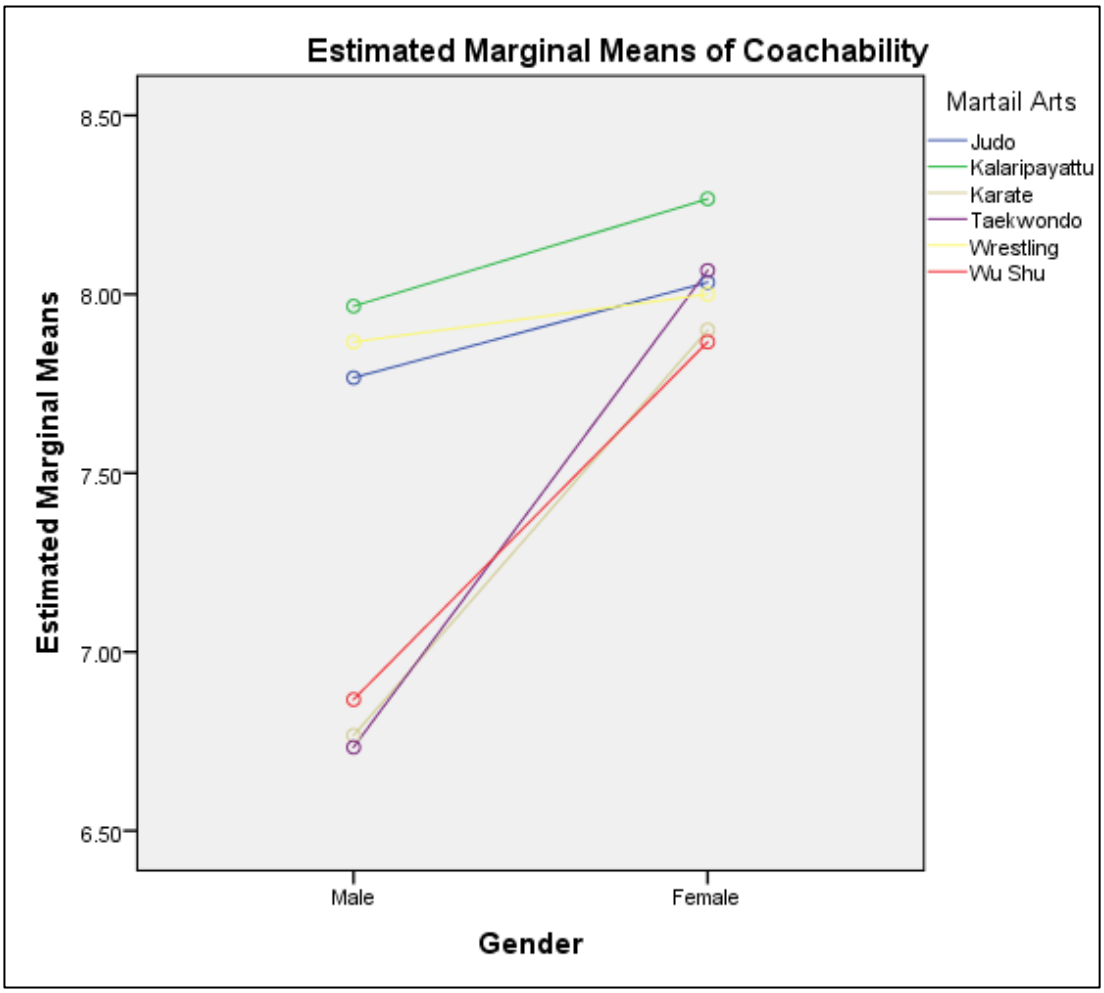
Male	**Female**	**M.D.**	**Sig. level**
7.33	8.02	0.69*	0.00

** The mean difference is significant at the .05 level.*

In table 4.50, difference between the mean scores of male and female on coachability was 0.69, which was significant since p value (0.00<0.05) at 0.05. Thus it may be concluded that the mean score of coachability of female practitioners are higher than the male subjects.

Figure 4.12

Pair wise comparison of coachability scores



c. Concentration

The comparison of the concentration among male and female martial arts practitioners were calculated in table 4.51.

Table 4.51

Description of concentration scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		7.98	8.04	8.01
Std. Error of Mean		0.15	0.17	0.11
Median		8.00	8.00	8.00
Std. Deviation		1.96	2.26	2.12
Variance		3.86	5.12	4.48
Skewness		0.20	-0.36	-0.13
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.11	0.61	0.38
Std. Error of Kurtosis		0.36	0.36	0.26
Range		9.00	11.00	11.00
Minimum		3.00	1.00	1.00
Maximum		12.00	12.00	12.00
Percentiles	25^{th}	6.00	7.00	7.00
	50^{th}	8.00	8.00	8.00
	75^{th}	9.00	9.00	9.00

The means and standard deviation of concentration of male and female different kind of martial art practitioners have been shown in table 4.50.

Table 4.52

Two way ANOVA on concentration among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	0.28	1	0.28	0.06	0.80
Martial Arts	62.26	5	12.45	2.81*	0.02
Interaction (Gender*Martial art)	1.02	5	0.20	0.05	1.00
Error	1544.40	348	4.44		
Total	1607.96	359			

** The mean difference is significant at the .05 level.*

The above table shows that, the calculated f value of column (martial art) was 2.81, which was significant since p value (0.02<0.05) at 0.05 level with df equal to 1, 348. Whereas, in the case of computed F value (0.06) for row (gender) and for interaction (0.05) was not significant since p values (0.06 and 1.00 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for column by using Least Significant Difference, LSD test (Post hoc test).

Column analysis (Martial arts wise)

Table 4.53

Estimates of concentration scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	8.35	0.27	7.82	8.89
Kalaripayattu	8.47	0.27	7.93	9.00
Karate	8.05	0.27	7.52	8.59
Taekwondo	8.00	0.27	7.47	8.54
Wrestling	8.03	0.27	7.50	8.57
Wu Shu	7.17	0.27	6.63	7.70

The mean scores and standard error for the concentration in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.53.

Table 4.54

Pairwise Comparisons of concentration martial art practitioners

Mean score						M.D.	Sig level
Judo	**Kalari**	**Karate**	**Taekw**	**Wrest**	**Wu sh**		
8.35	8.47					0.12	0.76
8.35		8.05				0.30	0.44
8.35			8.00			0.35	0.36
8.35				8.03		0.32	0.41
8.35					7.17	1.18*	0.00
	8.47	8.05				0.42	0.28
	8.47		8.00			0.47	0.23
	8.47			8.03		0.43	0.26
	8.47				7.17	1.30*	0.00
		8.05	8.00			0.05	0.89
		8.05		8.03		0.02	0.96
		8.05			7.17	0.88*	0.02
			8.00	8.03		0.03	0.93
			8.00		7.17	0.83*	0.03
				8.03	7.17	0.87*	0.03

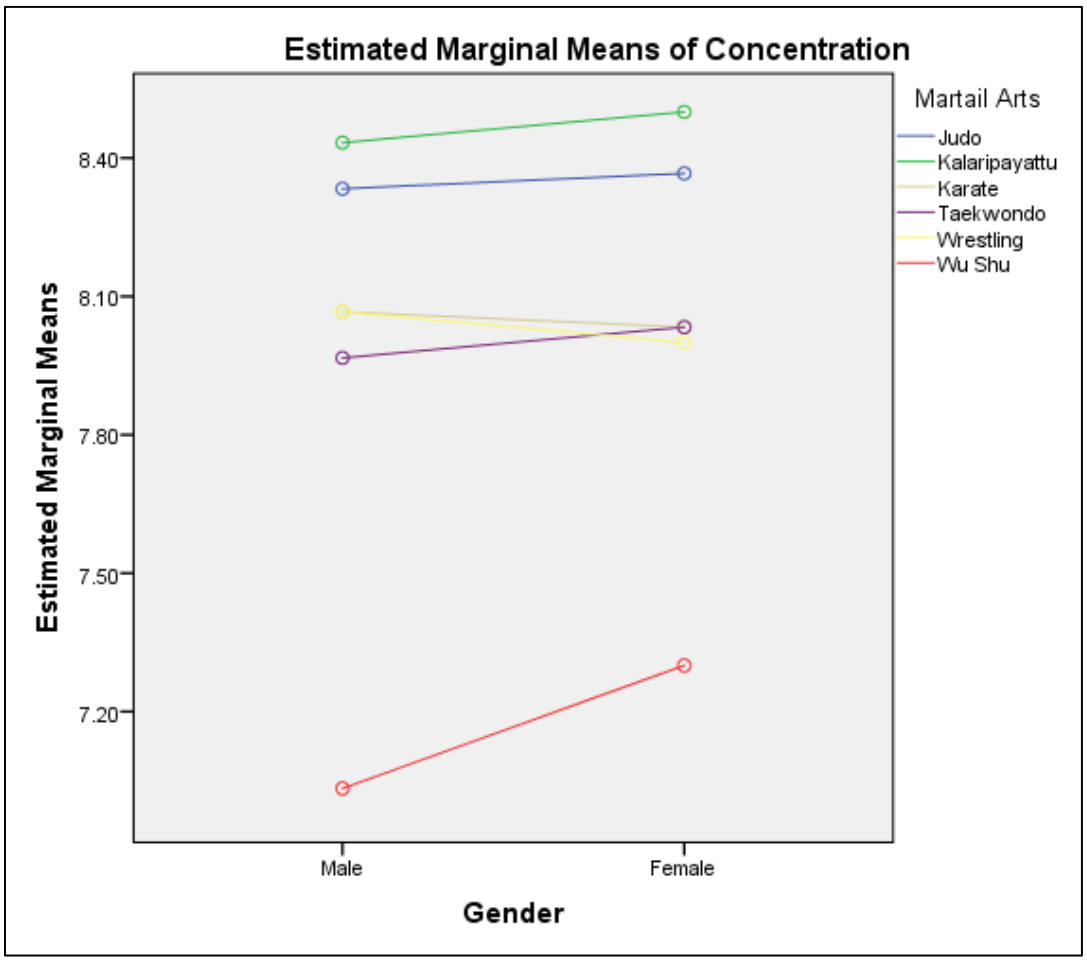
** The mean difference is significant at the .05 level.*

Table 4.54 shows that mean difference scores of concentration of wu shu practitioners when compared with judo, karate, kalaripayattu, taekwondo and wrestling practitioners were 1.18, 1.30, 0.88, 0.83 and 0.87 respectively were significant differences since critical differences were 0.00, 0.00, 0.02, 0.03 and 0.03

respectively lesser than at 0.05 level It may be concluded that the wu shu practitioners are low concentration than other martial arts practitioners.

Figure 4.13

Pair wise comparison of concentration scores



d. Confidence and achievement motivation

The comparison of the confidence and achievement motivation among male and female martial arts practitioners were calculated in table 4.55.

Table 4.55

Description of confidence and achievement motivation scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		8.21	8.33	8.27
Std. Error of Mean		0.14	0.15	0.10
Median		8.00	8.00	8.00
Std. Deviation		1.86	2.03	1.95
Variance		3.45	4.13	3.79
Skewness		-0.11	-0.12	-0.11
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.24	-0.25	-0.24
Std. Error of Kurtosis		0.36	0.36	0.26
Range		9.00	9.00	9.00
Minimum		3.00	3.00	3.00
Maximum		12.00	12.00	12.00
Percentiles	25^{th}	7.00	7.00	7.00
	50^{th}	8.00	8.00	8.00
	75^{th}	10.00	10.00	10.00

The means and standard deviation of confidence and achievement motivation of male and female different kind of martial art practitioners have been shown in table 4.55.

Table 4.56

Two way ANOVA on confidence and achievement motivation among martial art practitioners

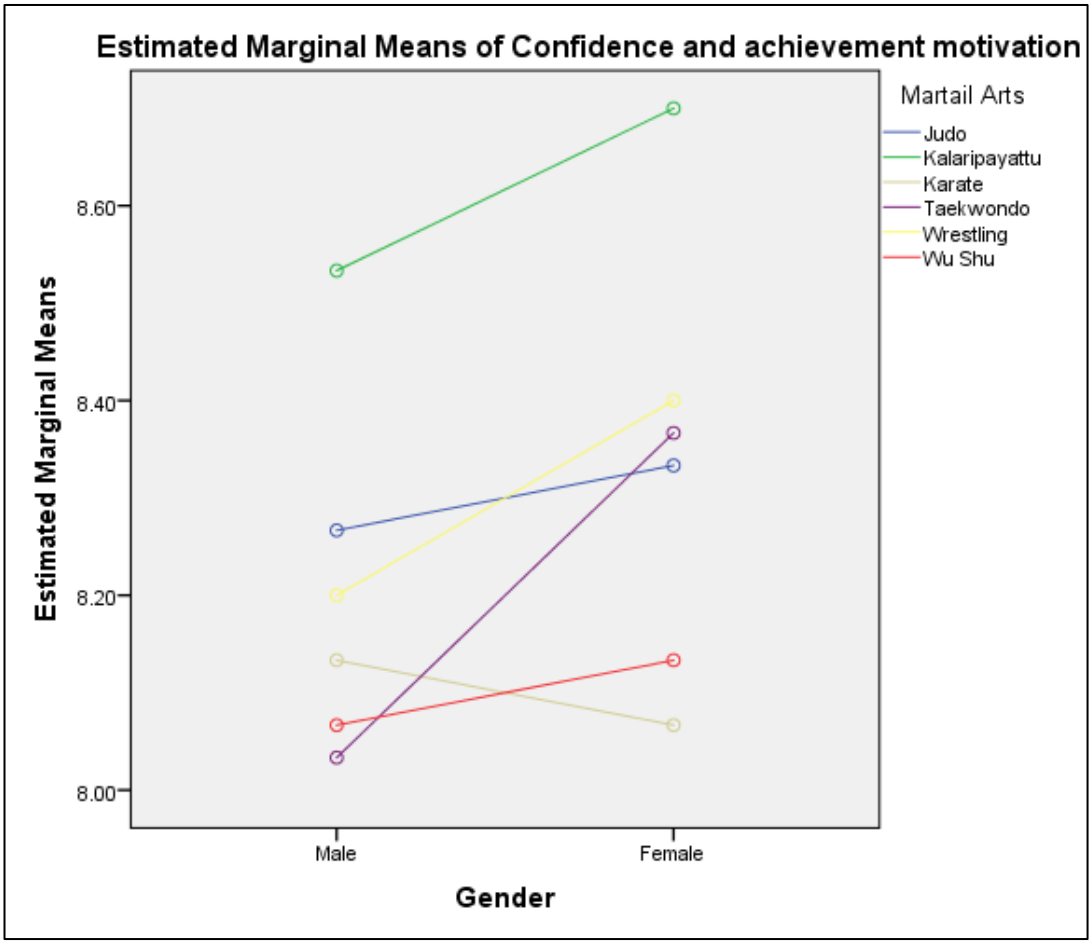
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	1.47	1	1.47	0.38	0.54
Martial Arts	11.08	5	2.22	0.57	0.72
Interaction (Gender*Martial art)	1.41	5	0.28	0.07	1.00
Error	1344.90	348	3.87		
Total	1358.86	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of row (gender), column (martial art) and interaction were 0.38, 0.57 and 0.07, which were no significant since p value (0.54, 0.72 and 1.00 < 0.05) at 0.05 level with df equal to 1, 348 and 5, 348. Therefore H_0 row (gender), column (martial art) and interaction may be accepted at 0.05 level of significance. . It may be concluded that the all martial art practitioners are similar confidence and achievement motivation level.

Figure 4.14

Pair wise comparison of confidence and achievement motivation scores



e. Goal setting and mental practice

The comparison of the goal setting and mental practice among male and female martial arts practitioners were calculated in table 4.57.

Table 4.57

Description of goal setting and mental practice scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		7.68	7.78	7.73
Std. Error of Mean		0.15	0.16	0.11
Median		8.00	8.00	8.00
Std. Deviation		2.02	2.14	2.08
Variance		4.06	4.58	4.31
Skewness		-0.35	-0.47	-0.41
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.12	-0.15	-0.05
Std. Error of Kurtosis		0.36	0.36	0.26
Range		9.00	9.00	9.00
Minimum		3.00	3.00	3.00
Maximum		12.00	12.00	12.00
Percentiles	25^{th}	6.00	6.00	6.00
	50^{th}	8.00	8.00	8.00
	75^{th}	9.00	9.75	9.00

The means and standard deviation of goal setting and mental practice of male and female different kind of martial art practitioners have been shown in table 4.57.

Table 4.58

Two way ANOVA on goal setting and mental practice among martial art practitioners

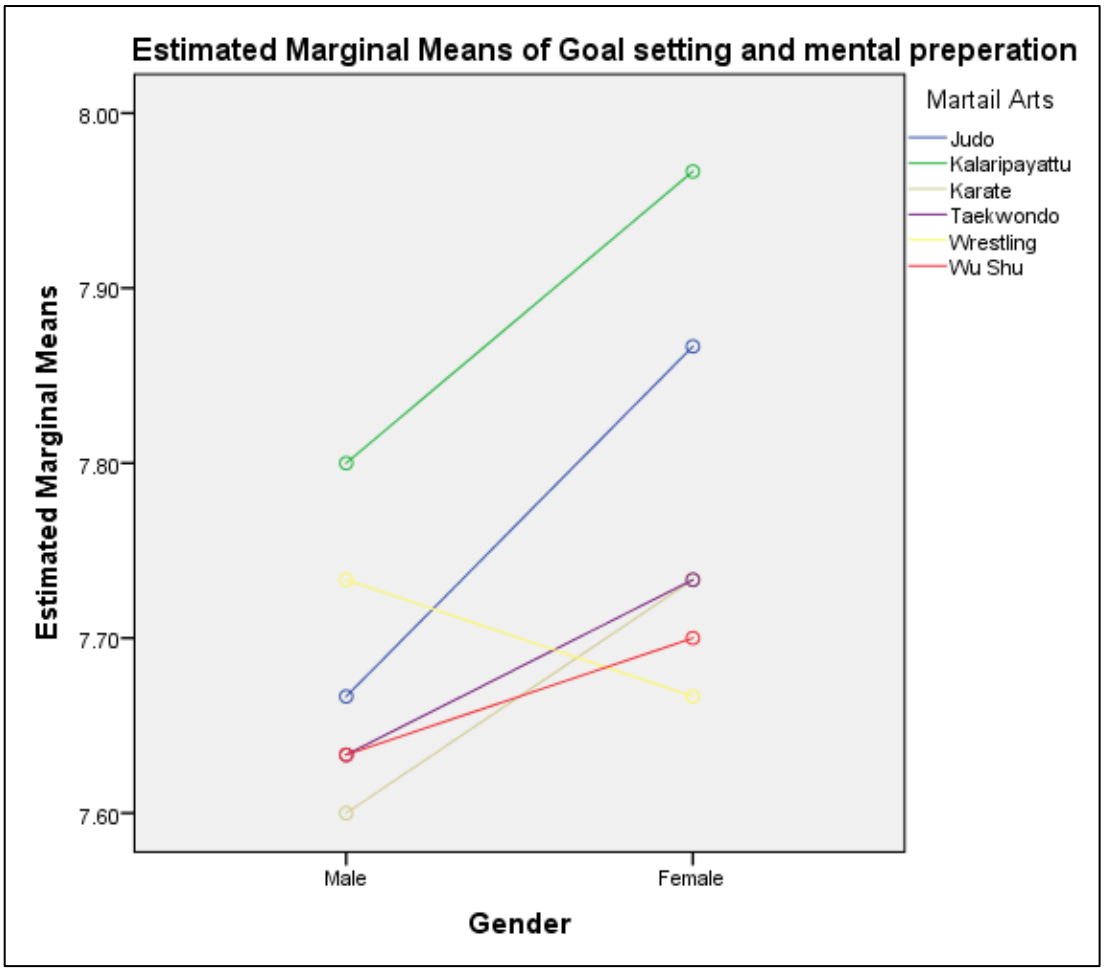
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	0.90	1	0.90	0.20	0.65
Martial Arts	2.16	5	0.43	0.10	0.99
Interaction (Gender*Martial art)	0.67	5	0.13	0.03	1.00
Error	1543.60	348	4.44		
Total	1547.32	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of row (gender), column (martial art) and interaction were 0.20, 0.10 and 0.03, which were no significant since p value (0.65, 0.99 and 1.00 < 0.05) at 0.05 level with df equal to 1, 348 and 5,348. Therefore H_0 row (gender), column (martial art) and interaction may be accepted at 0.05 level of significance. . It may be concluded that the all martial art practitioners are similar goal setting and mental practice level.

Figure 4.15

Pair wise comparison of goal setting and mental practice scores



f. Peaking under pressure

The comparison of the peaking under pressure among male and female martial arts practitioners were calculated in table 4.59.

Table 4.59

Description of peaking under pressure scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		7.72	7.94	7.83
Std. Error of Mean		0.14	0.14	0.10
Median		8.00	8.00	8.00
Std. Deviation		1.89	1.82	1.85
Variance		3.55	3.32	3.44
Skewness		-0.69	-0.84	-0.76
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.42	0.61	0.48
Std. Error of Kurtosis		0.36	0.36	0.26
Range		9.00	9.00	10.00
Minimum		3.00	2.00	2.00
Maximum		12.00	11.00	12.00
Percentiles	25^{th}	7.00	7.00	7.00
	50^{th}	8.00	8.00	8.00
	75^{th}	9.00	9.00	9.00

The means and standard deviation of peaking under pressure of male and female different kind of martial art practitioners have been shown in table 4.59.

Table 4.60

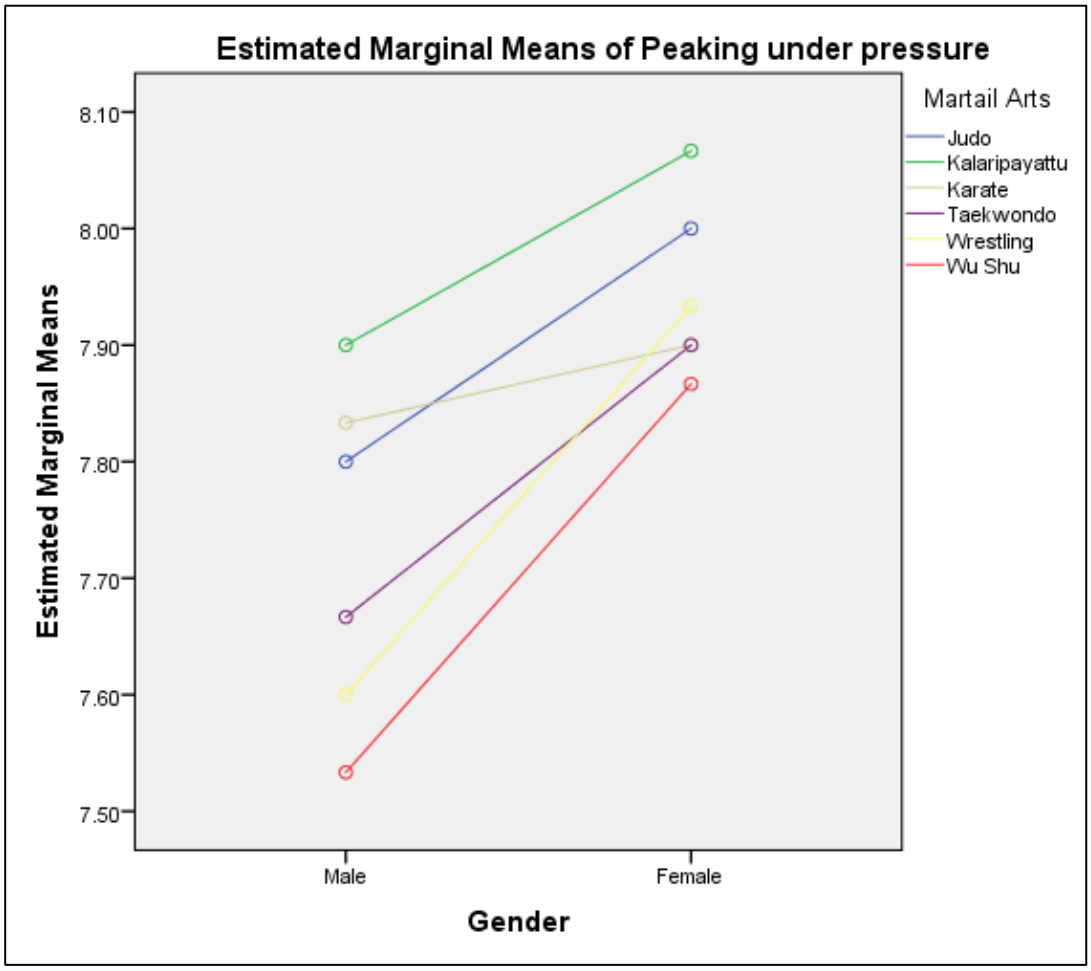
Two way ANOVA on peaking under pressure among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	4.44	1	4.44	1.26	0.26
Martial Arts	3.17	5	0.63	0.18	0.97
Interaction (Gender*Martial art)	0.79	5	0.16	0.05	1.00
Error	1225.60	348	3.52		
Total	1234.00	359			

The above table shows that, calculated F values of row (gender), column (martial art) and interaction were 1.26, 0.18 and 0.05, which were no significant since p value (0.26, 0.97 and 1.00 < 0.05) at 0.05 level with df equal to 1, 348 and 5, 348. Therefore H_0 row (gender), column (martial art) and interaction may be accepted at 0.05 level of significance. It may be concluded that the all martial art practitioners are similar peaking under pressure situation.

Figure 4.16

Pair wise comparison of peaking under pressure scores



g. Freedom from worry

The comparison of the freedom from worry among male and female martial arts practitioners were calculated in table 4.61.

Table 4.61

Description of freedom from worry scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		7.61	7.70	7.66
Std. Error of Mean		0.16	0.14	0.11
Median		8.00	8.00	8.00
Std. Deviation		2.15	1.86	2.01
Variance		4.62	3.45	4.03
Skewness		-0.26	-0.26	-0.27
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.21	0.04	-0.07
Std. Error of Kurtosis		0.36	0.36	0.26
Range		10.00	9.00	10.00
Minimum		2.00	3.00	2.00
Maximum		12.00	12.00	12.00
Percentiles	25^{th}	6.00	6.00	6.00
	50^{th}	8.00	8.00	8.00
	75^{th}	9.00	9.00	9.00

The means and standard deviation of freedom from worry of male and female different kind of martial art practitioners have been shown in table 4.61

Table 4.62

Two way ANOVA on freedom from worry among martial art practitioners

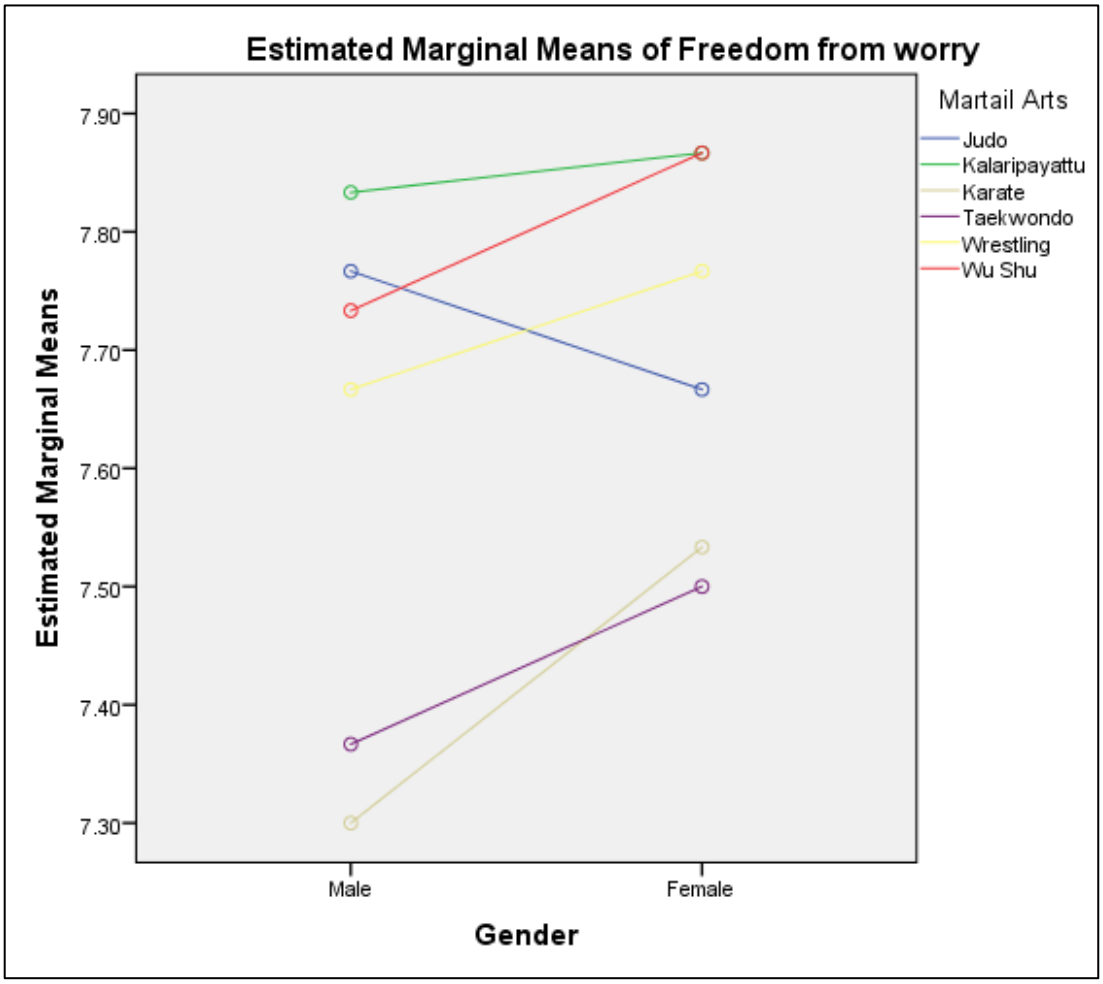
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	0.71	1	0.71	0.17	0.68
Martial Arts	10.36	5	2.07	0.50	0.77
Interaction (Gender*Martial art)	0.96	5	0.19	0.05	1.00
Error	1433.27	348	4.12		
Total	1445.29	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of row (gender), column (martial art) and interaction were 0.17, 2.07 and 0.19 which were no significant since p value (0.68, 0.77 and 1.00 < 0.05) at 0.05 level with df equal to 1, 348 and 5, 348. Therefore H_0 row (gender), column (martial art) and interaction may be accepted at 0.05 level of significance. It may be concluded that the all martial art practitioners are similar freedom from worry score.

Figure 4.17

Pair wise comparison of freedom from worry scores



3. Emotional intelligence in sports

a. Self confidence

The comparison of the self confidence among male and female martial arts practitioners were calculated in table 4.63.

Table 4.63

Description of self confidence scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		22.27	22.62	22.45
Std. Error of Mean		0.28	0.25	0.19
Median		22.00	23.00	22.00
Std. Deviation		3.81	3.39	3.60
Variance		14.49	11.50	12.99
Skewness		-0.24	-0.39	-0.32
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-1.17	-0.61	-0.93
Std. Error of Kurtosis		0.36	0.36	0.26
Range		13.00	13.00	13.00
Minimum		15.00	15.00	15.00
Maximum		28.00	28.00	28.00
Percentiles	25^{th}	20.00	20.25	20.00
	50^{th}	22.00	23.00	22.00
	75^{th}	26.00	26.00	26.00

The means and standard deviation of self confidence of male and female different kind of martial art practitioners have been shown in table 4.63.

Table 4.64

Two way ANOVA on self confidence among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	11.03	1	11.03	0.94	0.33
Martial Arts	556.65	5	111.33	9.51*	0.00
Interaction (Gender*Martial art)	21.63	5	4.33	0.37	0.87
Error	4073.70	348	11.71		
Total	4663.00	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of column (martial art) was 9.51 which was significant since p value (0.00 < 0.05) at 0.05 level with df equal to 1, 348 and 5, 348. Whereas, in the case of computed F value (0.94) for row (gender) and for interaction (0.37) was not significant since p values (0.33 and 0.87>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for column by using Least Significant Difference, LSD test (Post hoc test).

Column analysis (Martial arts wise)

Table 4.65

Estimates of self confidence scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	22.80	0.44	21.93	23.67
Kalaripayattu	24.97	0.44	24.10	25.84
Karate	21.95	0.44	21.08	22.82
Taekwondo	22.00	0.44	21.13	22.87
Wrestling	21.98	0.44	21.12	22.85
Wu Shu	20.98	0.44	20.12	21.85

The mean scores and standard error for the self confidence of emotional intelligence in sports in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.65.

Table 4.66

Pairwise Comparisons of self confidence martial art practitioners

Mean score						M.D.	Sig level
Judo	**Kalari**	**Karate**	**Taekw**	**Wrest**	**Wu sh**		
22.80	24.97					2.17*	0.00
22.80		21.95				0.85	0.17
22.80			22.00			0.80	0.20
22.80				21.98		0.82	0.19
22.80					20.98	1.82*	0.00
	24.97	21.95				3.02*	0.00
	24.97		22.00			2.97*	0.00
	24.97			21.98		2.98*	0.00
	24.97				20.98	3.98*	0.00
		21.95	22.00			0.05	0.94
		21.95		21.98		0.03	0.96
		21.95			20.98	0.97	0.12
			22.00	21.98		0.02	0.98
			22.00		20.98	1.02	0.11
				21.98	20.98	1.00	0.11

** The mean difference is significant at the .05 level.*

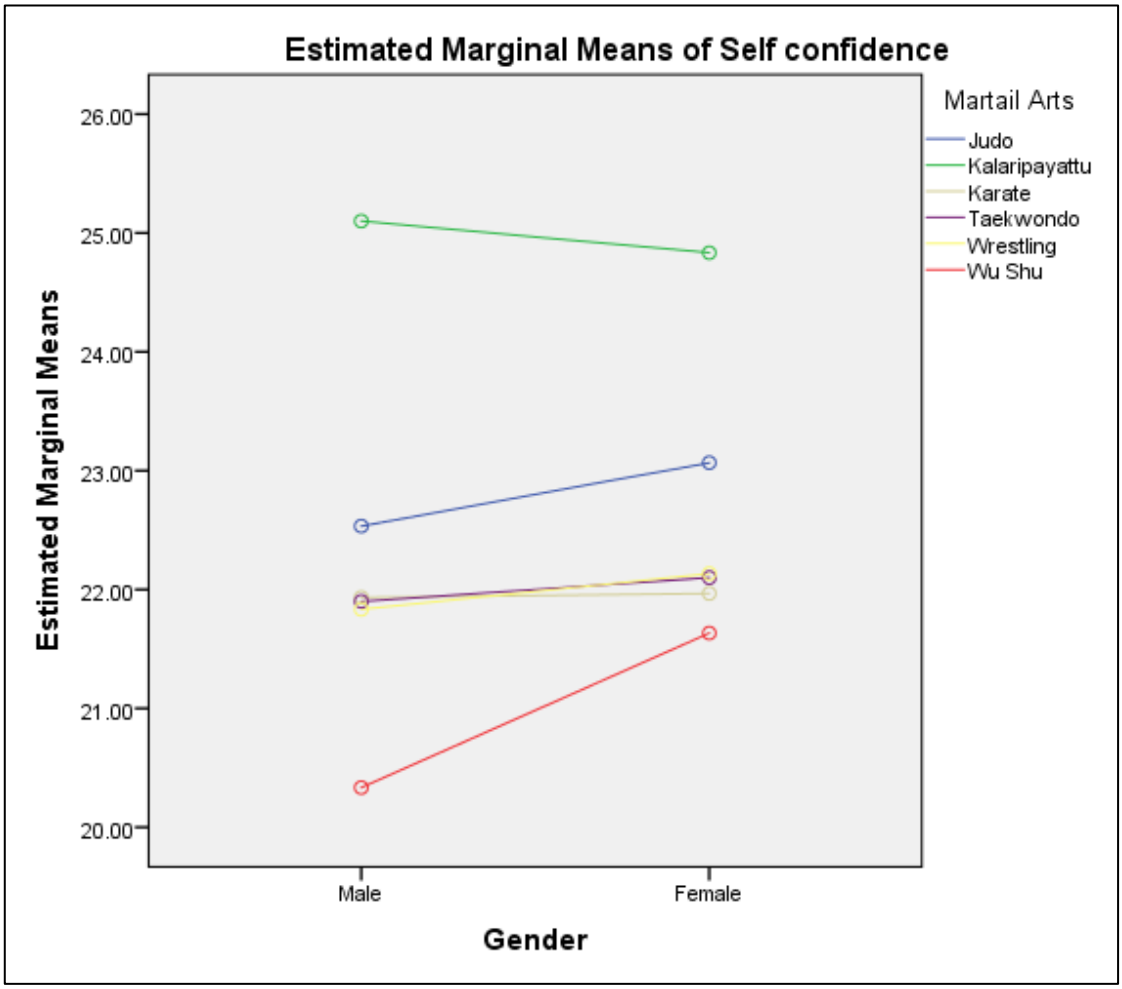
Table 4.66 shows that mean difference scores of self confidence of kalaripayattu practitioners when compared with judo, karate, taekwondo wrestling and wu shu practitioners were 2.17, 3.02, 2.97, 2.98 and 3.98 respectively were significant differences since critical differences were 0.00, 0.00, 0.00, 0.00 and 0.00 respectively lesser than at 0.05 level.

The mean difference score of self confidence of judo practitioners when compared with wu shu practitioner was 1.82 was significant differences since critical difference was 0.00 lesser than at 0.05 level.

It may be concluded that the mean value of self confidence was higher in kalaripayattu practitioners than other martial arts practitioners.

Figure 4.18

Pair wise comparison of self confidence scores



b. Self awareness

The comparison of the self awareness among male and female martial arts practitioners were calculated in table 4.67.

Table 4.67

Description of self awareness scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		23.79	24.20	23.99
Std. Error of Mean		0.30	0.25	0.20
Median		27.00	25.00	25.50
Std. Deviation		4.07	3.41	3.76
Variance		16.56	11.66	14.11
Skewness		-0.56	-0.74	-0.66
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.80	-0.28	-0.55
Std. Error of Kurtosis		0.36	0.36	0.26
Range		16.00	15.00	16.00
Minimum		13.00	14.00	13.00
Maximum		29.00	29.00	29.00
Percentiles	25^{th}	20.00	22.00	21.00
	50^{th}	27.00	25.00	25.50
	75^{th}	27.00	27.00	27.00

The means and standard deviation of self awareness of male and female different kind of martial art practitioners have been shown in table 4.67.

Table 4.68

Two way ANOVA on self awareness among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	15.21	1	15.21	1.15	0.28
Martial Arts	451.06	5	90.21	6.83*	0.00
Interaction (Gender*Martial art)	6.32	5	1.26	0.10	0.99
Error	4593.40	348	13.20		
Total	5065.99	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of column (martial art) was 6.83 which was significant since p value (0.00 < 0.05) at 0.05 level with df equal to 5, 348. Whereas, in the case of computed F value (1.15) for row (gender) and for interaction (0.10) was not significant since p values (0.28 and 0.99>0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for column by using Least Significant Difference, LSD test (Post hoc test).

Column analysis (Martial arts wise)

Table 4.69

Estimates of self awareness scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	24.85	0.47	23.93	25.77
Kalaripayattu	25.65	0.47	24.73	26.57
Karate	23.38	0.47	22.46	24.31
Taekwondo	22.87	0.47	21.94	23.79
Wrestling	24.63	0.47	23.71	25.56
Wu Shu	22.58	0.47	21.66	23.51

The mean scores and standard error for the self awareness of emotional intelligence in sports in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.69.

Table 4.70

Pairwise Comparisons of self awareness martial art practitioners

Mean score						M.D.	Sig level
Judo	Kalari	Karate	Taekw	Wrest	Wu sh		
24.85	25.65					0.80	0.23
24.85		23.38				1.47*	0.03
24.85			22.87			1.98*	0.00
24.85				24.63		0.22	0.74
24.85					22.58	2.27*	0.00
	25.65	23.38				2.27*	0.00
	25.65		22.87			2.78*	0.00
	25.65			24.63		1.02	0.13
	25.65				22.58	3.07*	0.00
		23.38	22.87			0.52	0.44
		23.38		24.63		1.25	0.06
		23.38			22.58	0.80	0.23
			22.87	24.63		1.77*	0.01
			22.87		22.58	0.28	0.67
				24.63	22.58	2.05*	0.00

** The mean difference is significant at the .05 level.*

Table 4.70 shows that mean difference scores of self awareness of judo practitioners when compared with karate, taekwondo and wu shu practitioners were 1.47, 1.98 and 2.27 respectively were significant differences since critical differences were 0.03, 0.00, 0.00 respectively lesser than at 0.05 level.

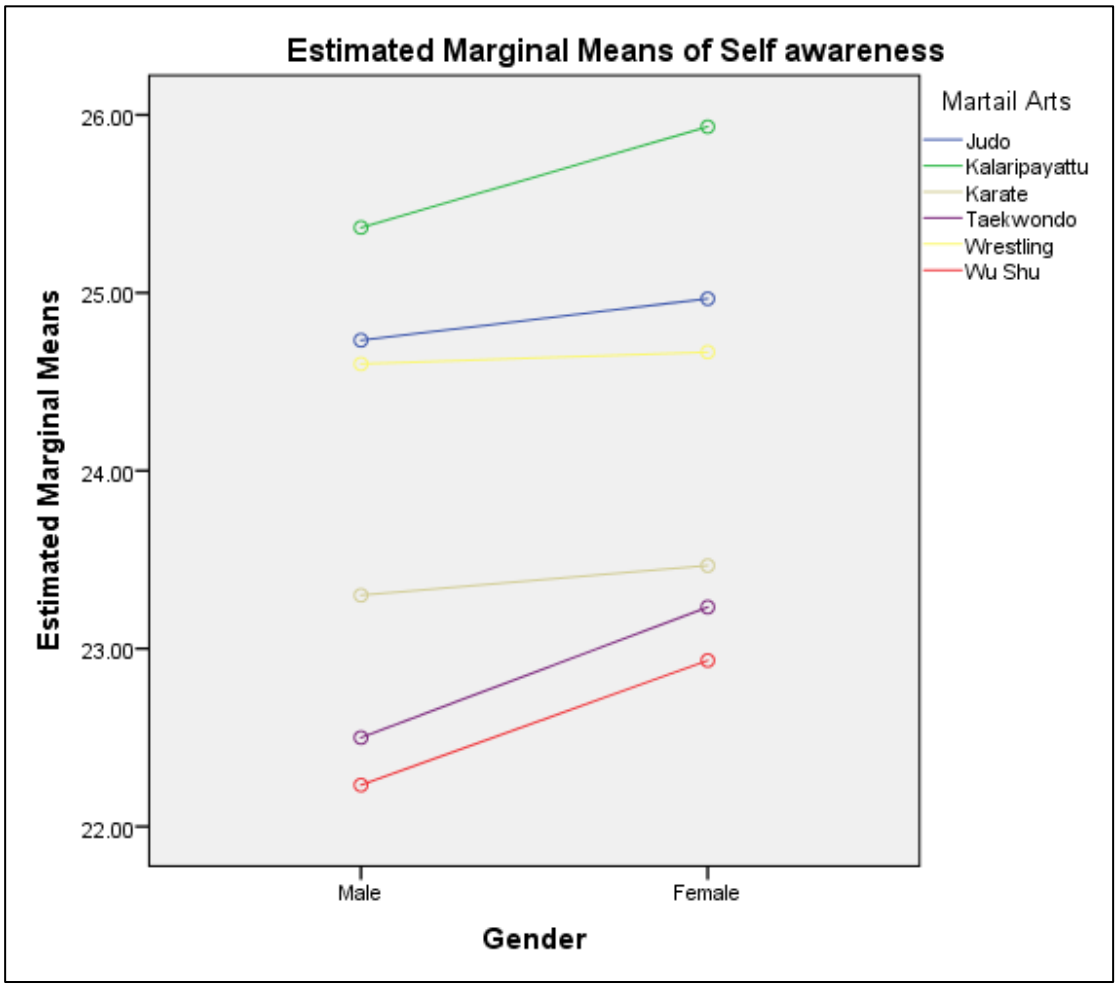
The mean difference scores of self awareness of kalaripayattu practitioners when compared with karate, taekwondo and wu shu practitioners were 2.27, 2.78, and 3.07 respectively were significant differences since critical differences were 0.00, 0.00 and 0.00 respectively lesser than at 0.05 level.

The mean difference scores of self awareness of wrestling practitioners when compared with taekwondo and wu shu practitioner were 1.77 and 2.05 were significant differences since critical difference were 0.01 and 0.00 lesser than at 0.05 level.

It may be concluded that the mean value of self awareness was higher in kalaripayattu, judo and wrestling practitioners whereas karate, taekwondo and wushu practitioners were scored very less self awareness in emotional intelligence in sports.

Figure 4.19

Pair wise comparison of self awareness scores



c. Self control

The comparison of the self control among male and female martial arts practitioners were calculated in table 4.71.

Table 4.71

Description of self control scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		23.96	24.24	24.10
Std. Error of Mean		0.24	0.21	0.16
Median		26.00	25.00	25.00
Std. Deviation		3.25	2.86	3.06
Variance		10.57	8.18	9.37
Skewness		-0.93	-0.63	-0.82
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		0.10	-0.13	0.10
Std. Error of Kurtosis		0.36	0.36	0.26
Range		15.00	14.00	15.00
Minimum		14.00	15.00	14.00
Maximum		29.00	29.00	29.00
Percentiles	25^{th}	21.00	22.25	22.00
	50^{th}	26.00	25.00	25.00
	75^{th}	26.00	26.00	26.00

The means and standard deviation of self control of male and female different kind of martial art practitioners have been shown in table 4.71.

Table 4.72

Two way ANOVA on self control among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	7.51	1	7.51	0.87	0.35
Martial Arts	342.47	5	68.49	7.97*	0.00
Interaction (Gender*Martial art)	21.49	5	4.30	0.50	0.78
Error	2990.93	348	8.60		
Total	3362.40	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of column (martial art) was 7.97 which was significant since p value (0.00 < 0.05) at 0.05 level with df equal to 5, 348. Whereas, in the case of computed F value (0.87) for row (gender) and for interaction (0.50) was not significant since p values (0.35 and 0.78 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for column by using Least Significant Difference, LSD test (Post hoc test).

Column analysis (Martial arts wise)

Table 4.73

Estimates of self control scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	24.90	0.38	24.16	25.64
Kalaripayattu	25.68	0.38	24.94	26.43
Karate	23.57	0.38	22.82	24.31
Taekwondo	23.12	0.38	22.37	23.86
Wrestling	24.35	0.38	23.61	25.09
Wu Shu	22.98	0.38	22.24	23.73

The mean scores and standard error for the self control of emotional intelligence in sports in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.73.

Table 4.74

Pairwise Comparisons of self control martial art practitioners

Mean score						M.D.	Sig level
Judo	Kalari	Karate	Taekw	Wrest	Wu sh		
24.90	25.68					0.78	0.14
24.90		23.57				1.33*	0.01
24.90			23.12			1.78*	0.00
24.90				24.35		0.55	0.31
24.90					22.98	1.92*	0.00
	25.68	23.57				2.12*	0.00
	25.68		23.12			2.57*	0.00
	25.68			24.35		1.33*	0.01
	25.68				22.98	2.70*	0.00
		23.57	23.12			0.45	0.40
		23.57		24.35		0.78	0.14
		23.57			22.98	0.58	0.28
			23.12	24.35		1.23*	0.02
			23.12		22.98	0.13	0.80
				24.35	22.98	1.37*	0.01

** The mean difference is significant at the .05 level.*

Table 4.74 shows that mean difference scores of self control of judo practitioners when compared with karate, taekwondo and wu shu practitioners were 1.33, 1.78 and 1.92 respectively were significant differences since critical differences were 0.01, 0.00, 0.00 respectively lesser than at 0.05 level.

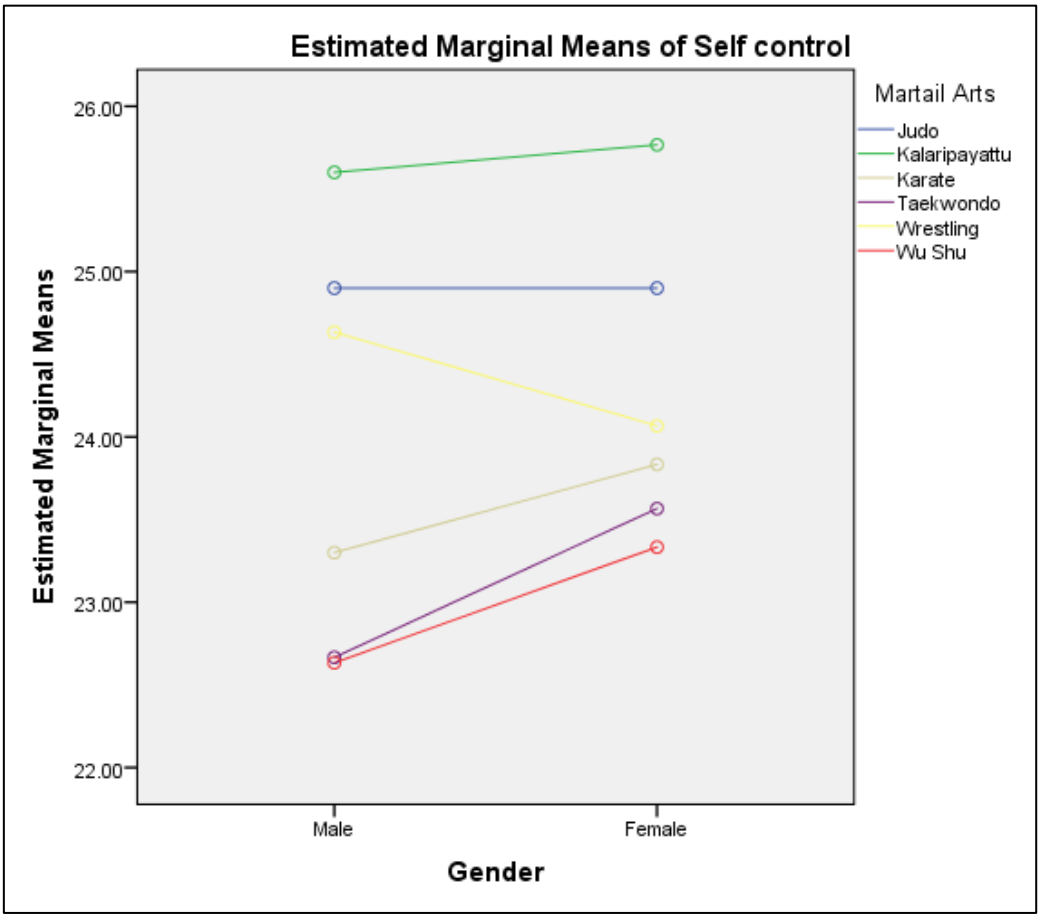
The mean difference scores of self control of kalaripayattu practitioners when compared with karate, taekwondo, wrestling and wu shu practitioners were 2.12, 2.57, 1.33 and 2.70 respectively were significant differences since critical differences were 0.00, 0.01, 0.00 and 0.00 respectively lesser than at 0.05 level.

The mean difference scores of self control of wrestling practitioners when compared with taekwondo and wu shu practitioner were 1.23 and 1.37 were significant differences since critical difference were 0.02 and 0.01 lesser than at 0.05 level.

It may be concluded that the kalaripayattu, and judo practitioners have higher level of self control, whereas taekwondo and wushu practitioners have very less self control in emotional intelligence in sports.

Figure 4.20

Pair wise comparison of self control scores



d. Motivation

The comparison of the motivation among male and female martial arts practitioners were calculated in table 4.75.

Table 4.75

Description of motivation scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		24.16	24.16	24.28
Std. Error of Mean		0.38	0.38	0.26
Median		24.00	24.00	25.00
Std. Deviation		5.04	5.04	4.88
Variance		25.37	25.37	23.82
Skewness		-0.28	-0.28	-0.40
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-1.36	-1.36	-1.21
Std. Error of Kurtosis		0.36	0.36	0.26
Range		15.00	15.00	15.00
Minimum		15.00	15.00	15.00
Maximum		30.00	30.00	30.00
Percentiles	25^{th}	20.00	20.00	20.00
	50^{th}	24.00	24.00	25.00
	75^{th}	28.00	28.00	28.00

The means and standard deviation of motivation of male and female different kind of martial art practitioners have been shown in table 4.75.

Table 4.76

Two way ANOVA on motivation among martial art practitioners

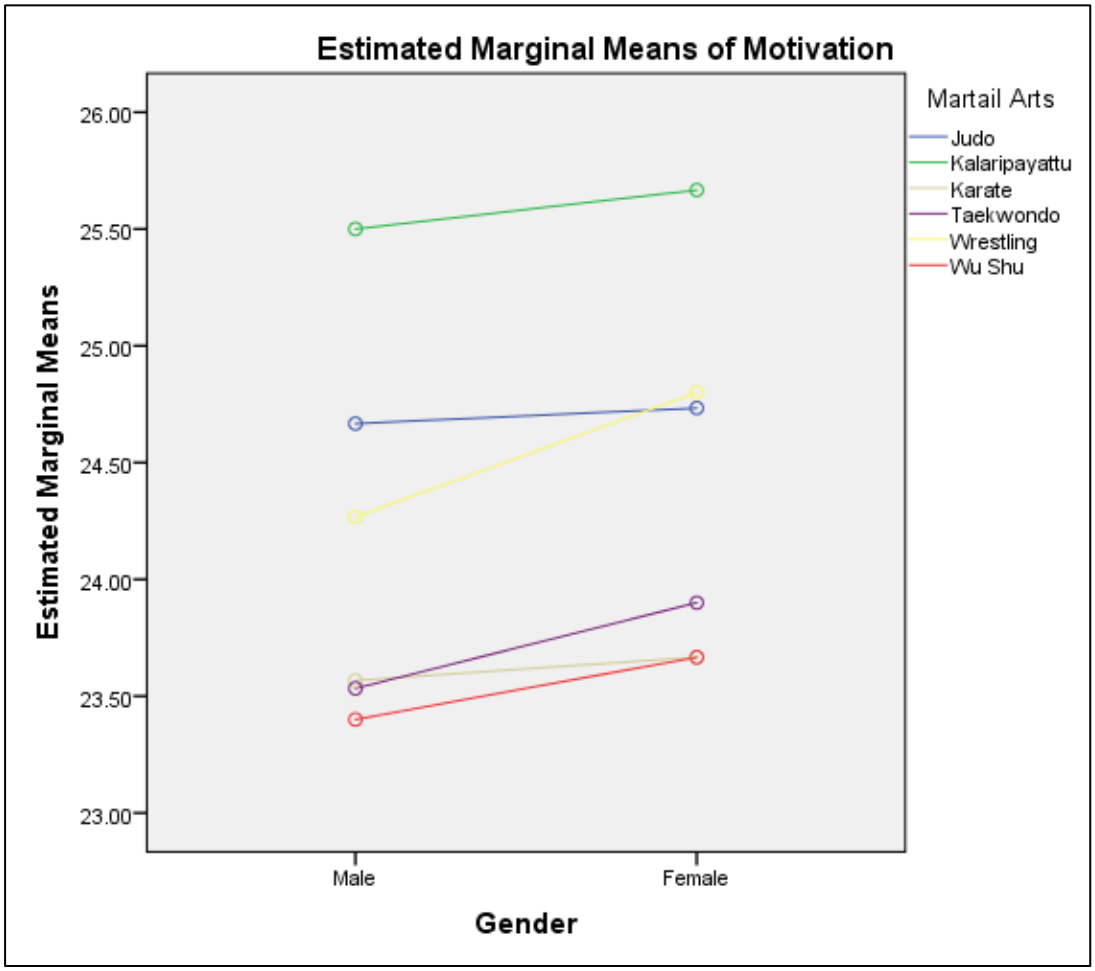
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	5.63	1	5.63	0.24	0.63
Martial Arts	195.25	5	39.05	1.63	0.15
Interaction (Gender*Martial art)	2.36	5	0.47	0.02	1.00
Error	8347.43	348	23.99		
Total	8550.66	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of row (gender), column (martial art) and interaction were 0.24, 1.63 and 0.02 which were no significant since p value (0.63, 0.15 and 1.00 < 0.05) at 0.05 level with df equal to 1, 348 and 5, 348. Therefore H_0 row (gender), column (martial art) and interaction may be accepted at 0.05 level of significance. It may be concluded that the all martial art practitioners are similar motivation score.

Figure 4.21

Pair wise comparison of motivation scores



d. Empathy

The comparison of the empathy among male and female martial arts practitioners were calculated in table 4.77.

Table 4.77

Description of empathy scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		22.88	23.16	23.20
Std. Error of Mean		0.22	0.22	0.16
Median		23.00	23.00	23.00
Std. Deviation		2.98	3.00	3.01
Variance		8.87	9.02	9.05
Skewness		0.00	0.11	-0.01
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.27	-0.65	-0.46
Std. Error of Kurtosis		0.36	0.36	0.26
Range		14.00	14.00	15.00
Minimum		15.00	16.00	15.00
Maximum		29.00	30.00	30.00
Percentiles	25^{th}	20.00	20.00	21.00
	50^{th}	23.00	23.00	23.00
	75^{th}	25.00	26.00	26.00

The means and standard deviation of empathy of male and female different kind of martial art practitioners have been shown in table 4.77.

Table 4.78

Two way ANOVA on empathy among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	3.03	1	3.03	0.35	0.55
Martial Arts	243.31	5	48.66	5.67*	0.00
Interaction (Gender*Martial art)	19.36	5	3.87	0.45	0.81
Error	2984.50	348	8.58		
Total	3250.20	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of column (martial art) was 4.75 which was significant since p value (0.00 < 0.05) at 0.05 level with df equal to 5, 348. Whereas, in the case of computed F value (0.57) for row (gender) and for interaction (0.20) was not significant since p values (0.45 and 0.96 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for column by using Least Significant Difference, LSD test (Post hoc test).

Column analysis (Martial arts wise)

Table 4.79

Estimates of empathy scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	23.28	0.38	22.54	24.03
Kalaripayattu	24.90	0.38	24.16	25.64
Karate	22.65	0.38	21.91	23.39
Taekwondo	22.38	0.38	21.64	23.13
Wrestling	23.23	0.38	22.49	23.98
Wu Shu	22.77	0.38	22.02	23.51

The mean scores and standard error for the empathy of emotional intelligence in sports in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.79.

Table 4.80

Pairwise Comparisons of empathy martial art practitioners

Mean score						M.D.	Sig level
Judo	Kalari	Karate	Taekw	Wrest	Wu sh		
23.28	24.90					1.62*	0.00
23.28		22.65				0.63	0.24
23.28			22.38			0.90	0.09
23.28				23.23		0.05	0.93
23.28					22.77	0.52	0.34
	24.90	22.65				2.25*	0.00
	24.90		22.38			2.52*	0.00
	24.90			23.23		1.67*	0.00
	24.90				22.77	2.13*	0.00
		22.65	22.38			0.27	0.62
		22.65		23.23		0.58	0.28
		22.65			22.77	0.12	0.83
			22.38	23.23		0.85	0.11
			22.38		22.77	0.38	0.47
				23.23	22.77	0.47	0.38

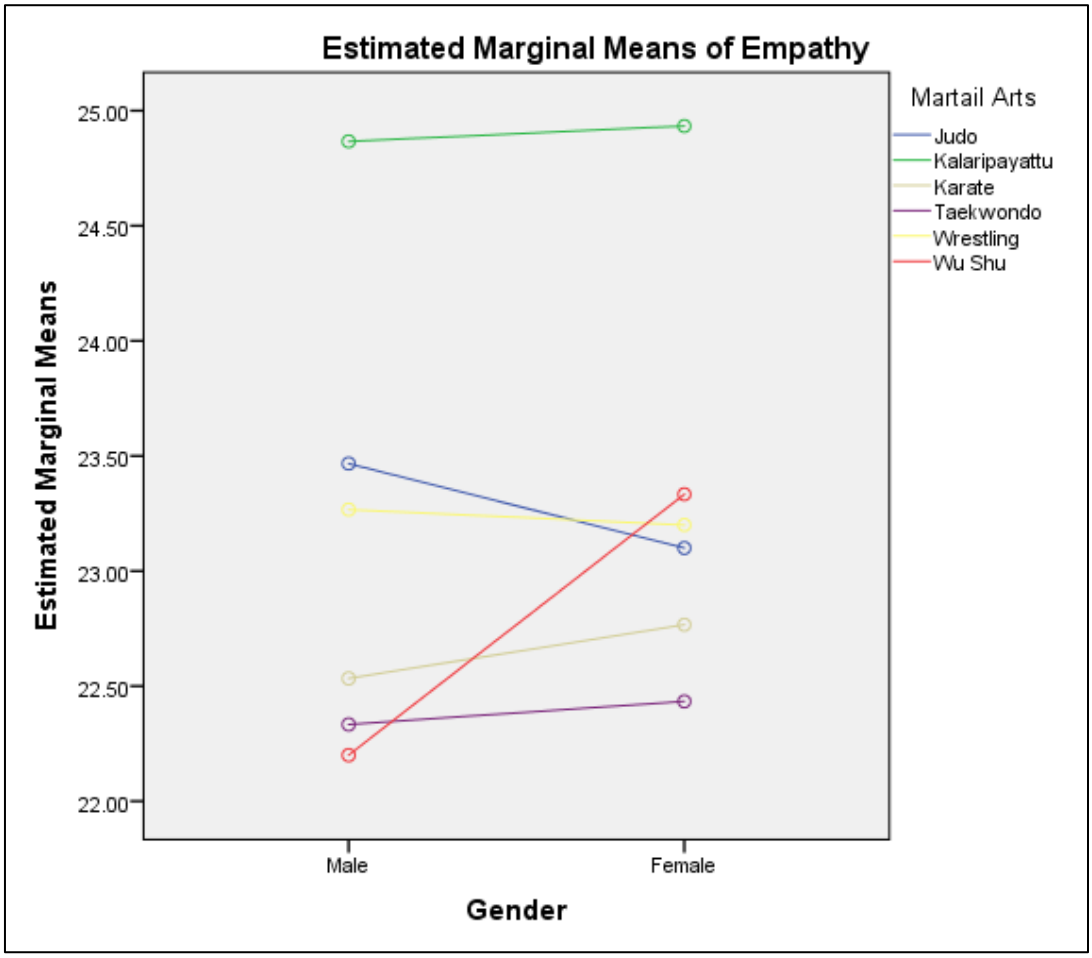
** The mean difference is significant at the .05 level.*

Table 4.80 shows that mean difference scores of empathy of kalaripayattu practitioners when compared with judo, karate, taekwondo, wrestling and wu shu practitioners were 1.62, 2.25, 2.52, 1.67 and 2.13 respectively were significant differences since critical differences were 0.00, 0.00, 0.00, 0.00 and 0.00 respectively lesser than at 0.05 level.

It may be concluded that the kalaripayattu practitioners gained more score in social competency than the other martial arts namely, judo, karate, taekwondo, wrestling and wushu practitioners.

Figure 4.22

Pair wise comparison of empathy scores



e. Social competence

The comparison of the social competence among male and female martial arts practitioners were calculated in table 4.81.

Table 4.81

Description of social competence scores of martial art practitioners

		Male	Female	Total
N		180	180	360
Mean		22.61	22.89	22.90
Std. Error of Mean		0.19	0.22	0.15
Median		23.00	23.00	23.00
Std. Deviation		2.58	2.94	2.78
Variance		6.64	8.64	7.75
Skewness		0.17	-0.03	0.02
Std. Error of Skewness		0.18	0.18	0.13
Kurtosis		-0.54	-0.31	-0.39
Std. Error of Kurtosis		0.36	0.36	0.26
Range		13.00	15.00	15.00
Minimum		16.00	14.00	14.00
Maximum		29.00	29.00	29.00
Percentiles	25^{th}	20.00	21.00	21.00
	50^{th}	23.00	23.00	23.00
	75^{th}	24.00	26.00	26.00

The means and standard deviation of social competence of male and female different kind of martial art practitioners have been shown in table 4.81.

Table 4.82

Two way ANOVA on social competence among martial art practitioners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Gender	4.23	1	4.23	0.57	0.45
Martial Arts	176.78	5	35.36	4.75*	0.00
Interaction (Gender*Martial art)	7.49	5	1.50	0.20	0.96
Error	2592.70	348	7.45		
Total	2781.20	359			

** The mean difference is significant at the .05 level.*

The above table shows that, calculated F values of column (martial art) was 4.75 which was significant since p value (0.00 < 0.05) at 0.05 level with df equal to 5, 348. Whereas, in the case of computed F value (0.57) for row (gender) and for interaction (0.20) was not significant since p values (0.45 and 0.96 > 0.05) at 0.05 level with df equal to 5, 348. Therefore H_0 for column (martial art) may be rejected at 0.05 level of significance. Pair wise comparison shall be done for column by using Least Significant Difference, LSD test (Post hoc test).

Column analysis (Martial arts wise)

Table 4.83

Estimates of social competence scores of male and female martial art practitioners

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Judo	22.77	0.35	22.07	23.46
Kalaripayattu	24.35	0.35	23.66	25.04
Karate	22.53	0.35	21.84	23.23
Taekwondo	22.63	0.35	21.94	23.33
Wrestling	22.98	0.35	22.29	23.68
Wu Shu	22.12	0.35	21.42	22.81

The mean scores and standard error for the social competence of emotional intelligence in sports in psychological variable of male and female different kind of martial art practitioners have been shown in table 4.83.

Table 4.84

Pairwise Comparisons of social competence martial art practitioners

Mean score						M.D.	Sig level
Judo	**Kalari**	**Karate**	**Taekw**	**Wrest**	**Wu sh**		
22.77	24.35					1.58*	0.00
22.77		22.53				0.23	0.64
22.77			22.63			0.13	0.79
22.77				22.98		0.22	0.66
22.77					22.12	0.65	0.19
	24.35	22.53				1.82*	0.00
	24.35		22.63			1.72*	0.00
	24.35			22.98		1.37*	0.01
	24.35				22.12	2.23*	0.00
		22.53	22.63			0.10	0.84
		22.53		22.98		0.45	0.37
		22.53			22.12	0.42	0.40
			22.63	22.98		0.35	0.48
			22.63		22.12	0.52	0.30
				22.98	22.12	0.87	0.08

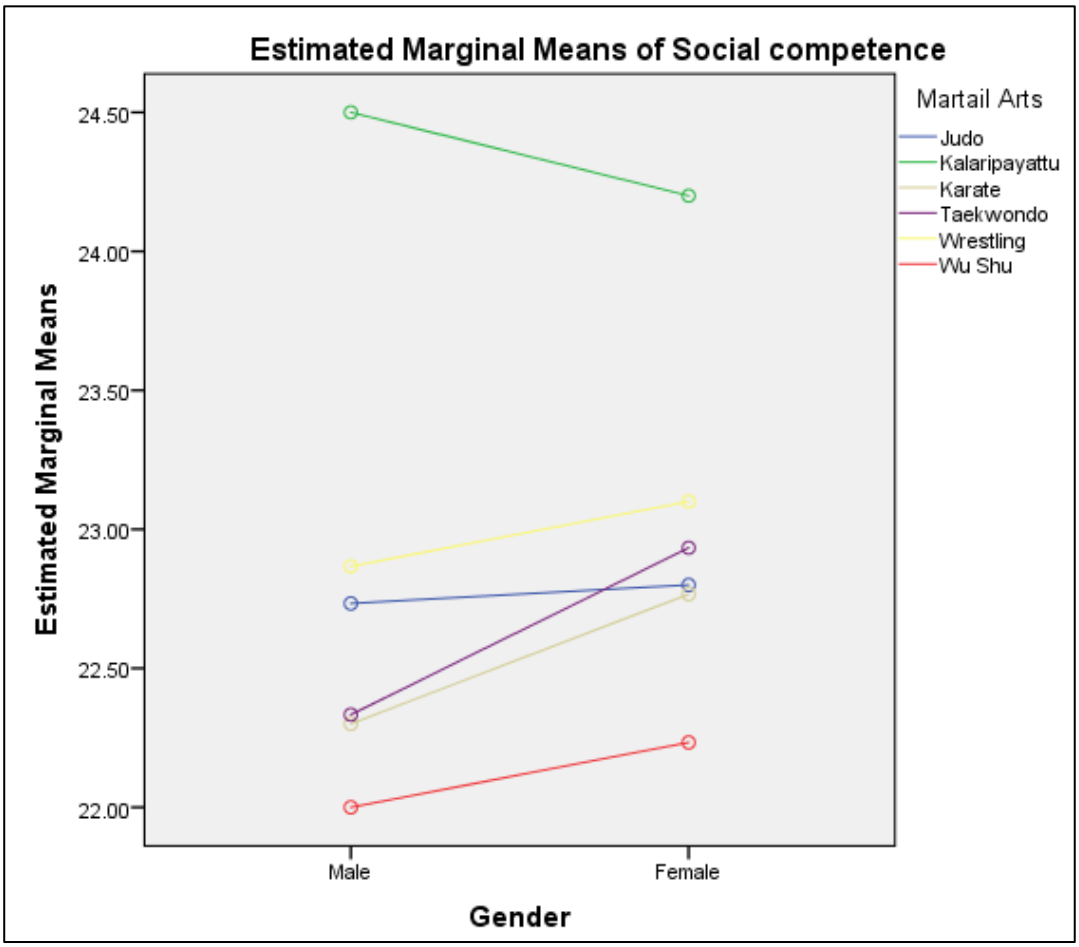
** The mean difference is significant at the .05 level.*

Table 4.84 shows that mean difference scores of empathy of kalaripayattu practitioners when compared with judo, karate, taekwondo, wrestling and wu shu practitioners were 1.58, 1.82, 1.72, 1.37 and 2.23 respectively were significant differences since critical differences were 0.00, 0.00, 0.00, 0.01, 0.00 respectively lesser than at 0.05 level.

It may be concluded that the kalaripayattu practitioners gained more score in social competence than the other martial arts namely, judo, karate, taekwondo, wrestling and wushu practitioners.

Figure 4.22

Pair wise comparison of social competence scores



Discussion on finding

The study was conducted to find out the selected physical, physiological and psychological variables among different martial arts practitioners in Kerala. For the study, a total of three hundred and sixty (N = 360) different martial arts practitioners were selected from northern region of Kerala state. The average age was 18 (±2) years.

The selected physical, physiological and psychological variables were based on the research scholar's reviewing of the available scientific literature pertaining to books, journals, periodicals, magazines, research abstracts and research papers and the discussion with experts, availability of instruments and the relevance of the study. Within the delimitations and limitations of the present study, the discussion was done in the physical, physiological and psychological variable based on the analysis and results of the study of each variable.

I. Physical variables

1. Agility

Owen Walker (2016) says that the terms 'agility' and 'change of direction speed' are often used interchangeably, recent knowledge has distinctively separated the two. Put simply, agility involves reactive abilities in unpredictable environments, whilst change of direction speed focuses purely on physical ability and is typically performed in pre-planned environments. This infers that traditional agility tests (e.g. t-test and pro-agility) are not actually capable of measuring agility, and thus should be referred to as change of direction speed tests. Recent research has shown that higher-levels athletes perform better on agility tests than lower-level athletes, but the same does apply to change of direction speed tests.

The result of the study shown that in the gender wise comparison, male martial art practitioners were significantly more agile than female practitioners. The findings of the studies conducted by Sekulic D, Spasic M, Mirkov D, Cavar M and Sattler T. are also in agreement to the gender wise findings of the study. Agility is a bio-motor ability that can be improved. It requires a solid foundation of strength and

a huge amount of body control, it is important that athletes learn how to produce and absorb force as efficiently as possible with speed and under pressure.

In any kind of martial artists practice, the practitioners need to react to stimulations quickly. If opponent tries to strike them, their ability to avoid, counter, block or offer any other response is determined first of all by their ability to pick up on the stimulation. By these points considered, martial art training programme may lead to improve speed of limbs, quick reaction and agility of the practitioners. Thus it might be the reason that no significant difference in agility among different kinds of martial arts namely judo, kalaripayattu, karate, taekwondo, wrestling and wushu.

2. Arm shoulder strength and endurance

It is a physiological fact that, on an average, men are stronger than women. A big part of the difference is based on the amount of muscle each gender has in their bodies. That is, men are stronger simply because they are typically larger; most of the reason for greater strength is larger muscles. Pound for pound, there is a much smaller difference in strength between genders than most would assume (Terry Williams, 2017). According to the National Strength and Conditioning Association, women generally produce about two-thirds the amount of total strength and applied force that men produce. Women are also physically built so that they generally carry two-thirds as much muscle mass as men. This proves that there is, in fact, a difference in strength that men are typically stronger, and that most of the difference is based on body size and muscle cross-sectional area alone. The same result was found in this study too, men martial arts practitioners were better in upper body strength and endurance than female practitioners.

In the case of comparison among different martial arts, wrestling practitioners are more dominant in arm shoulder strength and endurance than other martial arts. In the selected martial art, wrestling is involving struggling type techniques such as holding, clinching, fighting, throwing, joint lock etc. but in the case of other martial arts, there is no much holding technique. Thus it might be the reason of wrestling practitioners dominating in arm shoulder strength and endurance.

3. Body composition

In general, women have a higher percentage of body fat than men. The main reason of this is biological consideration which means body fat content is 25 percentages for women at normal size compared to 15 percentages for men. Other things are related to female hormones; they need fewer calories for their body weight.

In the case of body composition, the result of the study shows that in the gender wise comparison female subjects' body fat percentage is higher than the male subjects. Above said factor may be reason for the similar result in the case of body composition. There is no significant difference among martial arts practice on body composition.

4. Explosive leg power

Power is the ability to do work or generate force quickly. In terms of weight training, it's the ability to move a weight rapidly. On average, men are at an advantage in terms of generating power. In many sports and games, that requires power like sprinting. That certainly doesn't mean women can't excel at power sports and can't significantly enhance power through training.

The result of the study indicates that explosive leg power is higher in male practitioners than the female practitioners. Same as other physical variables, there is no significant difference among different form of martial arts practice.

5. Flexibility

When comparison comes to flexibility, women rule. *Ryan Halvorson (2011) confirms that female experienced improved range of motion than the male subjects.*

The result of the study revealed that the gender wise comparison, female practitioners were more flexible than the male subjects. And also Kalaripayattu practitioners are more flexible than other selected martial arts namely judo, karate, taekwondo, wrestling and wu shu.

Increasing the flexibility will lengthen the muscles, improve the exercise performance and help us with everyday activities. Many factors; it includes gender, heredity, pain, injury and age that affect in the improvement of flexibility. By incorporating stretching exercises into the martial art training program, it can improve range of motion of a joint or a series of joints, reduce joint pain, decrease risk of injury and improve ease of movement. The better flexibility of the kalariayattu practitioners may be due to their use of oil application before starting the payattu. In kalaripayattu training, maipayattu movement with oil massage is vital factor to improve range of movement than others.

II. Physiological variables

1. Breath holding time

Breath-holding time is directly proportional to the lung volume at the onset of breath holding, partly because this has a major influence on oxygen stores. There are, however, other effects of lung volume and its change, which are mediated by afferents arising from the chest wall, diaphragm and the lung itself. Prolongation of breath-holding times are seen after bilateral vagal and glossopharyngeal nerve block,87 and following complete muscular paralysis of conscious subjects.88 These studies suggest that much of the distress leading to the termination of breath holding is caused by frustration of the involuntary contractions of the respiratory muscles, which increase progressively during breath holding (Andrew B Lumb, 2017).

There was no significant difference in the breath holding time in gender wise comparison, martial arts group wise and interaction basis. It may be concluded that breath holding capacity is quite similar in the male and female martial arts practitioners. The findings of the study of Cherouveim ED, Botonis PG, Koskolou MD and Geladas ND (2012) are also in agreement to the findings of the study.

2. Mean arterial pressure

The practice of martial arts can raise heart rate and it helps improve the heart. The heart muscle needs to be worked. When we are going to attend martial arts class, then their heart rate is raised. This raising of heart rate can improve

oxygenates the blood and promote metabolic rate. Martial art is a best way to keep the heart pumping of all people. Hypertension is a leading contributor to heart disease. When we are ready to work out our heart will become stronger, which means heart can pump more blood efficiently and effectively than the heart can without workouts. The lower our blood pressure is to lower our heart pumping capacity (ferraro martial art, 2017).

The result of the study deals that the mean arterial pressure was higher in male practitioners than female practitioners, whereas there is no difference in mean arterial pressure among selected martial art practices. Finding of the Gleim GW, Stachenfeld NS, Coplan NL and Nicholas JA. (2001) are also agreement findings of the study.

3. Resting heart rate

Heart rate is the speed of the heartbeat measured by the number of contractions (beats) of the heart per minute (bpm). The heart rate can differ according to the body's physical needs, including the need to oxygen intake and carbon dioxide excretion.. Activities that can incite change include exercise, sleep, anxiety, stress, illness, and ingestion of drugs. The American Heart Association states the normal resting adult human heart rate is 60–100 bpm.

Warren Rosenberg (2010) agreed that the human heart beats approximately 70 to 85 times per minute in the average adult, with a notable difference between the genders. The average adult male heart rate is between 70 and 72 beats per minute, while there average for adult women is between 78 and 82 beats. This difference is largely accounted for by the size of the heart, which is typically smaller in females than males. The smaller female heart, pumping less blood with each beat, needs to beat at a faster rate to match the larger male heart's output.

The analysis and result of the resting heart rate variable shows that, the gender wise comparison, male practitioners was higher than the female practitioner. But in the case of martial art wise analysis, all the martial art practitioners had similar resting heart rate.

4. VO_2 Max

Yuri Elkaim (2009) says that VO_2 Max is the maximum capacity of our body to uptake, transport, and utilizes oxygen during incremental exercise. It is the gold standard measure that reflects our cardiovascular or aerobic fitness of the individual. The name VO_2 Max is derived from V - volume per time, O_2 - oxygen, max - maximum. Relative VO_2 max is often used to compare runners/athletes of varying bodyweights because using the absolute number would show that heavier athletes have a great absolute VO_2. Absolute values of VO_2 Max are typically 40-60% higher in men than in women. Obviously, this difference is most notably due to the variance in bodyweight and lean body mass between men and women. A more accurate comparison of maximal oxygen uptake between men and women would use the relative measure. Research has shown that the average young untrained male will have a VO_2 max of approximately 3.5 litres/minute (absolute) and 45 ml/kg/min (relative).

Male martial arts practitioners have more dominant in VO2 Max than the female practitioners, whereas there is no difference found among different form of martial arts practitioners.

III. Psychological variables

1. Aggression

Martial arts could help reduce aggressive behaviors in youth, according to psychology researchers from Bar-Ilan University and UCLA. The researchers conducted a meta-analysis of twelve studies to investigate what effects martial arts training had on youths' aggression, anger, and violence. A meta-analysis is a statistical method that allows researchers to test data from multiple studies. The previous research had examined a variety of martial art styles, including aikido, karate, taekwondo, and judo (Eric W. Dolan, 2017).

The result of the study shows that male practitioners were more aggressive than the female martial art practitioners. In the case of comparison among martial art

practices, there is no significant difference in aggression level. Finding of the Meysam Rahimizadeh and et al; (2011) are in agreement to the findings of the study.

2. Athletic coping skill

a. Coping with adversity

The coping with adversity assesses if an athlete remains positive and enthusiastic even when things are going badly, remains calm and controlled, and can quickly bounce back from mistakes and setbacks.

The result of the study indicated that there is a significant difference in coping with adversity in gender wise comparison and female practitioners were more adopt. Between practitioners of different Martials arts form, there is no significant difference was shown. Finding of the Mieczysław Radochoński and etal; (2011) are in agreement to the findings of the study.

b. Coachability

Coachability in athletic coping skill assesses if an athlete is open to and learns from instruction, and accepts constructive criticism without taking it personally and becoming upset.

In the case of coachability, female practitioners were more acceptable and learn from instructions than the male practitioners. There was no significant difference found in this sub scale among different martial art forms.

Martial arts teach students to listen and trust their coaches. Many children want to be great athletes but they have trouble to stay focused. A martial art practitioner is used to come for direction and committing to their action plan. They discover it easier to admit and train with coaches in other sports and tend to stay more comfortable when they involved in game. Through martial arts, they can become stronger and more skilled athlete and make the utmost of their training. They want to build plan and headship capabilities through focus and mental discipline. In an early age of children, martial art is a wonderful way to introduce as daily practicing activity (silverliningtk, 2017).

c. Concentration

This subscale reflects whether an athlete becomes easily distracted, and is able to focus on the task at hand in both practice and game situations, even when adverse or unexpected situations occur.

The result of the study revealed that in the concentration of athletic coping skill male and female martial art practitioners were similar in nature. But in the comparison among martial art forms, Kalaripayattu and Judo practitioners had more concentration and wu shu practitioners had less concentration in this study.

According to Ashleigh Johnstone, Martial arts need a decent level of motor fitness and also need to develop more amount of mental perception. Mental strength is more vital to martial arts that researchers have found martial art practitioners' stronger punching and hitting power may be lower to control the muscle movement in brain rather than increased muscular strength. Other studies have also found that children who practice martial arts achieve better academic test scores and behaviour.

d. Confidence and Achievement Motivation

It measures if an athlete is confident and positively motivated, consistently gives 100% during practices and games, and works hard to improve his or her skills.

In this study, in the case of confidence and achievement motivation, there was no significant difference found in male and female martial art practitioners. Finding of the Mieczysław Radochoński and etal; (2011) are in agreement to the findings of the study

e. Goal Setting and Mental Preparation

Through martial arts practice we can improve the character, behavior, and mental conditions of students of all ages and backgrounds. Apart from motor activities, most of the martial arts also promote intellectual concepts such as balance, meditation, proper breathing, and combat ethics. However, practitioners will realize how it helps in improving their goal-setting skills in life (atakick, 2018).

Goal setting and mental preparation assesses whether an athlete sets and works toward specific performance goals, plans and mentally prepares for games, and clearly has a game plan for performing well.

Male and female martial art practitioners were similar in setting goal and mental preparation. And also there was no significant difference among selected martial arts practitioners namely judo, kalaripayattu, karate, taekwondo, wrestling and wu shu. Finding of the Donny WiraYudha Kusuma and Aris Mulyono, (2019) are in agreement to the findings of the study.

f. Peaking under Pressure:

Peaking under pressure measures if an athlete is challenged rather than threatened by pressure situations and performs well under pressure.

In this criterion, male and female martial arts practitioners were very similar in handling the pressure situation. Finding of the Donny WiraYudha Kusuma and Aris Mulyono, (2019) are in agreement to the findings of the study.

g. Freedom from Worry

This sub scale assesses whether an athlete puts pressure on him or herself by worrying about performing poorly or making mistakes; worries about what others will think if he or she performs poorly.

In the above criteria, we already discussed about their handling pressure situation. In that case they were similar in nature same as that, all the selected martial art practitioners were similar in gaining freedom from worry.

3. Emotional intelligence

a. self confidence

Self-confidence is one of the six important facets of Emotional Intelligence. It is almost always present in people we admire and respect who “have their act together.” We admire individuals who display a positive attitude toward themselves without being arrogant. Self-confidence is a positive and balanced attitude having to do with the Self dimension. It consists of a basic belief that we can do what is

needed to produce the desired outcome. When obstacles occur, a person with a confident attitude continues to work to overcome the barriers, whereas someone lacking in self-confidence is not likely to persevere and might not even begin something. Overcoming barriers and giving ourselves credit for what we have achieved—no matter how insignificant to others—are important ways to build self-confidence. Experiencing small successes will build larger ones (Emily A. Sterrett, 2014).

Martial arts will build up and give the confidence. Those who have chosen the martial arts for self-defense, they will realize that it will bring positive changes in their physical, mental, spiritual and emotional components. One of the most obvious changes one sees is in their self-confidence.

In this study, the result have shown that the self confidence in emotional intelligence, male and female martial art practitioners are similar in their confidence level. But in the case of martial art wise comparison, kalaripayattu practitioners were higher confidence level than the rest of the martial art practitioners. Finding of the Mieczysław Radochoński and etal; (2011) and Samir Qasim, John Ravenscroft and John Sproule (2014) are in agreement to the findings of the study

b. self awareness

Self-Awareness in emotional intelligence is the ability to understand the inner emotions and their effects on the performance. He or she needs to know what he or she feelings and how it helps or hurts what he or she is trying to do. A person senses how others see him or herself and so align self-image with a larger reality. He or she has an accurate sense of him or herself strengths and limitations, which gives them a realistic self-confidence. It also gives clarity on their values and sense of purpose.

The maid of the martial art practitioner is the greatest weapon. If he or she loses the mental edge, the greatest fighter may go down in defeat. When a good understanding of one's surroundings and avoiding those situations then they can

understand the effectiveness of self defense and that may increase into clashes and putting one in destruction's way. Be aware of the practitioners surroundings at all times, know their escape routes, be prepared and present an air of confidence. Convicts target on the weak, worried, the easiest targets.

As self confidence, the result of the present study revealed that male and female martial arts practitioners proved no different in self awareness. But in the case of comparison of martial art forms, judo, kalaripayattu and wrestling practitioners were well aware of his or her self than the rest of the martial arts practitioners. Finding of the Donny WiraYudha Kusuma and Aris Mulyono, (2019) and Samir Qasim, John Ravenscroft and John Sproule (2014) are in agreement to the findings of the study.

c. Self control

Emotional Self-Control is the ability to manage disturbing emotions and desires and to maintain effectiveness under stressful or even aggressive conditions. Such self-control does not mean conquering emotions, but rather noticing the feelings and their accompanying bodily signals and choosing whether or how to act on them. Having Self-Control means staying clear-headed and calm, balancing one's impulses and feelings for the good of the group or mission.

Discharging our anger and frustration can help us recover control over a hectic day or win back productivity after feeling exhausted. But we have to do it in a careful way. Self-control cannot be developed in a day or two. It can be developed specially by martial arts training. To have control over ourselves and our actions, we need to be motivated and we should feel the need for control from within. While learning any kind of Martial Arts, will give us control over ourselves, it will surely change the things that around for noble within the community.

The result of the study indicates that self control in emotional intelligence in sports, no significant difference were found between male and female martial art practitioners. Whereas, in the case of martial art wise comparison, judo and kalaripayattu practitioners had more control over himself or herself. Least self

control was revealed in the martial art form of karate, taekwondo and wu shu practitioners. Finding of the Samir Qasim, John Ravenscroft and John Sproule (2014) and Donny WiraYudha Kusuma and Aris Mulyono, (2019) are in agreement to the findings of the study.

d. Motivation

Emotional Intelligence is divided into 'Personal' and 'Social' competences, which is broadly split between personal and interpersonal skills. Motivation is what pushes us to achieve our goals, feel more fulfilled and improve overall quality of life. It includes our personal drive to improve and achieve, commitment to our goals, initiative, or readiness to act on opportunities, and optimism and resilience.

In the present study, the analysis shows that all the subjects, male and female martial arts practitioners were motivated.

e. Empathy

Success in social interactions is a hallmark of Emotional Intelligence. We need to develop the ability to accurately assess the other person or the group and respond accordingly. The first step toward skillful social behavior is social knowledge or awareness. Such awareness or ability to tune in to others and feel what they are feeling is called empathy. Without empathy, we have difficulty sustaining relationships. Research shows that our brains are hard-wired for empathy. As we get to know a person socially and professionally and understand what they are feeling and why, it becomes easier to put ourselves in their shoes. That does not mean that we agree with everything they are thinking and feeling—just that we see things somewhat from their perspective. Empathy builds trust. Without trust, other people will not work collaboratively with us and we will have no power to influence them (Emily A. Sterrett, 2014).

Sympathy is when we feel bad in another person's condition. We don't know how other person is feeling in the same sort of situation in order to sympathize. On the other hand, empathy is when we not only feel bad for another person's problem, but we also feel and understand the same way of another person's feeling. It's the

ability to feel what someone else is feeling because we understand the situation from experience.

When we are in martial arts training, we learn how to defend ourselves from others and to stand up for what's right, but we must learn through our experience how to feel sympathy towards others and also empathize with other people, even when they're our opponents. If we are going to participate in championship then we will know how winning feels and how losing body feels. Instead of being a sore loser or winner, remember that we know how good it feels when we win and graciously accept the other's right to feel happy, just as they should accept our right not to feel happy to have lost.

The analysis of present study revealed that empathy factor in emotional intelligence, there was no significant difference found in gender wise comparison, whereas, in the case of martial art wise comparison, kalaripayattu practitioners were found more empathetic in nature than the rest of the martial art practitioners.

f. Social competence

The other half of emotional intelligence is related to the 'social' competencies we need to show within our life or work role. This requires we want to expand our awareness to include the emotions of those people around us. We will also need to develop our ability to read the emotional environment and power relationships we encounter in our role.

According to Han and Kemple (2006), socially competent individuals are those who are endowed with personal knowledge and skills which are effective tools to deal proficiently with many choices, challenges, and opportunities.

The result of the present study revealed that male and female martial arts practitioners were similar in social competence. But in the case of comparison of martial art practitioners, kalaripayattu practitioners were found ahead in social competence than the rest of the martial arts practitioners.

Discussion on hypothesis

The research scholar formulated two statistical (null) hypotheses formulated for this study. The analysis and results have directed to the following decisions for the hypothesis being formulated.

The first hypothesis (H_{0_1}) that was framed for the study says that *there will not be any significant difference in physical fitness, physiological and psychological variables between male and female martial arts practitioners in Kerala*.

The results of the following physical variables which comprise of agility, arm shoulder strength and endurance, body composition, explosive leg power and flexibility, the physiological variables; such as mean arterial pressure, resting pulse rate and VO_2 Max; and the psychological variables namely; aggression, coping with adversity and coachability of athletic coping skill leads that the hypothesis was rejected.

The statistical hypothesis was accepted in the rest of the physiological variable of breath holding time, selected psychological variables five sub scale of athletic coping skill namely; concentration, confidence and achievement motivation, goal setting and mental preparation, peaking under pressure and freedom from worry of athletic coping skill and all emotional intelligence in sports sub variables namely; self confidence, self awareness, self control, motivation, empathy and social competence.

The second hypothesis (H_{0_2}) that was framed for the study says that *there will not be any significant difference in physical fitness, physiological and psychological variables among selected martial arts practitioners in Kerala*.

The statistical hypothesis was accepted in the selected physical variables namely; body composition and explosive leg power, all the physiological variables namely; breath holding time, mean arterial pressure, resting heart rate and VO_2 Max and selected psychological variables such as aggression, six sub scales of athletic coping skill namely; coping with adversity, coachability, confidence and achievement motivation, goal setting and mental preparation, peaking under pressure

and freedom from worry and motivation sub variable of emotional intelligence in sports.

The results of the following physical variables such as; arm shoulder strength and endurance and flexibility and following psychological variables; rest of the sub scale of athletic coping skill - concentration and five emotional intelligence in sports variables namely; self confidence, self awareness, self control, empathy and social competence leads that the hypothesis was rejected.

CHAPTER V

Summary, Conclusions and Recommendations

2019

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Chapter V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Martial arts can play an important role in maintaining a healthy body, benefiting people in good health as well as those who suffer from cognitive, developmental, and physical disabilities. The martial arts date back to 2,000 B.C., where evidence of its use was seen in India and China (Lawler, 1996). For centuries, the martial arts were the "warrior's way", a system used to defend one's family and country. In China, certain martial arts were known as Healing Arts, and have been used for centuries to improve physical and emotional health, and enhance quality of life. The twentieth century brought the martial arts to America and the beginning of commercialization.

The researchers found that the martial arts training reduced the level of aggressive behaviour in boys, and found that they were more likely to step in and help someone who was being bullied than before they took part in the training. The Children aged between eight and eleven years old were tasked with traditional martial arts training that focused on respecting other people and defending themselves as part of an anti-bullying programme. The children were also taught how to maintain a level of self-control in heated situations. Significant changes were not found in the girls' behaviour, potentially because they showed much lower levels of physical aggression before the training than the boys did. Interestingly, this anti-aggression effect is not limited to young children. A different piece of research found reduced physical and verbal aggression, as well as hostility, in adolescents who practiced martial arts too (Ashleigh Johnstone, 2018).

The present study was designed to analyse the selected physical, physiological and psychological variables among different martial arts practitioners in Kerala. The investigator randomly selected a total of three hundred and sixty (N = 360) different martial arts practitioners such as; Judo, Kalaripayattu, Karate, Taekwondo, Wrestling and Wu shu from northern region of Kerala state. The

average age was 18 (±2) years. The subjects had practiced at least two years in their respective martial arts. The total subjects were equally divided into male and female groups, each group including one hundred and eighty subjects.

To find out the selected physical fitness variables such as agility, arm shoulder strength and endurance, body composition, explosive leg power and flexibility; selected physiological variables namely breath holding time, Mean arterial pressure and resting pulse rate and vo_2 max; selected psychological variables; namely aggression, athletic coping skill (coping with adversity, coachability, concentration, confidence and achievement motivation, goal setting and mental preparation and peaking under pressure and freedom from worry) and Emotional intelligence in sports (self confidence, self awareness, self control, motivation, empathy and social competence) were collected by conducting standardized tests.

For the purpose of finding out the comparison of selected physical, physiological and psychological variables of male and female subjects from different kinds of martial arts namely Judo, Kalarippayattu, Karate, Taekwondo, Wrestling and Wu shu, 2 way factorial design (MANOVA 2X6) was used. Whenever the 'F' ratio was found to be significant, the Least Significant Different test was applied as post-hoc test to determine the paired mean differences. The calculated numerical results were interpreted meaningfully. In all cases, the criterion for statistical significance is set at 0.05 level of confidence ($P < 0.050$). All the statistical analysis was carried out with the help of SPSS 23.0 version.

Conclusions

On the basis of the findings of the study, the following conclusions were drawn;

1. Male martial art practitioners proved better in the following physical variables namely, agility, arm shoulder strength and endurance, body composition and explosive leg power.

2. Female martial art practitioners proved better in the physical variable – flexibility than male subjects.
3. Male martial art practitioners were found better in the following physiological variables namely, resting heart rate and VO_2 Max.
4. Female martial art practitioners were found better in the physiological variable – mean arterial pressure than male subjects.
5. No significant differences were found in the breath holding time between male and female martial art practitioners of Kerala.
6. Male martial art practitioners were more in aggressive nature than the female practitioners.
7. Female martial art practitioners had more coping with adversity and coachability skill.
8. No significant differences were found in the five sub scales of athletic coping skill namely; concentration, confidence and achievement motivation, goal setting and mental practice, peaking under pressure and freedom from worry between male and female martial art practitioners of Kerala.
9. No significant differences were found in all the sub scales of emotional intelligence in sports namely; self confidence, self awareness, self control, motivation, empathy and social competence between male and female martial art practitioners of Kerala.
10. Wrestling practitioners had more arm and shoulder strength and endurance than other rest of the martail arts.
11. Kalaripayattu practitioners were more flexible than other martail art forms.
12. Judo and Kalaripayattu martial art practitioners proved better in concentration, athletic coping skill and also found that wu shu practitioners scored less in concentration skill.
13. Kalaripayattu practitioners were more self confident, empathetic and socially competent when compared to other martial art form.
14. Judo, Kalaripayattu and wrestling practitioners were more self aware than other rest of the martial arts forms.

15. Judo and Kalaripayattu practitioners were had more self control than other the martial art forms.
16. No significant difference was obtained in the following physical variables such as; agility, body composition and explosive leg power among different martial art forms.
17. No significant differences were obtained in the following physiological variables such as; breath hoding time, mean arterial pressure, resting heart rate and VO_2 Max among martial art form wise comparison.
18. No significant differences were obtained in aggression among martial art form wise comparison.
19. No significant differences were obtained in the athletic coping skills sub scales namely; coping with adversity, coachabillity, confidence and achievement motivation, goal setting and mental practice, peak under pressure and freedom from worry among martial art forms wise comparison.
20. No significant differences were obtained in motivation sub variable of emotional intelligence in sports among martial art forms wise comparison.

Recommendations

Based on the major findings of the present study the following recommendations are made:

1. The findings of the present study can be used by the martial arts practitioners for understanding his or her physical, physiological and psychological level.
2. The findings of the present study can be used by Trainers and Gurukals for assessing physical, physiological and psychological level of their practitioners.
3. The result of the study recommended that Kalaripayattu may be included in the school curriculum.
4. The finding of the study can help to identify the best martial art forms for school children of Kerala.
5. The study can be further extended to the research areas by adding other physical, physiological, psychological, variables.

6. The extended version of the study can be conducted in other martial art discipline, age categories, other geographical regions etc.
7. The result of the study will help the physical education teachers and coaches to know the current capabilities and weak points of different sport disciplines.
8. The result of the study may significantly help the other scholars to take up research projects in other states in India.
9. The selected variables will help to identify the talents, selection and team preparation to achieve the top performance.

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2019

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Appendices

2019

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Appendix A

Score Card

PHYSICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL PROFILING OF MARTIAL ARTS PRACTITIONERS IN KERALA

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Form No ☐ **Code No** ☐

Subject Name: …… Age:……

Activity: ……..…… Gender:……...

Institution/Club: …… District:…….....

I. Physical fitness variables

Variable	Test	Trial 1	Trial 2	Trial 3	Final Score
Agility	9X4 shuttle run		--	--	
Arm Shoulder Strength and Endurance	Bent Knee Push Up		--	--	
Explosive Leg Power	Standing Broad Jump				
Flexibility	Sit & reach				
Body composition (Skinfold Measurement)					
Abdominal (a)	Triceps (b)	Thigh (c)			Supra iliac (d)
e = ∑ of 4 Skinfold thickness (a+b+c+d)		f = $(e)^2$			
g = (0.29669*e)		h = (0.00043*f)			
i = g – h		j = (0.2963*age)			
% Body fat (i + j + 1.4072) =					

II. Physiological variables

Variable	Test	Score
Breath holding time	Holding time	
Mean arterial pressure		
Diastolic Blood pressure (DBP)	BP Monitor	
Systolic Blood pressure (SBP)	BP Monitor	
Mean arterial pressure (MAP)	DBP+[(SBP-DBP)/3]	
Resting pulse rate	Beats/minute	
VO_2 Max	"Astrand – Rhyming Nomogram Chart" method	

III. Physiological variables

Variable	Sub variables	Score
Aggression	--	
Athletic Coping Skill Inventory **Scoring:** 0 = almost never 1 = sometimes 2 = often 3 = almost always Note: * after a question number signifies a reverse-scored item (that is, 0 = almost always, 3 = almost never, and so on)	Coping with adversity (questions 5, 17, 21, and 24)	
	Coachability (questions 3*, 10*, 15, and 27)	
	Concentration (questions 4, 11, 16, and 25)	
	Confidence and achievement motivation (questions 2, 9, 14, and 26)	
	Goal setting and mental preparation (questions 1, 8, 13, and 20)	
	Peaking under pressure (questions 6, 18, 22, and 28)	
	freedom from worry (questions 7*, 12*, 19* and 23*)	
Emotional intelligence in sports **Scoring Key** **Grading** / **Points of statement** Never 1 Seldom 2 Some time 3 Often 4 Always 5	Self confidence (question No. 1, 7, 13, 18, 24 and 30)	
	Self awareness (question No. 2, 8, 14, 19, 25 and 31)	
	Self control (question No. 3, 9, 15, 20, 26 and 32)	
	Motivation (question No. 5, 11, 16, 22, 28 and 34)	
	Empathy (question No. 4, 10, 12, 21, 27 and 33)	
	Social competence (question No. 6, 17, 23, 29, 35 and 36)	
Any Comments: ***Signature***		

Appendix B

QUESTIONNAIRE OF AGGRESSION

Name: _____Age: _____

Sex: _____ Martial Art: _____

The questionnaire contains 10 statements. Each question contains six answers. You have to choose one by marking a tick mark under the appropriate column against each statement.

S.I No.	Question	Very much	Much	Ordinary	Less	Very Less	Not at all
1	How far is it good to break social traditions when need arises?						
2	How much anger do I experience when people do not accept even reasonable things?						
3	How much do I like to be a dashing and fearless leader?						
4	How much do I like bloody warriors fighting in a pitched battle?						
5	How far I believe in the policy of tit for tat?						
6	How much do I find myself possessed with in incident of anger in day today life situation?						
7	How much I like to deep in my room, a picture in comparison to others depicting a warrior soldier with a naked sword?						
8	How much do I like to have pitched discussions?						
9	How much would I like to contest elections?						
10	How much do I like reading biographies of revolutionaries?						

Appendix C

Athletic Coping Skills Inventory

Name: _____Age: _____

Sex: _____ Martial Art: _____

Instructions: The following are statements that athletes have used to describe their experiences. Please read each statement carefully, and then recall as accurately as possible how often you experience the same thing. There is no right or wrong answers. Do not spend too much time on any one statement. Please tick how often you have these experiences when playing sports.

Responses			
Almost Never (0)	**Sometimes (1)**	**Often (2)**	**Almost Always (3)**

Sl. No	Statement	Responses 0	1	2	3
1.	On a daily or weekly basis, I set very specific goals for myself that guide what I do.	☐	☐	☐	☐
2.	I get the most out of my talent and skill.	☐	☐	☐	☐
3.	When a coach or manager tells me how to correct a mistake I've made, I tend to take it personally and feel upset.	☐	☐	☐	☐
4.	When I'm playing sports, I can focus my attention and block out distractions	☐	☐	☐	☐
5.	I remain positive and enthusiastic during competition, no matter how badly things are going	☐	☐	☐	☐
6.	I tend to play better under pressure because I think more clearly	☐	☐	☐	☐
7.	I worry quite a bit about what others think of my performance	☐	☐	☐	☐
8.	I tend to do lots of planning about how to reach my goals	☐	☐	☐	☐
9.	I feel confident that I will play well	☐	☐	☐	☐
10.	When a coach or manager criticizes me, I become upset	☐	☐	☐	☐

	rather than feel helped				
11.	It is easy for me to keep distracting thoughts from interfering with something I am watching or listening to	☐	☐	☐	☐
12.	I put a lot of pressure on myself by worrying about how I will perform	☐	☐	☐	☐
13.	I set my own performance goals for each practice	☐	☐	☐	☐
14.	I don't have to be pushed to practice or play hard; I give 100%	☐	☐	☐	☐
15.	If a coach criticizes or yells at me, I correct the mistake without getting upset about it	☐	☐	☐	☐
16.	I handle unexpected situations in my sport very well	☐	☐	☐	☐
17.	When things are going badly, I tell myself to keep calm, and this works for me	☐	☐	☐	☐
18.	The more pressure there is during a game, the more I enjoy it	☐	☐	☐	☐
19.	While competing, I worry about making mistakes or failing to come through	☐	☐	☐	☐
20.	I have my own game plan worked out in my head long before the game begins	☐	☐	☐	☐
21.	When I feel myself getting too tense, I can quickly relax my body and calm myself	☐	☐	☐	☐
22.	To me, pressure situations are challenges that I welcome	☐	☐	☐	☐
23.	I think about and imagine what will happen if I fail or screw up	☐	☐	☐	☐
24.	I maintain emotional control regardless of how things are going for me	☐	☐	☐	☐
25.	It is easy for me to direct my attention and focus on a single object or person	☐	☐	☐	☐
26.	When I fail to reach my goals, it makes me try even harder	☐	☐	☐	☐
27.	I improve my skills by listening carefully to advice and instruction from coaches and managers	☐	☐	☐	☐
28.	I make fewer mistakes when the pressure is on because I concentrate better	☐	☐	☐	☐

Appendix D

EMOTIONAL INTELLIGENCE

Name: _____Age: _____

Sex: _____ Martial Art: _____

Instructions

There are sixty six statements in this questionnaire. You are requested to put √ mark in appropriate box. Do not think much after reading a statement. Please give immediate response that comes to your mind as a first thought.

- There is no right or wrong answer to any statement.
- Information collected will only be used for research purpose and will be kept strictly confidential.
- There is no time limit, however, completing of questionnaire is deeply solicited and does not take more than 10 to 15 minutes.

Responses				
Never (1)	**Seldom (2)**	**Sometimes (3)**	**Often (4)**	**Always (5)**

Sl. No	**Statement**	**Responses**				
		(1)	**(2)**	**(3)**	**(4)**	**(5)**
1.	I can readily admit mistakes and apologies.	☐	☐	☐	☐	☐
2.	I am aware of the physical reaction during any activity period.	☐	☐	☐	☐	☐
3.	I allow the past problems, injuries, anger and hurts to go and move beyond these.	☐	☐	☐	☐	☐
4.	I know what another person thinks about me during a particular interaction.	☐	☐	☐	☐	☐
5.	I have many reasons to participate in any activity and I am enthusiastic about it.	☐	☐	☐	☐	☐
6.	I can easily meet and initiate conversation with new people when I have to.	☐	☐	☐	☐	☐

7.	I take all possible precaution to ensure safety before taking risks while attempting new skills during programmes	☐	☐	☐	☐	☐
8.	I can easily recognize the type of emotions and its affects during my performance.	☐	☐	☐	☐	☐
9.	I am aware about my moods and rarely express my negative emotions before my treatment.	☐	☐	☐	☐	☐
10.	I listen to others attentively	☐	☐	☐	☐	☐
11.	I only indulge in a work, which has value for the society	☐	☐	☐	☐	☐
12.	I understand the person's mood by their body language	☐	☐	☐	☐	☐
13.	I share my views with class-mates and teachers without being prejudiced	☐	☐	☐	☐	☐
14.	I analyze myself regularly	☐	☐	☐	☐	☐
15.	I am good at managing my moods and I seldom bring negative emotions in the field.	☐	☐	☐	☐	☐
16.	I can keep going despite obstacles.	☐	☐	☐	☐	☐
17.	I can advocate my point of view effectively	☐	☐	☐	☐	☐
18.	I take initiative and move ahead to learn new task while performing	☐	☐	☐	☐	☐
19.	I am aware of my bodily changes like pain in my body parts taking place during activity.	☐	☐	☐	☐	☐
20.	I socialize with people around appropriately neither too close nor too distant	☐	☐	☐	☐	☐
21.	I can understand the other person's mood based on non-verbal signals	☐	☐	☐	☐	☐
22.	I participate in social activities because I have	☐	☐	☐	☐	☐

	interest in doing so					
23.	I do not hesitate in meeting and initiating conversation with new people	☐	☐	☐	☐	☐
24.	I express my thoughts honestly and thoughtfully before the teachers and class mates without being emphasized on them	☐	☐	☐	☐	☐
25.	I take out time to understand my self	☐	☐	☐	☐	☐
26.	I neither suppress my anger nor explode on others during practice	☐	☐	☐	☐	☐
27.	I can match my feelings with my class mates in an interaction	☐	☐	☐	☐	☐
28.	I often find myself positive in any given situation	☐	☐	☐	☐	☐
29.	I respect and like others in the class, even when they don't agree with me	☐	☐	☐	☐	☐
30.	I am generally comfortable in new competitive situations	☐	☐	☐	☐	☐
31.	I prefer taking break during practice when I feel that my energy level is getting low	☐	☐	☐	☐	☐
32.	I make appropriate relationship with the people	☐	☐	☐	☐	☐
33.	I have a strong support system and I ask for their help when I need it	☐	☐	☐	☐	☐
34.	I often inspire and encourage other's after interaction	☐	☐	☐	☐	☐
35.	I have no trouble making presentations in front of class	☐	☐	☐	☐	☐
36.	I take time in expressing myself in front of group	☐	☐	☐	☐	☐

Appendix E

Raw data on agility

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
14.82	13.54	15.2	13.4	14.2	11.42	14.3	15.98	16.14	14.3	14.29	14.3
14.6	14.5	14.12	14.04	14.03	12.8	14.89	14.59	15.01	15	14.1	15.19
15.79	15.36	13.32	14.06	13.62	12.2	15	15.3	15.5	15.79	15.21	15.09
13.5	14.25	14.02	14.56	14.01	14.45	14.3	15.4	15.02	15.81	14.8	14.3
13.24	12.3	13.03	15.25	14.21	15.2	15	14.6	15	14.3	15	15.7
14.2	13.96	14.8	13.01	13.35	15.27	15.79	15	15.86	14.54	15.02	15.1
13	12.65	14.25	15.21	14.31	14.2	15.81	15.02	15.89	15.2	13.6	16.4
14.14	14.25	15.01	13.98	13.79	14.03	14.3	13.6	15.98	15.05	14.6	14.53
12.8	12.04	15.4	15.21	14.5	13.62	14.54	14.6	14.59	14.89	16.2	14.04
13.05	12.2	13.2	13.38	12.68	14.01	15.2	16.2	13.25	15.24	15.9	14.39
14.45	13.98	14.5	14.25	13.07	14.21	15.05	15.9	15.4	14.3	15.9	15.43
15.2	14.87	13.2	15.21	13.39	13.35	14.89	15.9	14.2	15.19	14.8	15.43
13.25	14.04	11	13.74	15.2	14.31	15.24	14.8	14.6	15.09	15.3	13.84
12.25	12.15	14	14.02	13.27	13.79	14.3	15.3	16.2	14.3	15.4	14.82
17.42	16.02	14.25	14.03	14.25	14.5	15.19	15.4	15.9	15.7	13.98	14.6
13.6	13.6	14.5	14.25	13.02	12.68	15.09	13.98	15.9	14.3	14.02	15.79
12.9	12.01	14.6	13.18	14.21	13.07	14.3	14.02	14.8	14.89	14.7	15.03
13.25	14.25	13.5	15.01	14.18	15.27	15.7	14.7	13.21	14.53	14.3	15.21
12.1	14	14.5	13.29	14.25	14.21	14.3	14.3	15.4	14.04	15.03	14.2
12.65	12.32	12.87	12.89	14.04	13.27	14.89	15.03	16.2	14.39	15.79	15
12.9	12.4	15.4	13.4	13.06	14.25	14.53	14.53	14.52	14.89	15.81	14.53
12.25	14.25	13.56	14.24	14.2	14.87	14.04	14.04	14.02	15	14.3	14.04
14.04	12.25	14.2	13	13.07	14.21	14.39	13.62	14.49	14.3	14.54	14.39
12.4	12.04	14.5	12.63	15.01	15.02	14.89	14.54	15.23	15.19	15.2	15.43
14.2	14	15.2	12.98	14.22	14.2	13.84	12.98	14.28	14.39	15.05	13.84
14.82	13.54	14.5	14.24	15.18	14.25	14.3	15.3	14.52	14.89	14.89	15.79
14.6	14.5	13.25	13.7	14.43	12.8	15.19	15.4	14.02	16.34	15.24	15.03
15.79	15.36	11	13.89	13.85	12.2	15.09	13.98	14.49	14.3	14.3	12.4
15	14.3	14	14.25	15.21	14.45	14.3	14.02	15.23	13.07	12.99	16.21
12.4	12.3	12.25	13.7	13.59	15.2	15.7	14.7	14.28	15.64	13.63	15

Appendix F

Raw data on Arm Shoulder strength and endurance

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
20	14	15	10	23	13	20	18	15	12	20	20
18	19	18	18	25	16	20	16	18	18	18	18
20	19	19	20	24	19	21	17	14	13	20	14
21	19	20	21	20	22	21	19	18	20	21	14
21	21	22	21	21	21	15	20	13	18	21	16
15	17	15	15	21	16	17	21	16	17	15	15
17	17	16	17	21	17	14	22	18	16	17	18
14	16	15	14	20	15	18	21	19	18	14	14
18	18	17	18	20	15	15	22	22	14	18	15
15	16	14	15	19	16	14	21	20	15	15	18
14	17	16	14	23	14	16	19	21	13	14	14
16	19	18	16	25	16	19	21	21	19	16	16
19	20	19	19	24	20	24	17	20	24	19	16
24	21	22	24	20	23	20	17	20	20	24	15
20	22	15	20	21	22	21	16	19	21	20	17
21	21	21	21	21	21	24	18	18	20	15	18
24	22	21	24	21	23	19	16	25	19	18	18
19	21	20	19	20	20	18	10	24	18	18	15
18	19	20	18	20	16	18	12	20	20	18	16
20	21	19	20	19	21	17	13	21	24	16	17
24	17	16	24	23	18	18	15	12	26	14	18
26	17	25	26	25	26	12	19	17	25	14	20
25	16	16	25	24	20	14	21	13	21	20	16
21	18	20	21	20	16	12	17	18	20	21	14
20	16	21	20	21	21	19	17	14	15	14	21
20	18	21	15	21	16	18	16	15	17	18	24
17	16	21	17	21	17	12	18	10	10	19	23
25	17	20	14	20	15	18	16	18	12	21	21
18	19	20	18	20	19	18	15	16	11	25	20
15	20	19	15	19	16	16	10	14	14	24	24

Appendix G

Raw data on Body Composition

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
8.32	6.21	3.56	11.20	6.53	24.83	18.78	14.17	22.12	13.63	16.66	17.19
4.15	13.21	7.75	14.78	4.15	12.94	13.21	13.34	16.12	13.51	10.14	17.99
14.92	13.41	11.04	6.53	27.36	13.09	16.06	20.75	13.93	17.61	17.66	19.17
14.78	6.68	8.01	7.31	12.63	6.79	16.21	10.31	13.23	13.93	12.85	12.78
10.88	14.92	6.94	11.04	13.09	3.72	15.21	16.66	10.12	16.92	12.31	16.33
14.78	14.78	3.72	14.78	3.56	11.04	13.63	13.63	16.63	14.31	15.21	17.13
6.21	10.88	11.04	11.04	7.75	14.47	20.21	14.31	13.21	11.02	18.36	15.52
7.56	8.64	14.47	14.94	11.04	6.53	14.51	21.35	16.12	17.72	13.11	13.93
13.41	12.01	6.53	6.21	3.88	4.15	16.01	13.93	13.93	16.12	13.34	18.10
6.68	7.56	4.15	9.54	6.94	11.20	13.93	12.01	13.24	13.93	12.21	16.01
12.79	9.87	11.20	13.25	7.56	10.87	15.61	17.13	10.21	21.35	21.02	21.35
11.04	6.68	14.78	4.63	6.00	6.53	13.93	15.82	16.12	12.31	12.31	12.82
9.99	15.01	6.53	3.83	3.72	3.99	16.63	13.63	13.93	17.22	13.63	16.63
11.04	13.25	11.04	11.04	11.99	11.04	15.25	16.12	21.35	20.75	18.25	17.72
14.78	4.63	14.78	6.79	15.73	14.78	16.12	13.93	24.69	22.06	21.35	16.12
11.04	5.01	6.68	8.75	6.53	11.04	13.93	13.21	15.82	14.01	13.93	13.93
14.94	4.32	4.15	11.04	4.15	10.85	13.23	12.21	13.63	13.93	11.88	19.10
6.21	10.78	11.04	14.47	27.36	6.21	21.25	15.82	12.54	13.63	13.21	24.69
6.01	5.12	3.56	6.53	12.63	3.83	16.12	13.63	13.34	18.20	18.21	15.82
13.25	6.01	7.75	11.04	13.09	13.25	13.34	20.75	16.92	13.34	13.63	13.63
4.63	8.01	11.04	6.31	3.56	4.63	13.81	13.34	10.84	13.28	18.21	17.10
9.32	7.01	3.88	11.04	7.75	6.01	13.93	16.92	18.71	15.21	18.27	13.34
11.04	13.25	6.94	14.78	11.04	11.04	16.92	11.54	14.67	12.04	21.35	16.92
14.78	6.31	15.73	11.04	3.88	14.78	17.43	13.34	20.04	13.93	13.93	17.72
6.68	13.25	6.53	14.94	6.94	6.68	16.12	16.33	17.21	12.34	16.04	16.41
4.15	4.63	4.15	6.21	7.56	4.15	13.93	17.13	13.93	23.02	13.02	13.93
11.04	8.72	27.36	3.83	6.00	11.04	23.34	12.01	16.01	21.35	15.02	21.35
14.63	8.33	12.63	13.25	3.72	14.63	16.31	14.29	16.25	12.82	15.02	24.98
11.04	14.78	13.09	4.63	11.99	11.04	12.5	15.20	13.34	15.31	18.69	16.02
14.78	6.68	14.02	3.83	15.73	14.78	12.78	13.63	15.34	17.72	24.69	15.01

Appendix H

Raw data on Explosive leg power

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
1.7	1.81	2.93	1.71	1.67	1.42	1.7	1.8	1.8	1.64	1.87	1.87
1.8	1.84	1.75	1.56	1.6	1.87	1.63	1.68	1.68	1.7	2.01	2.06
1.98	2.03	1.82	1.71	1.42	1.63	1.59	1.62	1.62	2.01	1.64	1.59
2	2.01	2.3	1.65	1.87	1.87	2.01	1.54	1.54	2.01	1.68	1.73
1.95	1.98	1.88	2.93	1.63	1.63	1.58	1.63	1.63	2.05	1.45	2.3
1.67	1.69	1.75	1.75	1.59	1.59	1.7	1.75	1.75	1.75	1.3	1.46
1.6	1.73	2.93	1.82	1.73	1.73	2.21	1.63	1.63	1.42	2.05	2.03
1.42	1.53	1.75	2.3	2.3	2.3	1.79	2.05	2.05	1.75	2.14	1.87
1.87	1.87	1.82	1.88	2.93	2.93	1.78	1.66	1.66	1.59	2.05	1.63
1.63	1.73	1.75	2.3	1.75	1.75	2	2.01	1.98	1.56	1.52	1.59
1.59	1.54	1.88	2.93	1.82	1.59	2.05	2.05	2.05	1.58	1.82	1.73
1.73	1.73	1.9	1.75	2.3	1.73	1.42	2.03	2.03	1.5	1.54	2.3
2.3	2.5	2	1.82	1.88	2.3	1.87	1.94	1.94	1.42	1.89	1.46
2.93	2.98	1.75	2.3	2.93	2.93	1.63	1.75	1.75	2.01	2.05	1.31
1.75	1.76	2.8	1.88	1.75	1.75	1.59	1.6	1.6	1.45	1.62	1.26
1.82	1.89	1.75	1.9	1.82	1.82	1.73	1.74	1.74	1.98	1.78	1.35
2.3	2.52	2.3	2	2.3	2.3	2.3	2.6	1.7	2.01	1.78	1.38
1.88	1.99	1.88	2.58	1.67	1.88	1.63	2.05	1.56	1.39	2.25	1.87
1.9	1.94	1.9	2.8	1.6	1.9	1.59	1.5	1.55	2.05	1.61	2.3
2	2.3	2	2.69	1.42	2	1.89	1.62	1.68	1.72	1.62	1.46
2.58	2.64	2.58	2.93	1.87	1.42	1.58	1.56	1.62	1.75	1.68	1.31
2.8	2.9	2.8	1.75	1.63	1.87	1.7	1.67	1.58	2.5	1.74	1.26
2.69	2.74	1.75	1.82	1.59	1.63	1.59	1.61	1.56	1.98	1.64	1.38
1.89	1.96	1.89	2.3	1.73	1.89	1.79	1.5	1.7	1.87	1.68	1.38
1.9	1.99	1.9	1.88	2.3	1.9	1.66	2.01	2.3	1.96	1.45	1.87
2.3	2.5	2.93	2.3	2.93	1.59	2	1.78	1.55	1.75	1.88	1.87
1.88	2.98	1.75	2.93	1.75	1.73	1.6	1.94	1.68	1.88	1.05	1.63
1.9	1.76	1.82	1.75	1.82	2.3	1.42	1.75	1.78	1.69	1.19	1.46
2	1.89	2.3	1.82	2.3	2.93	1.87	2.05	1.58	1.67	1.56	1.75
2.58	2.52	1.88	2.3	1.88	1.75	1.63	1.74	1.56	1.72	1.52	2.3

Appendix I

Raw data on Flexibility

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
20	20	19	18	25	15	18	21	24	24	21	18
18	19	19	19	23	18	19	20	23	23	22	17
19	21	20	20	24	17	18	19	21	21	18	21
23	22	22	19	16	21	16	17	15	15	18	15
16	23	19	21	21	14	20	21	17	17	21	17
15	18	18	15	15	20	24	25	20	20	15	20
18	18	17	17	17	18	23	24	19	19	17	19
17	16	15	21	16	20	21	22	21	21	20	21
19	20	19	15	19	19	15	22	20	15	19	18
18	19	19	17	21	22	17	18	17	17	21	21
20	21	18	20	18	20	20	21	20	20	23	20
21	22	19	19	18	23	19	21	19	19	21	18
16	23	24	21	24	20	18	19	18	18	15	18
21	21	22	18	18	19	20	22	20	20	23	20
23	24	21	19	21	18	19	22	20	20	21	19
20	21	23	20	15	17	24	25	23	23	15	16
19	20	21	19	17	19	22	23	20	20	17	22
18	19	20	21	14	22	21	22	19	19	20	21
17	21	17	21	19	17	23	24	18	22	19	18
15	18	15	17	15	15	24	22	19	20	21	21
22	23	16	23	17	16	20	21	15	19	23	20
17	21	17	16	21	16	23	24	21	18	21	23
18	18	18	17	20	21	18	19	20	20	20	19
19	20	19	18	16	19	17	18	18	20	23	17
20	21	20	19	18	20	19	21	19	23	18	19
22	21	22	20	20	16	20	21	20	20	20	24
15	24	15	19	19	23	19	25	19	19	19	22
23	21	19	21	16	20	18	24	21	18	17	21
22	20	19	15	22	19	20	22	21	24	22	23
16	19	18	17	16	22	19	24	22	17	16	21

Appendix J

Raw data on Breath holding time

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
26.01	24.25	26.14	24.3	24.29	24.3	24.82	21.42	28.5	23.54	24.2	23.54
24.89	24.59	25.01	25	24.1	25.19	24.6	22.8	24.5	24.5	24.03	24.5
25	24.65	23.78	25.79	25.21	25.09	23.25	22.2	25.36	25.36	23.62	25.36
24.3	26.23	23.98	25.81	24.8	24.3	24.5	24.45	24.25	24.25	24.01	24.25
25	27.15	25	24.3	25	25.7	22.68	25.2	22.3	22.3	24.21	26.45
25.79	26.87	24.38	24.54	25.02	25.1	23.07	25.27	23.96	23.96	28.7	22.32
25.81	25.02	24.38	25.2	26.24	26.4	23.39	28.4	22.65	22.65	24.31	23.4
26.18	26.25	24.32	25.05	24.6	24.53	25.2	24.03	24.25	24.25	23.79	24.25
24.54	22.25	24.59	24.89	26.2	24.04	23.27	23.62	22.3	22.04	29.1	22.25
24.27	24.6	23.25	25.24	25.9	24.39	24.25	24.01	23.96	27.8	22.68	22.04
24.38	25.9	25.4	24.3	25.9	25.43	23.02	27.6	22.65	23.98	23.07	28.01
24.89	24.32	24.31	23.25	24.8	25.43	22.25	23.35	28.3	24.87	23.39	23.54
24.37	24.8	24.6	25.09	25.3	23.84	24.18	24.31	23.54	24.04	25.2	24.5
24.3	24.56	25.17	24.3	25.4	24.82	24.25	23.79	24.5	22.15	23.27	22.15
27.18	24.25	24.37	23.24	23.98	24.6	24.04	26.8	25.36	26.02	24.25	26.02
27.15	23.98	24.36	24.3	24.02	25.79	23.06	22.68	24.3	28.7	28.2	23.6
24.3	24.02	24.8	24.89	26.25	25.03	24.2	23.07	23.13	22.01	24.21	22.01
24.32	25.89	25.24	24.53	24.3	24.23	23.07	25.27	29.4	24.25	24.18	24.25
26.31	24.3	25.4	24.04	25.03	24.2	56.7	24.21	26.02	28.6	24.25	26.42
24.89	25.03	26.24	24.39	25.79	25	24.22	23.27	23.6	23.14	24.04	22.32
24.53	24.53	24.52	24.89	25.81	24.53	25.18	24.25	22.01	22.4	23.06	26.4
24.04	25.86	24.02	25	25.89	24.04	24.43	24.87	24.25	24.25	28.1	24.25
24.39	24.89	24.49	24.3	24.54	24.01	23.85	24.21	28.5	22.25	23.07	28.01
24.89	24.54	24.28	25.19	25.2	25.43	25.21	28.3	23.14	22.04	25.01	22.04
23.84	25.78	24.28	24.39	25.05	23.84	24.2	24.2	22.4	26.4	24.22	24
24.3	24.32	24.52	24.89	24.89	23.21	24.82	24.25	24.25	23.54	25.18	23.54
24.65	23.25	24.02	26.34	25.24	25.03	24.6	22.8	22.25	24.5	24.43	28.9
24.12	25.23	24.49	24.3	24.3	22.4	25.79	26.3	22.04	25.36	25.3	25.36
26.25	24.02	25.24	23.25	27.5	24.01	23.25	24.45	24.3	24.3	25.21	24.3
24.39	24.7	24.28	25.64	23.63	25	25.4	25.2	22.3	28.4	23.59	22.3

Appendix K

Raw data on Mean arterial pressure

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
89.33	86.67	92.33	89.67	90.33	90.33	85.67	86.67	85.33	89.67	87.33	87
88.67	87	92	89.67	90.67	88.33	88.67	87	92	83.33	80.33	88.33
89.33	88.33	89.67	87.33	92.33	89.67	84.67	88.33	89.67	87.33	82.33	83.33
90.11	83.33	88.67	86.67	90.67	90	83.33	83.33	88.76	83.33	85.67	90
89.99	90	94	90.33	90.67	91	88	90	84	84.33	85.67	91
90.67	91	90.33	92.67	91.33	90	90.67	91	80.67	86.33	85.67	90
89.15	90	95.33	89.33	85.33	89.33	83.67	90	85.33	85.67	85.33	84.67
93	94.67	89.33	94	88	90.33	89	84.67	84	90	88	85.67
89.33	95.33	89.5	94	90.67	90.33	87.33	85.67	89.5	82.33	86.33	83.33
89.13	93.33	90.33	84.33	90.33	91.33	80.33	83.33	90.33	84.33	90.33	85.67
88.67	89.33	89.67	85.33	88.33	90	82.33	85.67	89.67	85.33	88.33	90
92.33	90	90	89	94.33	90.33	85.67	90	90	89	87.88	86.33
90.33	92.33	92	88.67	90.33	92.33	85.67	86.33	87	82.67	87	90
89.33	90	89.33	92.33	88.33	90.33	85.67	82.33	86	87.33	88.33	87
88.67	90	90	89.33	89.33	89.67	85.33	86.67	88	89.33	83.33	88.33
93.33	89.67	89.33	92.67	90	89.33	88	85.33	84	82.67	90	83.33
90.67	89.67	89.67	91.67	91	90	86.33	83.67	88	85.67	91	90
88.33	89	89.33	94	90	91	90.33	86.67	82.33	90.33	90	91
90.67	95.33	95.33	94	90.67	90	88.33	85.33	85.33	84.33	84.67	90
89.67	95	89.33	89.33	93.33	91.33	87.88	85	89.33	89.33	85.67	84.67
93.33	90	94	94	90.67	92.33	85.33	82.33	86	94	83.33	85.67
90.33	89.33	91.33	90.33	93.67	89.33	88	86.33	88	84.33	85.67	83.33
89.33	90	90.33	89.67	90	90.33	86.33	90	84	85.33	90	86.33
88.67	90	88	89	93.33	90	90.33	90	88	89	86.33	86.33
92.33	90.33	92.33	89.67	90	90	88.33	85.33	82.33	88.67	90	82.67
90.33	93.33	91.67	92.33	90.33	91	85.33	83.67	85.33	86.67	85.33	84
88.67	89	89.33	89.33	91.33	90	88	89	89.33	89.33	88	86
94.33	91.67	89.67	92.67	94	92.33	86.33	85.33	88	86.33	86.33	84.67
90.33	90.67	92.67	89.33	90.33	90.67	90.33	85	82.33	85.67	90.33	85.67
88.33	89.33	90.33	94	88.33	91	88.33	89.33	85.33	85.33	88.33	91

Appendix L

Raw data on resting heart rate

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
72	66	70	72	72	67	76	73	72	70	75	72
70	70	70	71	76	70	72	70	68	71	72	76
74	69	76	78	70	69	72	72	70	70	76	72
71	70	76	70	66	68	70	70	71	71	72	71
69	67	69	70	72	70	71	69	72	70	71	74
69	69	70	72	68	71	72	72	74	76	74	67
76	73	67	69	73	71	73	72	67	72	67	70
76	68	69	70	74	72	70	68	70	71	70	71
69	68	73	75	70	70	72	70	71	72	75	70
70	71	68	70	73	68	70	71	70	75	72	71
67	68	68	70	68	70	69	72	68	70	76	70
69	68	71	72	70	69	72	74	68	75	72	75
73	74	68	69	74	70	72	67	75	72	71	72
68	69	68	69	75	65	68	70	70	76	74	70
68	80	74	75	68	67	70	71	75	72	67	76
71	75	69	70	70	69	71	70	72	71	70	72
68	71	80	72	65	67	72	68	76	74	71	70
68	68	75	73	65	71	74	68	72	67	70	76
74	68	71	73	73	75	67	75	71	70	71	72
69	68	68	70	68	75	70	70	74	75	70	71
80	71	68	72	68	73	71	75	67	72	75	72
75	68	68	71	73	73	70	72	70	76	72	75
71	68	71	72	74	72	71	76	71	72	76	70
68	70	68	68	70	67	70	72	70	71	72	75
68	68	68	70	73	76	76	71	71	74	71	72
68	68	74	72	68	80	72	78	70	67	71	70
71	75	69	69	70	70	71	78	76	70	67	72
68	72	80	70	74	70	76	70	72	71	70	71
68	70	75	66	75	69	70	72	72	70	75	70
74	69	71	70	68	72	72	68	72	71	72	67

Appendix M

Raw data on VO_2 Max

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
3.4	3.2	3.2	3.2	3.6	3	2.85	3	2.85	2.85	2.85	2.85
2.75	3.15	3.15	3.15	3.7	3.1	2.95	2.9	2.5	2.55	2.5	2.8
3.35	2.8	2.8	2.8	3.4	3.5	2.65	3.5	3	2.95	3	3.3
3.1	3.55	3.55	3.55	3.7	3.7	3.35	2.95	2.9	2.95	2.9	3.55
3.05	4.3	4.3	4.3	3.7	4.3	3.9	2.05	3.5	3.5	3.5	4.1
3.2	3.45	3.45	3.45	3.2	2.9	3.05	3.4	3.12	3	2.95	2.7
2.85	4.25	3.45	3.45	3.7	3.45	3.2	3.7	2.05	2.05	2.05	3.2
4.25	3.45	2.8	2.8	3.15	2.95	2.7	2.75	3.12	3.4	4.21	2.7
3.2	3.2	3.85	3.2	3.56	2.85	2.89	2.65	3.7	3.65	3.7	2.7
4.25	3.45	3.45	3.45	3.6	2.75	3.3	3.5	2.75	4.25	4.12	2.6
3.75	3.55	3.55	3.55	3.7	2.9	4.21	3.9	2.65	2.65	2.65	2.7
3.2	3.55	3.55	3.55	3.4	3.8	3.24	4.25	4.25	3.45	3.5	3.55
4.1	3.95	3.95	3.95	3.7	4	3.25	3.49	3.9	3.9	3.9	3.65
3.15	4.12	3.45	4.25	3.7	4.2	2.8	3.4	2.65	2.65	2.65	3.9
3.56	3.7	3.7	3.7	3.6	2.15	3.45	3.2	3.49	3.5	3.49	1.95
3.6	4.5	4.5	4.5	3.4	4.5	3.36	4.23	3.4	3.5	3.4	3.9
3.7	4.25	3.55	3.55	2.75	3.7	4.01	2.5	3.2	3.25	3.12	3.25
4.01	4.05	3.05	3.05	3.35	3.7	2.85	3	2.55	2.6	2.55	2.3
3.7	2.75	2.75	2.75	3.1	3.55	2.65	4.12	3.45	3.5	3.45	3.3
3.7	3.55	3.55	3.55	3.05	3.4	3.25	3.5	3.95	4	3.95	3.1
3.2	2.8	2.8	4.25	3.2	3	2.7	4.12	4.25	2.65	3.7	2.7
3.7	4.12	3.2	3.2	2.85	3.1	2.89	3.75	2.95	3.45	2.75	3.55
3.15	3.45	3.45	3.45	4.12	3.5	3.3	3.4	3.78	3.9	3.02	3.65
3.56	3.55	3.55	3.55	4.25	3.7	3.25	3.7	3.4	2.65	3.5	3.9
3.6	3.55	3.55	3.55	3.3	4.3	3.24	2.75	3.7	3.05	3.9	1.95
3.7	3.95	3.95	3.95	3.75	4	3.25	2.65	2.75	3.05	3.65	3.9
3.4	4.25	4.21	3	4.12	4.2	2.8	3.5	2.65	3.05	3.49	3.25
3.7	3.15	3.15	3.15	3.7	4.25	3.45	3.9	3.5	2.6	3.4	2.3
3.7	2.8	2.8	2.8	3.15	4.5	4.01	2.65	3.9	3.5	3.2	3.3
3.6	3.55	3.55	3.55	3.56	3.7	3.15	3.05	2.65	3.25	2.55	3.1

Appendix N

Raw data on Aggression

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
32	28	29	36	21	23	32	32	31	26	29	29
26	26	26	29	20	32	29	28	21	29	26	40
26	36	31	30	31	35	32	21	32	30	31	32
33	29	21	36	30	31	28	27	23	27	21	35
28	26	32	24	26	34	30	24	26	36	32	32
32	28	23	27	35	26	28	28	30	40	28	36
32	20	26	25	36	34	30	28	32	28	26	23
29	26	30	36	33	32	30	22	30	23	30	30
35	28	32	18	28	34	22	26	28	40	32	24
31	23	30	32	32	26	28	23	31	23	40	36
30	25	28	24	36	32	40	20	27	36	18	26
29	27	31	36	33	28	30	27	40	26	40	31
29	25	27	40	28	29	31	29	29	28	23	28
26	28	40	18	32	30	28	28	26	30	31	29
31	26	31	32	24	38	30	20	31	24	36	30
31	31	31	23	34	26	28	31	21	23	30	29
32	36	32	36	32	34	30	30	21	31	32	29
23	30	34	31	40	32	30	26	32	31	26	32
26	35	26	36	28	34	22	35	23	30	34	35
40	36	30	25	29	26	28	36	26	28	26	32
32	33	32	26	33	32	40	33	30	26	32	31
30	28	30	40	28	28	30	28	32	27	23	28
28	32	28	26	32	29	31	32	30	32	28	30
31	24	31	32	24	30	28	22	28	24	30	24
38	18	27	23	34	38	30	34	31	23	32	22
40	32	40	38	32	26	28	32	32	40	30	26
29	36	32	36	40	34	30	34	40	26	28	31
26	32	26	36	28	32	30	28	29	27	31	29
31	36	31	22	29	34	22	18	32	28	27	26
31	28	38	40	28	26	28	28	31	28	31	31

Appendix O

Raw data on coping with adversity

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
6	4	8	8	8	8	8	8	10	6	8	10
6	11	6	7	4	8	2	7	8	12	12	7
7	2	8	5	6	6	6	6	8	6	12	8
6	8	2	4	8	8	4	8	6	8	10	8
5	6	6	11	12	10	5	6	8	10	6	9
8	8	6	6	6	6	6	9	4	8	8	8
8	10	7	5	9	9	8	11	6	6	8	6
8	6	7	9	8	8	6	4	4	2	8	4
5	8	10	9	6	4	8	8	7	8	6	7
8	2	8	6	6	6	8	10	10	8	6	5
8	6	7	0	7	8	8	6	7	6	8	8
8	10	8	8	8	6	12	10	8	4	4	10
6	8	4	5	7	7	8	8	8	8	8	7
7	4	8	6	8	8	7	6	12	5	6	9
7	6	10	8	6	8	8	8	8	6	6	7
9	8	6	10	8	2	8	8	6	8	8	2
6	6	6	2	7	10	9	12	8	9	7	6
7	10	7	7	5	7	12	8	6	8	6	7
7	8	10	8	8	5	7	8	8	8	4	10
4	10	7	6	3	9	8	8	12	6	6	7
9	6	8	4	7	6	5	6	8	12	7	8
3	6	7	8	9	6	6	6	7	8	8	6
9	7	8	5	7	6	9	8	8	6	7	4
8	8	7	6	6	5	6	12	7	6	8	7
9	7	8	9	7	5	10	7	8	8	7	5
5	8	4	6	6	6	8	8	4	8	6	8
8	6	8	10	5	6	6	6	8	2	6	6
9	8	2	8	9	7	9	4	2	8	8	8
8	10	6	8	9	7	8	8	6	8	12	12
9	12	6	6	5	7	9	12	6	10	5	7

Appendix P

Raw data on coachability

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
8	6	5	5	10	10	8	12	5	5	6	10
10	12	6	4	6	8	10	10	7	4	10	8
9	6	6	10	8	6	9	8	7	10	12	9
5	12	6	6	3	12	5	10	9	6	9	6
7	8	8	6	5	6	7	8	8	9	6	10
5	10	8	12	10	4	5	10	6	9	10	8
9	8	9	5	7	9	9	8	9	9	7	6
6	6	6	4	12	6	6	8	8	8	6	8
7	12	6	9	6	6	7	8	8	7	6	6
5	6	7	10	8	8	5	6	7	6	8	8
9	8	5	5	6	4	9	8	9	12	6	9
6	6	8	9	7	5	6	6	7	10	9	5
7	12	6	6	9	6	7	10	6	6	8	3
9	6	8	10	5	7	9	6	12	8	5	10
9	8	6	3	12	6	9	12	6	10	7	6
7	8	8	5	8	12	10	7	10	8	5	8
7	5	8	6	4	8	7	8	10	10	8	8
9	7	9	10	10	10	9	10	9	10	10	12
9	9	6	8	10	7	9	12	6	8	10	10
8	6	6	6	8	4	8	6	6	8	8	10
8	6	7	5	8	5	8	7	7	6	9	9
10	8	8	9	6	6	10	8	9	10	6	8
8	12	7	6	12	3	8	6	7	6	8	9
8	7	5	8	10	4	9	7	7	8	9	10
8	5	5	3	6	10	8	12	8	10	6	6
8	5	6	5	7	6	8	5	10	9	9	8
10	6	6	6	12	8	10	6	12	6	10	8
6	10	6	10	4	9	6	5	6	10	8	7
8	9	8	8	9	6	12	9	8	8	9	6
8	10	8	3	8	5	8	10	8	6	10	5

Appendix Q

Raw data on concentration

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
9	7	9	7	8	3	9	8	12	10	7	4
6	9	9	9	7	9	8	10	8	8	10	8
10	10	6	6	8	7	10	9	10	12	8	8
4	5	8	12	9	6	8	9	6	10	6	6
9	9	9	7	6	8	7	12	9	8	8	6
8	12	12	9	7	9	8	4	8	6	7	9
10	9	4	8	12	8	10	8	4	8	9	8
11	7	12	12	6	7	10	7	8	10	6	7
7	6	8	9	6	10	12	8	8	4	3	7
8	10	9	8	9	8	8	12	9	8	9	8
10	9	10	12	8	6	10	9	6	8	8	12
7	8	7	9	9	6	9	8	12	6	12	6
12	9	7	8	8	7	9	9	9	7	6	10
7	9	6	9	7	10	9	7	6	8	8	9
9	8	6	6	6	6	7	8	3	8	12	6
11	6	9	6	12	5	11	12	9	12	6	8
10	10	8	10	7	9	9	6	8	3	10	9
7	7	10	9	9	8	7	8	12	8	12	8
10	9	8	9	7	9	12	9	8	10	7	9
6	6	8	7	8	6	6	6	8	8	8	6
8	6	9	12	10	7	10	4	9	3	4	7
7	9	6	5	8	6	7	9	6	8	8	6
8	8	9	6	6	6	8	12	9	7	10	2
12	9	10	6	12	7	6	9	9	10	6	7
8	12	7	6	8	6	8	12	7	12	8	4
5	7	7	9	6	7	5	7	12	8	6	7
10	6	6	4	9	8	7	6	1	1	7	8
8	12	6	3	9	4	8	12	8	12	9	6
5	7	9	9	9	7	5	7	9	10	10	10
8	12	8	7	6	6	8	8	8	8	10	8

Appendix R

Raw data on confidence and achievement motivation

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
8	8	10	10	8	9	9	12	12	8	4	9
6	12	10	8	8	8	7	11	6	10	12	8
7	8	12	6	9	11	8	10	7	6	9	10
6	10	12	6	10	7	7	8	6	6	7	7
8	8	8	10	6	6	6	9	8	10	6	10
6	10	12	4	8	9	4	12	9	12	10	10
8	8	7	10	10	8	9	10	7	3	9	10
6	8	10	9	7	8	6	8	8	9	7	12
8	9	8	3	6	6	8	9	8	10	6	6
6	12	10	8	8	9	6	9	8	8	8	9
8	8	5	9	6	7	8	12	5	8	7	7
6	10	10	10	8	6	7	11	12	10	5	9
8	6	6	7	5	8	6	11	6	7	8	8
8	8	9	8	10	8	10	10	7	8	12	9
9	9	7	9	8	7	9	9	10	10	8	7
7	7	8	6	7	6	8	7	10	10	12	6
8	12	7	6	8	8	8	6	9	6	10	8
11	8	7	9	8	6	10	8	7	10	10	10
9	10	6	6	8	10	9	5	6	8	12	10
11	9	9	8	9	5	8	7	7	8	9	5
9	6	5	10	10	4	9	6	8	10	7	4
9	8	10	10	6	10	7	9	8	10	6	8
10	6	5	7	9	7	10	7	12	7	8	7
10	10	10	8	9	8	11	9	10	8	12	8
9	9	4	7	8	10	9	7	4	12	10	6
9	4	6	12	8	10	10	4	6	6	8	5
9	10	7	9	12	9	9	8	7	6	10	9
10	7	6	8	9	11	10	8	9	9	9	9
10	10	8	10	12	11	10	10	8	8	3	6
9	6	10	8	6	10	12	9	12	8	8	12

Appendix S

Raw data on goal setting and mental preparation

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
8	9	10	8	8	6	8	8	8	8	9	10
6	9	8	9	5	6	6	10	6	9	8	12
7	3	8	6	10	5	7	6	8	6	10	10
6	8	12	6	8	10	4	7	10	5	8	8
10	8	8	10	11	8	10	8	8	10	11	6
9	9	10	7	8	8	9	10	10	10	8	8
8	6	8	10	8	12	8	9	10	5	3	6
12	10	6	6	6	8	9	10	8	10	8	10
10	8	10	10	6	5	10	8	10	6	9	9
9	6	3	9	7	10	12	6	3	9	8	10
6	8	12	3	6	8	8	8	7	10	6	8
5	8	8	8	10	9	5	4	10	7	3	11
3	8	5	7	7	8	3	8	5	10	7	8
10	5	8	9	8	9	12	5	8	8	8	9
4	10	8	8	9	8	12	10	10	8	9	7
8	8	8	6	10	6	5	10	8	11	3	7
6	11	8	3	9	10	9	11	10	3	9	8
9	8	6	6	8	6	5	12	6	6	10	6
4	12	6	8	8	3	8	3	6	6	8	6
9	8	8	8	10	7	9	8	10	8	10	7
9	6	3	3	6	8	9	8	3	10	6	3
9	8	7	9	6	9	5	8	7	7	6	6
6	6	6	8	7	3	6	6	3	10	7	3
8	10	7	8	9	9	10	8	7	8	8	9
6	7	8	8	8	9	6	7	8	8	8	6
9	8	5	11	7	8	9	8	5	11	7	8
12	9	8	10	5	9	8	9	8	3	10	9
6	3	6	8	6	6	6	9	10	6	10	8
10	9	8	9	6	8	9	9	10	6	6	6
6	6	10	8	10	8	9	6	10	8	7	7

Appendix T

Raw data on peaking under pressure

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
8	7	3	6	3	11	8	10	10	4	6	10
8	8	8	8	7	10	8	9	10	8	10	8
10	8	7	10	10	7	8	8	9	7	7	9
9	8	10	10	7	7	8	8	10	8	9	7
7	7	7	8	8	3	10	9	7	8	8	8
7	9	10	8	9	7	9	7	6	10	10	7
7	5	6	7	9	8	7	5	10	10	8	6
9	9	10	10	7	9	6	7	9	10	9	8
8	7	7	3	6	7	8	7	7	3	3	7
7	10	11	9	10	6	7	6	9	9	10	6
7	8	7	10	9	7	9	7	10	10	2	7
9	7	8	6	9	8	6	4	6	6	10	8
9	10	7	8	7	9	10	3	7	8	10	9
6	7	8	7	10	9	6	8	7	9	10	9
7	10	3	9	10	9	7	10	3	8	9	7
8	7	12	8	3	10	4	7	7	8	6	4
9	8	10	3	8	7	10	11	9	10	8	7
6	9	6	10	7	9	8	9	8	10	7	9
7	9	9	5	10	9	10	9	7	5	10	9
6	10	9	9	6	7	9	7	10	9	6	10
8	3	9	10	10	8	8	10	9	10	8	6
6	7	10	6	9	9	10	7	7	6	9	9
10	9	9	8	7	3	11	9	8	8	7	10
10	10	7	10	6	8	8	9	10	10	6	8
6	7	10	7	9	7	6	7	6	7	9	7
8	6	7	8	6	6	8	10	7	8	9	3
6	9	7	3	7	4	6	9	9	8	7	11
8	7	3	5	5	6	8	10	8	6	8	10
8	10	7	10	6	9	7	10	4	5	9	9
10	6	8	9	8	7	10	10	8	9	8	8

Appendix U

Raw data on freedom from worry

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
4	10	7	7	7	8	8	8	7	7	8	8
6	8	5	7	6	10	4	7	5	8	5	8
5	7	9	7	6	8	10	6	7	6	6	6
8	10	6	5	8	9	6	7	7	6	8	9
7	7	3	7	10	10	8	6	8	7	10	6
9	8	6	9	9	3	7	8	9	8	8	6
10	9	5	5	6	7	9	8	6	4	6	7
8	4	10	10	9	8	10	8	8	9	9	8
4	6	7	3	6	5	8	9	7	4	6	5
12	8	6	7	9	10	7	6	9	7	8	8
10	7	10	12	4	8	9	3	10	10	6	8
11	9	7	7	10	10	10	8	7	7	8	10
10	7	10	7	10	8	6	7	9	7	10	8
2	11	9	3	7	8	5	6	9	3	7	6
3	10	6	8	7	9	4	8	6	8	7	9
9	12	9	10	12	6	3	8	3	10	12	9
8	10	9	6	7	10	10	10	10	6	7	8
7	8	5	8	9	4	10	8	5	8	7	4
8	6	8	8	7	6	9	10	6	10	7	8
7	9	4	8	9	10	8	9	8	8	8	10
9	6	6	12	8	7	7	10	6	12	5	8
6	3	10	7	4	7	8	10	10	9	7	7
9	4	6	7	10	12	9	6	6	7	10	12
8	6	10	3	9	8	8	6	10	3	8	7
7	10	7	8	7	7	7	10	7	7	8	8
10	7	9	10	9	7	5	7	10	8	8	7
10	7	9	6	5	6	6	8	9	10	6	6
8	12	6	8	10	5	10	12	6	8	10	10
9	7	9	8	3	6	10	7	10	8	8	10
9	7	6	8	7	10	9	10	6	10	10	10

Appendix V

Raw data on self confidence in emotional intelligence in sports

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
25	24	24	20	20	21	21	26	18	27	25	27
22	27	26	16	18	23	23	28	16	27	20	15
27	22	22	20	26	21	21	27	20	27	16	20
16	21	21	21	18	20	18	27	21	26	22	24
27	27	21	25	16	17	17	27	21	26	24	25
25	27	20	21	20	21	21	28	18	16	20	15
15	27	27	27	21	21	21	25	22	20	21	24
27	26	26	22	24	18	24	24	20	21	25	21
19	26	20	26	16	19	25	26	18	22	20	20
21	16	16	16	21	28	26	27	16	20	16	22
27	27	22	21	20	21	20	28	20	21	22	21
19	26	26	18	21	19	22	22	21	24	24	25
25	27	24	21	22	21	24	20	22	16	26	25
21	27	18	27	22	23	21	27	21	20	24	15
15	26	22	26	24	21	18	24	20	21	26	24
16	26	21	26	23	18	19	25	21	24	23	18
24	16	27	16	16	17	27	24	21	23	24	16
25	27	20	20	20	21	24	26	20	22	22	22
15	26	18	26	21	21	24	23	26	20	22	18
25	27	20	18	23	20	21	24	26	21	16	25
21	27	26	21	24	24	23	21	26	16	22	24
27	27	16	27	16	17	24	28	26	21	24	18
25	26	21	26	27	21	26	21	26	16	20	20
24	26	26	18	27	19	28	22	26	25	26	22
28	16	20	16	26	17	27	23	22	23	23	20
15	27	20	25	16	18	28	24	21	24	24	25
21	26	26	26	27	22	24	27	26	26	27	27
27	27	26	24	26	21	26	22	26	26	22	25
27	27	16	20	27	20	21	28	26	26	16	28
25	26	20	21	27	20	28	21	26	16	22	18

Appendix W

Raw data on self awareness in emotional intelligence in sports

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
20	27	29	29	29	22	18	27	29	26	24	24
18	27	28	28	28	28	20	28	28	28	26	27
28	27	20	20	20	27	27	27	20	20	20	26
27	20	20	18	18	20	28	26	20	20	24	18
27	22	16	28	28	22	26	22	26	24	28	22
27	28	22	27	14	28	28	28	22	28	23	28
20	27	14	27	22	27	26	27	14	27	22	27
22	28	22	27	22	27	23	28	22	27	24	28
22	27	22	20	22	28	20	27	22	28	22	24
21	27	22	22	27	18	21	27	22	26	26	26
20	27	20	28	27	28	20	27	20	24	27	28
22	20	22	22	27	27	23	24	22	20	28	21
28	22	28	22	28	22	27	22	28	24	28	22
27	20	27	22	21	22	27	26	27	22	21	24
28	22	27	13	20	22	26	22	27	16	20	22
27	27	20	14	28	21	27	27	20	18	28	18
28	27	16	19	27	20	28	27	27	24	24	25
27	27	22	18	27	19	27	27	22	22	27	24
28	28	27	17	27	18	24	25	14	17	28	24
27	28	27	20	27	17	26	28	26	20	27	17
27	27	20	16	20	20	27	27	22	20	28	21
27	28	22	22	22	16	28	28	22	22	27	18
20	27	28	18	28	22	26	27	24	18	26	22
22	27	27	20	27	14	24	24	24	20	27	16
28	27	27	22	20	27	28	27	28	22	18	27
27	20	27	28	22	27	27	26	27	28	21	28
20	22	27	27	28	20	28	22	27	27	28	21
22	28	20	27	27	16	23	25	20	28	23	18
28	27	22	27	27	22	20	26	26	24	24	24
27	20	28	27	28	20	26	24	26	27	21	18

Appendix X

Raw data on self control in emotional intelligence in sports

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
26	26	21	20	26	25	26	27	21	26	29	20
27	27	18	24	27	18	27	26	18	19	25	24
21	21	23	20	21	22	21	26	23	24	19	20
19	19	29	19	19	24	19	26	29	26	24	19
27	27	25	15	27	21	27	29	25	26	22	15
26	26	19	26	26	24	26	21	19	26	25	26
26	26	24	26	26	19	26	27	24	26	25	26
26	26	22	26	26	27	26	26	22	26	25	26
27	29	25	26	20	26	29	26	25	19	23	26
21	21	25	19	21	25	21	26	25	24	24	19
19	27	25	24	27	18	27	26	25	26	22	24
27	26	23	26	26	24	26	29	23	20	25	26
26	26	21	20	26	24	26	21	23	24	25	26
26	26	18	24	27	24	27	27	29	20	25	26
28	26	23	20	21	26	21	26	25	19	25	26
22	29	29	19	19	19	19	27	19	21	19	26
21	21	25	15	27	15	27	26	24	18	24	19
26	27	19	26	26	26	26	26	22	23	22	24
26	26	24	26	26	26	26	26	25	29	25	26
22	27	22	26	26	26	26	29	25	25	25	26
21	26	25	26	29	26	29	21	25	19	25	26
27	26	25	19	21	19	21	27	23	24	23	26
26	26	25	24	27	24	27	21	24	22	24	26
27	29	23	26	26	26	26	27	22	25	22	19
26	21	22	19	26	25	21	26	25	25	25	24
26	27	25	15	26	18	19	26	25	25	25	26
26	26	25	26	26	21	27	26	25	23	25	20
26	26	25	26	20	24	26	26	23	23	23	24
26	26	23	26	21	23	26	29	23	29	23	20
27	26	21	26	27	14	26	21	29	25	29	19

Appendix Y

Raw data on motivation in emotional intelligence in sports

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
20	20	22	20	20	20	20	28	20	28	28	28
28	28	21	28	28	24	24	30	28	30	21	28
24	24	18	24	24	24	20	30	24	30	28	20
18	18	16	18	18	23	30	30	18	21	27	28
28	28	20	28	28	19	30	19	28	19	19	24
30	28	26	24	30	20	30	15	27	15	25	18
30	26	20	20	30	24	30	28	24	28	28	28
30	25	23	16	30	24	19	30	27	28	27	27
19	19	18	19	19	28	15	30	19	27	28	21
15	15	19	21	15	24	28	30	15	28	28	20
28	28	20	20	30	18	30	30	28	27	28	19
30	24	22	20	30	28	28	19	28	19	24	15
20	30	22	16	19	20	30	15	20	15	25	28
28	30	28	17	15	22	30	28	28	28	28	30
24	30	24	18	28	20	30	30	24	27	28	24
18	19	18	20	20	20	19	28	18	28	28	18
28	15	28	21	28	28	15	30	28	21	27	28
20	28	30	19	24	24	28	30	27	28	26	21
28	30	30	20	18	18	15	30	24	21	20	28
30	28	30	28	28	26	28	19	20	19	26	26
19	30	19	30	30	24	30	15	19	17	21	21
15	30	15	30	30	26	30	28	15	28	24	26
28	30	28	30	30	28	30	15	28	18	25	22
30	19	30	26	19	19	24	28	30	28	26	24
30	15	30	25	15	24	20	30	24	26	22	20
30	28	30	28	30	28	24	30	18	24	21	26
30	30	30	30	30	27	20	30	28	27	25	19
19	30	19	30	19	20	24	30	21	28	21	26
15	30	23	30	15	28	20	19	28	19	20	23
28	30	28	30	28	24	21	16	24	15	20	24

Appendix Z

Raw data on empathy in emotional intelligence in sports

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
18	24	24	18	23	20	19	23	18	23	23	24
23	23	25	23	21	22	25	20	23	20	21	26
19	24	22	19	20	24	22	24	19	23	20	23
16	23	22	16	22	21	20	23	16	23	22	26
23	26	22	23	26	23	22	28	23	20	26	18
20	29	21	20	21	21	26	24	20	20	21	17
23	27	23	23	23	26	21	25	23	26	23	27
23	26	21	23	26	19	23	26	23	26	26	28
28	28	24	28	29	25	26	24	28	20	29	23
20	23	23	20	19	22	29	23	28	23	19	26
26	28	18	26	25	24	19	26	26	23	25	28
26	23	24	26	22	29	22	28	26	20	22	24
20	23	22	18	23	19	20	28	18	20	20	20
23	29	24	23	21	23	22	26	23	26	22	24
23	20	22	19	20	19	26	26	28	26	26	23
28	26	22	16	22	16	21	28	16	23	21	26
20	23	15	23	26	20	23	28	23	20	23	27
26	20	26	20	21	20	26	23	20	23	26	21
26	23	24	23	23	23	29	23	23	23	29	18
23	23	24	23	26	23	19	20	23	20	19	24
28	28	24	28	29	28	25	20	28	20	25	23
23	24	23	20	19	20	22	27	20	26	22	22
23	26	24	26	25	21	23	28	26	20	23	22
28	25	24	26	22	20	26	26	26	26	26	24
24	28	22	20	26	20	29	26	19	26	29	24
26	20	21	23	29	23	19	24	28	20	19	24
26	26	22	23	19	23	25	23	23	23	25	21
26	26	24	28	25	28	22	28	20	23	22	24
23	24	21	20	22	20	20	30	23	21	20	22
23	28	23	26	23	24	22	20	23	20	22	21

Appendix AA

Raw data on social competence in emotional intelligence in sports

MALE						FEMALE					
JD	KL	KR	TK	WR	WU	JD	KL	KR	TK	WR	WU
22	23	23	18	24	20	22	23	18	20	19	21
21	21	23	23	23	21	21	21	23	20	25	22
22	28	21	19	20	18	22	20	19	23	22	18
22	22	20	16	23	26	22	22	16	23	20	26
23	26	23	23	23	24	20	26	23	21	22	18
27	21	20	20	28	22	21	24	20	20	26	24
21	23	23	23	20	23	22	23	23	26	21	22
25	26	23	23	26	21	23	26	23	26	23	18
24	29	21	26	26	20	21	29	28	20	26	22
23	28	20	20	23	20	23	19	20	23	29	21
20	25	26	26	20	21	25	25	26	23	19	20
22	22	26	26	23	24	24	22	26	20	22	24
22	23	18	20	23	23	22	20	28	26	20	18
21	21	23	23	21	22	24	22	23	26	22	21
22	26	19	23	20	18	22	26	28	26	26	23
22	22	21	21	26	26	23	24	26	23	21	18
24	26	23	20	23	18	28	23	23	20	23	14
26	21	20	26	20	21	22	26	20	23	26	26
26	23	23	26	23	23	21	29	23	23	29	24
26	26	23	23	23	20	20	28	23	20	19	26
24	29	20	20	20	21	18	25	28	20	25	25
23	26	20	23	20	21	27	22	20	26	22	25
18	25	26	23	26	20	24	24	26	20	23	24
18	22	26	21	23	24	23	26	26	26	26	27
22	26	20	20	21	18	26	29	19	26	29	25
20	29	23	26	20	24	24	26	16	20	19	26
21	19	23	26	26	26	22	26	23	23	25	26
24	25	26	20	26	24	26	22	20	23	22	24
25	26	20	23	20	24	24	26	23	28	20	18
26	26	26	23	26	27	22	22	23	24	22	21

Appendix AB

Body Composition – Skin fold sites

Abdominal Skin Fold

Triceps Skin Fold

Thigh Skin Fold

Supraspinal Skin Fold