EFFECT OF SKILL BASED TAEKWONDO TRAINING PROGRAM ON EXECUTIVE FUNCTIONS AMONG SCHOOL GOING ADOLESCENTS OF BAHRAIN

Thesis Submitted for the Award of the Degree of

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By

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DECLARATION

I, hereby declared that the presented work in the thesis entitled "Effect of Skill Based Taekwondo Training Program on Executive Functions Among School Going Adolescents of Bahrain" in fulfilment of degree of **Doctor of Philosophy (Ph. D.)** is outcome of research work carried out by me under the supervision of Dr. Neelam K Sharma, working as Professor and Deputy Dean, in the Lovely School of Physical Education, Lovely Professional University, Punjab, India. In keeping with the general practice of reporting scientific observations, due acknowledgements have been made whenever work described here has been based on findings of other investigators. This work has not been submitted part or full to any other University or Institute for the award of any degree.

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CERTIFICATE

This is to certify that the work reported in the Ph. D. thesis entitled "Effect Of Skill Based Taekwondo Training Program On Executive Functions Among School Going Adolescents Of Bahrain" submitted in fulfillment of the requirement for the award of degree of **Doctor of Philosophy (Ph.D.)** in the Lovely Institute of Physical Education, is a research work carried out by (Name of Scholar) DIPSHIKHA BARUAH, Registration No. 42000221, is bonafide record of his/her original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.

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ABSTRACT

Traditionally, the martial arts have used words like discipline, self-control, and bodily control to highlight the value of self-regulation. Traditional martial arts instill character training that helps people become more self-aware and actively pursue character development by continuously assessing their thoughts and behaviors and then changing them for the better. Martial arts have been practiced for over 3000 years and come in hundreds of varieties. The martial arts' longevity and growth over time, according to (Richman and Rehberg 1986), may be evidence of their significant psychological and physical benefits. A more thorough overview of the mechanisms via which practicing martial arts improves an individual's ability to regulate themselves is provided, and recent research has linked self-regulation theory to both empirical and theoretical investigations of martial arts training (Lakes, 2003). The general results of martial arts training can be divided into two categories: psychological (i.e., generalized psychological benefits) and physical (i.e., physical skill and psychological impacts associated with physical appearance and ability). Martial arts training has been linked to positive physical outcomes, including improved body image (Guthrie, 1995), higher physical confidence (Finkenberg, 1990), and improved self-perceptions of physical competence (Richman & Rehberg, 1986). Furthermore, it was proposed by (Posner and Rothbart,2000) that self-regulation, or intentional control, is an essential part of child socialization because it is associated with empathy, aggression, and conscience. "Understanding self-regulation is the single most crucial goal for advancing an understanding of development and psychopathology," according to (Posner and Rothbart,2000).

Executive function includes basic cognitive skills such as response inhibition, working memory, emotional control, flexibility, sustained attention, task initiation, planning, organization, time management, goal-directed persistence, metacognition, and stress tolerance. These skills help a person to execute goals successfully (Dawson and Guare, 2018). According to (Goldberg, 2001) Exercise has been shown to boost working memory reaction times in experiments. It’s proven that mild-depth workout selectively impacts govt features in children (chia-liang et al., 2017). Growing empirical evidence supports the physical (Chai et al. 2011) and psychological (Fong et al., 2012) benefits of martial arts, especially Taekwondo, for children and adolescents, despite the numerous intentional edges associated with the sport receiving more

attention from adults (Lakes & Hoyt, 2004). A Taekwondo intervention in schools has a positive effect on students' executive functioning, as demonstrated by (Lakes & Hoyt, 2004). Kids' academic self-efficacy and cognitive function may be enhanced by regular taekwondo instruction (Cho et al., 2017) Maintaining a balanced improvement in fundamental fitness parameters may be facilitated by regular Taekwondo training (Per Cho et al., 2018). It enhances personality and fosters the growth of social abilities. Senior female Taekwondo practitioners can enhance their cognitive abilities in addition to their physical health (Cho et al., 2019). In adolescents with such conditions, taekwondo instruction may improve selective attention. (Azaiez,2019).

In the field of sports, there are different types of training that a sports person must go through, which develop a personality. During training, a person is challenged physically as well as mentally, which one must deal with in a positive manner. If a person is trained in a particular sport this training being a positive transfer, will help in other sports too of a similar kind. For example, the training of a badminton player will help the player to play squash, lawn tennis, table tennis, etc. Training in the techniques of a sport makes a person intelligent enough to use the proper reaction to any action in their personal lives too. Training helps a person to learn many practical situations that may be dangerous, accidental, etc. It also makes a person physically fit, which lowers the chances of high blood pressure, diabetes, cardiac arrest, etc. A person can reach a new height of performance through training. The capacity to deal with the high-tech competitive era keeps on improving. Taekwondo is a martial art that helps a person mentally and physically. In taekwondo athletes are already mentally prepared for any situation during their competition. This art trains a person physically and mentally in such a way that their minds are already prepared to resist any kind of sudden impact in the competition. While competing, they are so well-disciplined and focused that they can improvise in any situation and convert the negative situation into positive by the outputs of their training. They are so goal-oriented that during competition they use every ounce of their tactics in a very organized way with flexibility that gives the opponent a tough competition. Besides on this study we also identified drawbacks, weaknesses, of the following Executive skills Response inhibition, working memory, Emotional control, Flexibility, Planning/prioritizing, Sustained attention, Task initiation, Organization, Time management, Goal-directed Persistence, Metacognition and Stress Tolerance. It has shown the difference between trained taekwondo players and normal person. To psychological and physical empowerment of school going female adolescents of Bahrain through taekwondo. The present study has

incorporated the effect of skill-based taekwondo training program on executive function of school going adolescents of Bahrain. Thus, considering the aim of the present study, different objectives were set up.

Objectives of the study

- To identify the effect of skill-based taekwondo training program on executive function of school going adolescents of Bahrain
- To find out the effects of skill-based taekwondo training program on the working memory skill of adolescents of Bahrain
- To determine the effects of skill-based taekwondo training program on response inhibition skill and their impact on adolescents of Bahrain
- To understand the effects of skill based taekwondo training program for emotional control skill and its impact on the adolescents of Bahrain
- To study the impact of skill-based taekwondo training program process on the task initiation skill of adolescents of Bahrain
- To study the impact of skill based taekwondo training program on the sustained attention skill of the adolescent of Bahrain
- To identify the effect of skill based taekwondo training program on planning skill of the adolescents of Bahrain
- To evaluate the effects of skill based taekwondo training program on the organization skill of the adolescent of Bahrain
- To find out the effects of skill-based taekwondo training program on time management skill on adolescents of Bahrain
- To study the impact of skill based taekwondo training on the flexibility skill of the adolescents of Bahrain.
- To identify the skill based taekwondo training on metacognition skill of the adolescents of Bahrain.
- To determine the effect on goal-directed persistence skill on adolescents while implementing skill based taekwondo training process.
- To study the impact of skill based taekwondo training on the stress tolerance skill of the adolescent of Bahrain.

To fulfill the purpose of the study, a pre-test Mid-test and post-test randomized group design from an experimental design was used in this study. A total of 80 females between the age group of 12-16 years from the Indian School of Bahrain was selected as subjects. For appropriate representation of the population, purposive random sampling technique was used, the research was of a purely qualitative nature. Further groups are divided into two groups, Experimental group (N = 40) and Control group (N = 40Training was provided by qualified individuals, particularly a black belt 3rd Dan Taekwondo player and a World Taekwondo Certified Level-2 Coach. The treatment groups had gone through one-hour skill-based Taekwondo training for twelve weeks whereas, controlled group was not given any of the training. Pre-tests were conducted on all the 80 (N=80) subjects and after the pre-test, a training program of Twelve weeks was implemented to the treatment groups, whereas control group was not exposed to any sort of training. After completing 6 weeks of training, Mid test data was collected from those treatment group subjects that had gone through the complete training program and control group subjects to see the direction of the intervention. After completion of the experiment A post-test was conducted on the criterion variables among the subjects. Post-test data was collected from those treatment group subjects that had gone through the complete training program for a period of 12 weeks and control group. The data was collected by using an executive skills questionnaire 'self-made questionnaire on Executive Function skill 'for adolescents of Bahrain (2023) which include the 36 items. Following the intervention, a posttest was administered to each group. Mean, standard deviation, and paired sampled T-test were employed was applied to assess the differences between experimental group and control group school going female adolescents of Bahrain. For testing the hypotheses, the level of significance was set at 0.05 with the help of statistical package (SPSS).

Presents t-value for comparing the adjusted means on Executive Function in experimental group and control group during pre, mid and post testing. On the pre-test it was found that the calculated t-value is .093 (<1.66 at 0.05) and the p-value is .926 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in executive function between the experimental group and control group during the pre-test. On mid test it was found that the calculated t-value is 3.075 (>1.66 at 0.05) and the p-value is .003 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in executive function between the experimental group and control group

during the mid-test. After 12 weeks of skill based taekwondo training program post-test it was found that the calculated t-value is 6.93 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in executive function between the experimental group and control group during the post-test. It is evident that the mean score of executive function on experimental group (mean after 6weeks =190.32 and mean after 12 weeks =212.05) is higher than the mean score of executive function on control group (mean after 6weeks =167.37 and mean after 12 weeks =169.05) Therefore, the research hypothesis "There is significant effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain," accepted. After 12 weeks of giving taekwondo training on experimental group based on adjusted mean values, we found there is significant differences on effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain. It showed improvement on Response inhibition, working memory, Emotional control, Flexibility, Planning, Sustained attention, Task initiation, Organization, Time management, Goal-directed Persistence, Metacognition and Stress Tolerance skills which might be attributed to their adolescent period and intervening variables. It revealed that there is a significant difference in executive function between the experimental group and control group after 12 weeks of taekwondo training program. Therefore, the findings indicate that the taekwondo training program stands out as the most effective treatment program for empowering school going adolescents in Bahrain with the essential everyday life skills needed to exercise cognitive control over their behavior. This program enables them to excel in learning, work, and daily life management, as well as to deftly choose and monitor behaviors conducive to achieving their goals.

Integrating skill-based Taekwondo training programs for adolescents in Bahrain can profoundly benefit both individuals and society. For adolescents, enhanced executive function gained through such training translates into improved academic performance, better self-regulation, and more effective decision-making, fostering overall personal growth. Societally, this initiative promotes a culture of discipline and physical well-being, contributing to healthier, more focused youth who are better equipped to handle life's challenges. By embedding these programs into educational settings, Bahrain can nurture a generation that excels in both cognitive and emotional resilience, thereby strengthening community cohesion and advancing public health.

The findings of this research can be considered the skill based taekwondo training program was considered the most effective treatment program for executive function skills of school going adolescents of Bahrain. The findings of this research can be considered to find out the effects of any training on any group of people. It will allow us to use these skills every day to learn, work, and manage daily life and follow directions, and handle emotions, among other things. This study can be very useful in preventing the youth at risk of Attention-deficit/hyperactivity disorder. In this concern, Psychiatrists, researchers, and professionals can use this study for screening and Identifying drawbacks, weaknesses, and skills where one is doing well but needs to be nurtured. This study will be very helpful to teachers, coaches, and educators to find out talents facilitate the behaviors required to plot and gain goals on this Executive functioning. The essential competencies associated with features encompass talent in adaptable thinking, planning, self-monitoring, self-control, operating memory, time management, and organization. The study has highlighted the significance of 'sports' for improving their overall well-being and benefits in their life. Therefore, it can be applied to the school's organizations some sort of training program should be held, so that students can develop their Executive function skills and personality towards their educational career get motivation for academic achievement, and side ignore the conflict regarding their roles.

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INTRODUCTION

1.1 THEORATICAL ORIENTATION OF PROBLEM

Taekwondo is a martial art with Korean roots that mostly focuses on kicks. "During the 1940s and 1950s, Korean martial artists developed it" (Choi, 1993). Chinese martial arts, Okinawan karate, and the native takedown and gwonbeop traditions were combined to create it. The World Taekwondo Federation (WTF), established in 1973 by KTA Kang (Sik et al., 1999) and the International Taekwondo Federation (ITF), founded by General (Choi ,1966) are the two primary international organizations for taekwondo today. What set this martial art apart was its concentration on head-height kicks, rapid kicking techniques, and jumping and spinning kicks. The World Taekwondo Federation gives extra points for blows in sparring matches that include jumping and spinning kicks (World Taekwondo,2017). Although wide stances are frequently used by combat arts like karate, Taekwondo typically utilizes narrower stances, which are less stable than larger ones, to permit fast twisting kicks.

Traditionally, the martial arts have used words like discipline, self-control, and bodily control to highlight the value of self-regulation. Traditional martial arts instill character training that helps people become more self-aware and actively pursue character development by continuously assessing their thoughts and behaviors and then changing them for the better. Martial arts have been practiced for over 3000 years and come in hundreds of varieties. Martial arts' longevity and growth over time, according to (Richman and Rehberg ,1986) may be evidence of their significant psychological and physical benefits. A more thorough overview of the mechanisms via which practicing martial arts improves an individual's ability to regulate themselves is provided, and recent research has linked self-regulation theory to both empirical and theoretical investigations of martial arts training (Lakes, 2003). The general results of martial arts training can be divided into two categories: psychological (i.e., generalized psychological benefits) and physical (i.e., physical skill and psychological impacts associated with physical appearance and ability). Martial arts training has been linked to positive physical outcomes, including improved body image (Guthrie,

1995), higher physical confidence (Finkenberg, 1990), and improved self-perceptions of physical competence (Richman & Rehberg, 1986).

Taekwondo was previously categorized as a vigorous physical activity (Ainsworth et al., 2000) with a metabolic equivalent (MET) magnitude of ten, which is a measure of the activity's energy expenditure based on the quantitative relationship between its work rate and a typical resting rate of 1 unit/MET. Growing empirical evidence supports the physical (Chai et al., 2011) and psychological (Fong et al., 2012) benefits of martial arts, especially Taekwondo, for children and adolescents, despite the numerous intentional edges associated with the sport receiving more attention from adults (Lakes & Hoyt, 2004). A Taekwondo intervention in schools has a positive effect on students' executive functioning, as demonstrated by (Lakes & Hoyt, 2004). Kids' academic self-efficacy and cognitive function may be enhanced by regular taekwondo instruction (Cho et al., 2017). Maintaining a balanced improvement in fundamental fitness parameters may be facilitated by regular Taekwondo training (Cho et al., 2018). It enhances personality and fosters the growth of social abilities. Senior female Taekwondo practitioners can enhance their cognitive abilities in addition to their physical health (Cho et al., 2019). In adolescents with such conditions, taekwondo instruction may improve selective attention. (Azaiez,2019).

Scientists and the general public are increasingly focusing on the psychological aspects of exercise, among its many other advantages. According to (Amso, et al., 2006), "executive performance" refers to essential psychological feature skills that may be the focus of future research on how exercise affects psychological feature functioning. These include inhibiting oneself physically (inhibition), modifying conduct to suit the demands of the moment (cognitive flexibility), and retrieving and utilizing information to direct action (working memory). One of the primary human abilities that support successful results might also be these executive processes. Empirical research involving 1,000 children enrolled at birth and monitored for 32 years (Moffit et al., 2011) revealed that early self-control markers predicted adult outcomes related to physical health, drug abuse, personal wealth, and criminal activity. They understand that self-control is a major factor in success and should be measured and addressed. Additionally, they found a robust self-control gradient, suggesting the safety of universal therapies.

A skill that has been honed over generations, traditional Taekwondo instructs students in a highly effective way to improve their cognitive (e.g., focus), physical (e.g., physical flexibility, strength, and precision in motor movements), emotional (e.g., learning to meditate and managing dominant negative emotions), and social (e.g., active respect toward others and individual responsibility) abilities. It's possible that Taekwondo incorporates a sophisticated behavioral philosophy that prioritizes self-control, respect, integrity, perseverance, goal setting, and attention. Taekwondo is an exercise technique that emphasizes intricate physical movements along with set-shifting, brainstorming, and downside determination The intricate physical choreography of Taekwondo is best demonstrated by the forms, or poomsae, which are a sequence of well-planned movements carried out in a very precise order. The forms used in beginner coaching are relatively simple, with fewer and fewer technically challenging movements (one lower-level kind, for instance, has thirty-six individual movements, in addition to blocks and kicks, that follow a directional pattern that requires the student to show repeatedly in four distinct directions). Over several months, an athlete develops a novel type of active repression management and physical exertion memory through a very severe series of scaffolded processes. Playing poomsae helps students develop their working memory since it requires them to precisely follow a set of instructions and perform a sequence of activities in a specific order.

In the field of sports, there are different types of training that a sportsperson must go through, which develops a personality. During training, a person is challenged physically as well as mentally, which one must deal with in a positive manner. If a person is trained in a particular sport this training being a positive transfer will help in other sports too of a similar kind. For example, the training of a badminton player will help the player to play squash, lawn tennis, table tennis, etc. Training in the techniques of a sport makes a person intelligent enough to use the proper reaction to any action in their personal lives too. Training helps a person to learn many practical situations that may be dangerous, accidental, etc. It also makes a person physically fit, which lowers the chances of high blood pressure, diabetes, cardiac arrests, etc. A person can reach a new height of performance through training. The capacity to deal with the high-tech competitive era keeps on improving. Sports training improves the behavior of a person psychologically according to the demands of the situation and optimizes the benefit of elite performance and excellence (Birrer and Morgan, 2010). Training helps a person psychologically and clinically by preventing the effects of negativity. The experimental enthusiasm of a person is greatly boosted if a person

trains in a well-developed and organized training program. One of the most prevalent behavioral and neurodevelopmental diseases affecting teenagers is attention deficit hyperactivity disorder or ADHD. The development of cognition, memory, selective attention, and motor response time is greatly aided by exercise and physical activity, particularly for teenagers with ADHD. Furthermore, self-regulation, or conscious control, is identified by (Posner and Rothbart,2000) as an essential aspect of infant socialization, and they further suggest that it is linked to aggression, empathy, and conscience. To further our understanding of development and psychopathology, "understanding self-regulation is the single most crucial goal," as stated by (Posner and Rothbart,2000). They understand the need for measuring and intervening in self-control, as it is the primary factor determining success. It is also suggested that universal therapies are safe because of the high self-control gradient they observed.

Executive functions are a set of mental processes such as attention, language use, memory, perception, problem solving, creativity, self-checking, and reasoning, juggling information, figuring out and categorizing important information. It helps an individual manage their day-to-day schedule in a proper, progressive way. Executive functions encompass a range of crucial mental processes such as attention, language use, memory, perception, problem solving, creativity, and reasoning. These skills are vital for learning, working, and managing daily life, as they are essential for cognitive control of behavior. They enable individuals to select and effectively monitor behaviors that lead to the achievement of their desired goals.

“Executive function skills are like the brain’s management team. They help us plan, make decisions, stay focused, and manage our emotions, enabling us to set goals and figure out how to achieve them. Just as a manager organizes tasks, someone with strong executive function skills can navigate challenges, control impulses, and adjust strategies as needed in daily life” (Diamond, 2013). Executive functions (EFs) enable engagement in unusual, unexpected difficulties, mental play with ideas, deliberate before acting, avoiding temptation, and maintaining attention. (Diamond, 2020). It fosters teamwork, adaptability, and flexibility, transforming the mind into a goal-directed persistence. As the age of an individual increases, the executive function skills develop if well nurtured. For example, a highly trained person can perform a task very well and on time, whereas a non-trained person of the same age can’t manage. The behavioral ability of a person is more-polished, self-controlled, pro-active, calm, and perseverant are some of the

characteristics. Executive function includes basic cognitive skills such as response inhibition, working memory, emotional control, flexibility, sustained attention, task initiation, planning and prioritizing, organization, time management, goal-directed persistence, metacognition, and stress tolerance. These skills help a person to execute goals successfully (Dawson and Guare, 2018). (Drollette et al., 2020) Showed that across executive function circumstances, the favorable effects of physical exercise intervention on cognitive performance were generally found. Exercise may assist in sustaining behavioral performance levels and executive functions by focusing on reorganizing the executive brain network, which may indicate increased neural efficiency for executive activities.

Executive functioning talents facilitate the behaviors required to plot and gain goals. The essential competencies associated with executive function encompass talent in adaptable thinking, planning, self-monitoring, self-control, operating memory, time management, and organization. The essential abilities associated with executive characteristics consist of talent in adaptable thinking, planning, self-monitoring, self-control, running memory, time management, and organization. Cognitive function skills are primarily concerned with knowledge acquisition, information manipulation, and reasoning. Under the umbrella of cognitive function skills, one works on the mechanisms of learning, remembering, problem solving, and paying attention. Perception, attention, memory, learning, decision-making, and language skills are all included. The capacity of an individual to do different mental tasks related to learning and problem-solving is known as cognitive function. verbal, spatial, psychomotor, and processing-speed abilities are the key components. Whereas working memory, flexible thinking, and self-control are all examples of executive function. An individual uses these abilities on a regular basis to study, work, and go about daily life. It helps an individual to manage schedules and to work things out in a proper plan to achieve their goal on time. The management skill under EF skills helps a person to prioritize and organize their work.

Adolescence is the age range of 10 to 19 years old, which is the transitional period between childhood and adulthood. This stage of human development is essential to laying the foundations for a lifetime of good health. (World Health Organization). For this study, adolescence has been chosen as in this period of age, humans develop their skills, grow, learn a lot of things and interact with different emotions, feelings, circumstances, habits etc., which have an impact on

life and will lead to a healthy or unhealthy future. This period is an opportunity to participate in many programs which will develop mental health and will also help a person to recognize their needs and rights for a healthy future.

Executive function skills help the adolescent identify drawbacks, weaknesses, and skills where one is doing well but needs to be nurtured. Identification of weaknesses and lack thereof will help a person to successfully execute goals. The most rapid changes in cognition occur during childhood, but the brain continues to grow throughout adolescence and even into the 20s (Charles, et al., 2010), (Elvevg et al., 2005). There is no better time to quickly overcome one's inadequacies than now. The prefrontal cortex, the part of the brain in charge of planning, reasoning, and problem solving, continues to grow as kids become older (Charles et al., 2010). According to (Goldberg, 2001) Exercise has been shown to boost working memory reaction times in experiments. It's proven that mild-depth workout selectively impacts govt features in children (chia-liang et al., 2017). Taekwondo is an exercise that improves cognitive functioning and is both feasible and applicable to enforce in a public university setting (Arastoo et al., 2013). Getting trained in Taekwondo on a regular basis improves variables of basic fitness, which exerts positivity on the mode and develops sociability (Cho, 2018). Martial arts training appears to have benefits in the affective, cognitive, social, and behavioral domains of general psychology.

In the field of sports, there are different types of training that a sportsperson must go through, which develops a personality. During training, a person is challenged physically as well as mentally, which one must deal with in a positive manner. If a person is trained in a particular sport this training being a positive transfer will help in other sports too of a similar kind. For example, the training of a badminton player will help the player to play squash, lawn tennis, table tennis, etc. Training in the techniques of a sport makes a person intelligent enough to use the proper reaction to any action in their personal lives too. Training helps a person to learn many practical situations that may be dangerous, accidental, etc. It also makes a person physically fit, which lowers the chances of high blood pressure, diabetes, cardiac arrests, etc. A person can reach a new height of performance through training. The capacity to deal with the high-tech competitive era keeps on improving. Taekwondo is a martial art that helps a person mentally and physically. In taekwondo athletes are already mentally prepared for any situation during their competition. This art trains a person physically and mentally in such a way that their minds are already prepared to

resist any kind of sudden impact in the competition. While competing they are so well-disciplined and focused that they can improvise in any situation and convert the negative situation into positive by the outputs of their training. They are so goal-oriented that during competition they use every ounce of their tactics in a very organized way with flexibility that gives the opponent a tough competition.

Although there are many youths program that aim to reduce behavioral problems and are encouraged by research, there is still a lack of research on the promotion of positive youth development. It's likely that individuals in those studies chose to train in martial arts because it fit with their ethical standards.

1.2 STATEMENT OF THE PROBLEM

Exercise and physical hobbies are important for improving memory, cognitive function, motor response speed, and selective attention, especially in adolescents. Taekwondo training boosts selective attention in adolescents with such types of disorders. (Azaiez, 2019). Regular taekwondo training help develop adolescents' academic self-efficacy and cognitive function (Cho et al., 2017). Regular Taekwondo training may be beneficial for balanced gains in fundamental fitness factors. It improves personality and stimulates the development of sociability (Cho et al., 2018). Taekwondo education can be powerful in enhancing now no longer best health however additionally cognitive feature in aged girls as well. (Cho et al., 2019). Executive function includes basic cognitive skills such as response inhibition, working memory, emotional control, flexibility, sustained attention, task initiation, planning and prioritizing, organization, time management, goal-directed persistence, metacognition, and stress tolerance. These skills help a person to execute goals successfully (Dawson and Guare, 2018). As the age of an individual increases, the executive function skills develop if well nurtured although the maximum speedy cognitive modifications arise at some point of childhood, the mind maintains to increase at some point of adolescence and even into the 20s (Charles, et al., 2010) (Elvevg, et al., 2005). The Adolescent period is one of the best where one can overcome their shortcomings in a speedy way. As young adults get more mature, the prefrontal cortex—the area of the brain responsible for cognitive reasoning, planning, and trouble solving, additionally keeps developing (Charles, et al., 2010),(Goldberg, 2001). Exercise was found to significantly improve working memory reaction times in experiments. Research has demonstrated that adolescents' executive function is selectively

impacted by moderate-intensity exercise (Chia-Liang et al., 2017). For taekwondo athletes, sports psychological skill variables and scale development have been identified by (Cho et al., 2022).

A review of the existing literature reveals that Taekwondo training is highly beneficial for improving fundamental fitness, cognitive function, and personality development. Given these proven advantages, it prompts the question: why not explore its potential benefits for enhancing executive function among school-going adolescents in Bahrain? It is noteworthy that there is a significant lack of research in this area, both in Bahrain and India. This gap highlights a valuable opportunity for further investigation into how Taekwondo could positively influence executive functions in these regions. Keeping all this in mind the investigator has selected to observe "**EFFECT OF SKILL BASED TAEKWONDO TRAINING PROGRAM ON EXECUTIVE FUNCTIONS AMONG SCHOOL GOING ADOLESCENTS OF BAHRAIN"**

1.3 OPERATIONAL DEFINITIONS OF THE TERMS

1. **Executive functions**

   Executive skills are cognitive processes that enable planning, attention, memory, task management, and problem solving among the adolescent population of Bahrain.

   "Executive function skills are the brain's ability to manage and coordinate our thoughts, actions, and emotions. These skills help us plan, make decisions, control impulses, and stay focused on our goals. Just as a coach helps players stay on track during a game, executive function skills guide us in managing tasks, solving problems, and adapting to new challenges" (Dawson & Guare, 2018).

2. **Taekwondo**

   Taekwondo is a form of martial art primarily focused on high head kicks and front kicking techniques. In this study, the skill is being examined for its impact on the executive function of adolescents in Bahrain

3. **Adolescence**

Adolescence refers to the developmental phase between childhood and adulthood, typically encompassing the ages of 10 to 19. This period marks a significant transition in physical, emotional, and psychological growth.

4. **Bahrain**

Bahrain is a small island nation in the Persian Gulf is strategically positioned near Saudi Arabia to the west and Qatar to the south. While Taekwondo is globally acknowledged for its benefits in improving fitness, cognitive functions, and personality, there is a distinct lack of research focusing on its effects on executive functions among school-going adolescents in Bahrain.

Following Executive Function skills used in the present investigation the researcher the following skill is used

1. **Response inhibition**

The ability to analyze circumstances before jumping to conclusions is referred to as response inhibition**.** It is the capacity to think before any action. Response inhibition is the suppression of actions which are not required in every context, that intervenes in the sustainability of a person in a task. It helps to react in a positive manner to control the situation.

2. **Working memory**

Working memory is the ability of adolescents that helps them to recall information instantly whenever required.

3. **Emotional control**

Emotional control is the ability that allows a person to concentrate on a task dedicatedly without letting their personal emotions interfere with their commitments.

4. **Task initiation**

Task initiation is the ability to motivate oneself to complete the task on time, accept and overcome new challenges, and stay rigid with full determination to complete the task.

5. **Sustained attention**

Sustained attention in adolescents is the ability to maintain focus on a task or activity over an extended period, crucial for effective learning and task completion amidst distractions.

6. **Planning**

Planning is the process of setting goals, defining strategies, and outlining tasks and schedules to achieve specific objectives. It involves anticipating potential challenges and organizing resources and actions to ensure efficient and effective execution.

7. **Organization**

Organization is a skill that is essential in task completion. This skill helps to execute the task in a smooth way, keeping all the information and required materials easily reachable.

8. **Time Management**

Time management is the skill of allocating time effectively to prioritize tasks and avoid delays. It ensures that individuals make the most efficient use of their time to achieve their goals and meet deadlines.

9. **Flexibility**

Flexibility is the ability to accept changes, adapt the available solution, and improvise according to circumstances to overcome the situation.

10. **Metacognition**

Metacognition is a skill to evaluate their won performance level and effectiveness of their work. It is like self-questioning and nurturing their abilities for better input.

11. **Goal-Directed Persistence**

Goal-Directed Persistence is the capacity of a person's willpower to stay rigid on their path to achieve their goals without being distracted.

12. **Stress Tolerance**

Stress tolerance is the ability to remain calm and effective when facing challenging or high-pressure situations. It involves managing stress constructively and maintaining performance despite difficulties.

1.4 OBJECTIVES OF THE STUDY

The objectives of the study are to investigate whether skill-based taekwondo training program effect on executive function of school going adolescents of Bahrain.

1. To identify the effect of skill-based taekwondo training program on executive function of school going adolescents of Bahrain
2. To find out the effects of skill-based taekwondo training program on the response inhibition skill of adolescents of Bahrain
3. To determine the effects of skill-based taekwondo training program on working memory skill and their impact on adolescents of Bahrain
4. To understand the effects of skill based taekwondo training program for emotional control skill and its impact on the adolescents of Bahrain
5. To study the impact of skill-based taekwondo training program process on the task initiation skill of adolescents of Bahrain
6. To study the impact of skill based taekwondo training program on the sustained attention skill of the adolescent of Bahrain
7. To identify the effect of skill based taekwondo training program on planning skill of the adolescents of Bahrain
8. To evaluate the effects of skill based taekwondo training program on the organization skill of the adolescent of Bahrain
9. To find out the effects of skill-based taekwondo training program on time management skill on adolescents of Bahrain

10. To study the impact of skill based taekwondo training on the flexibility skill of the adolescents of Bahrain.
11. To identify the skill based taekwondo training on metacognition skill of the adolescents of Bahrain.
12. To determine the effect on goal-directed persistence skill on adolescents while implementing skill based taekwondo training process.
13. To study the impact of skill based taekwondo training on the stress tolerance skill of the adolescent of Bahrain.

1.5 HYPOTHESES

From personal experience, Expert's opinion, public view and after review of the literature,

H_1 - There is significant effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain.

H_2 - There is significant effect of skill based taekwondo training program on response inhibition of school going adolescents of Bahrain

H_3 - There is significant effect of skill based taekwondo training program on working memory of school going adolescents of Bahrain

H_4 - There is significant effect of skill based taekwondo training program on emotional control of school going adolescents of Bahrain

H_5 - There is significant effect of skill based taekwondo training program on task initiation of school going adolescents of Bahrain

H_6 - There is significant effect of skill based taekwondo training program on sustained attention of school going adolescents of Bahrain

H_7 - There is significant effect of skill based taekwondo training program on Planning of school going adolescents of Bahrain

H_8 - There is significant effect of skill based taekwondo training program on organization of school going adolescents of Bahrain

H_9 - There is significant effect of skill based taekwondo training program on time management of school going adolescents of Bahrain

H_{10} - There is significant effect of skill based taekwondo training program on flexibility of school going adolescents of Bahrain

H_{11} - There is significant effect of skill based taekwondo training program on metacognition of school going adolescents of Bahrain.

H_{12} - There is significant effect of skill based taekwondo training program on goal-directed persistence of school going adolescents of Bahrain.

H_{13} - There is significant effect of skill based taekwondo training program on stress tolerance of school going adolescents of Bahrain.

1.6 DELIMITATIONS

1. The subject was delimited to the school going non-sports adolescents. The subject shall be delimited to the Indian School of Bahrain.
2. 80 female adolescents were selected for this study. The subjects' ages will be limited to 12 to 16 years old.
3. The study samples did not officially participate in any sports competitions during or prior to the current investigation
4. In this study, the investigator employed twelve different executive function skills, incorporating expertise opinions.
5. The study was delimited to this following executive skills response inhibition, working memory, emotional control, flexibility, planning, Sustained attention, task initiation, organization, time management, goal-directed persistence, metacognition and stress tolerance only.
6. The study was delimited by “Executive Function” self-made questionnaire only.
7. A self-made questionnaire was designed with the adolescent population of Bahrain in mind.
8. To established self made questionnaire with the help of Peg Dawson & Richard Guare “Executive Skills in Children and Adolescents” which on the population of New Work

1.7 LIMITATIONS

1. Sample size of the present investigation was 80 which may limit the generalizability of the findings to a broader adolescent population in Bahrain or other regions.
2. The tools and methods used to assess executive functions may not comprehensively measure all relevant aspects. Keeping in mind the expert opinion and review literature, in this investigation, study was delimited to 12 executive functions only.
3. There was one control group in the study, it may be difficult to attribute observed changes specifically to the Taekwondo training rather than other factors.
4. Differences in the implementation of the Taekwondo program, such as instructor experience and training consistency, could affect the outcomes.
5. Other concurrent factors, such as academic pressures or social changes, could impact the adolescents' executive functions and confuse the results.
6. Factors outside the study's scope, such as personal and environmental influences, may have impacted the results.
7. The researchers could not control the students' regular activities at their Indian school in Bahrain.
8. No motivational strategies were implemented during the testing phase.

1.8 SIGNIFICANCE OF THE STUDY:

Executive function skills are critical for adolescents as they help identify personal strengths, weaknesses, and areas for improvement. By recognizing these aspects, individuals can better achieve their goals. This study focuses on identifying gaps in executive function skills and examining the effectiveness of skill-based Taekwondo training in enhancing these skills. The study specifically targets executive function areas such as response inhibition, working memory, emotional control, flexibility, planning/prioritizing, sustained attention, task initiation, organization, time management, goal-directed persistence, metacognition, and stress tolerance. It aims to assess how Taekwondo training can impact these cognitive processes in adolescents. The findings of this research offer a deeper understanding of how skill-based Taekwondo training influences executive function development in adolescents. The study provides evidence of significant improvements in the targeted executive skills and suggests that such training can be more effective than traditional school activities in fostering these abilities. Furthermore, this study

underscores the practical application of the research findings, demonstrating their validity and reliability. The results have implications for various groups, including students and adolescents aged 10 to 19, and suggest that structured physical activities like Taekwondo can play a crucial role in enhancing both academic and sports performance.

Overall, the research highlights the benefits of integrating skill-based Taekwondo training into adolescent development programs, offering valuable insights into improving cognitive and emotional skills through structured physical activity. The result will be helpful in identifying various skills gaps prevailing in executive functions skills and studying the effectiveness of skill based taekwondo training in executive functions skills.

1. The findings of the study could be valuable for evaluating how skill-based Taekwondo training impacts adolescents' mental processes related to executive functions.
2. The results may assist in assessing adolescents' executive function skills and related cognitive processes.
3. This research might support improvements during performance evaluations.
4. It may provide solutions for addressing executive function skill challenges that affect adolescent performance.
5. The study could contribute to personality development in adolescents.
6. It may help adolescents identify their weaknesses in executive function skills.
7. The findings might facilitate the development of these weaker executive function skills.

CHAPTER II

REVIEW OF LITERATURE

Chapter-II

REVIEW OF LITERATURE

2.1 REVIEW OF RELATED LITERATURE

Recent research has increasingly examined the role of physical activities, particularly martial arts, in enhancing youth development. While numerous programs aim to address behavioral issues among adolescents, comparatively fewer studies emphasize the promotion of positive developmental traits such as self-regulation, goal orientation, and executive functioning. Although some books and peer-reviewed journals have discussed the cognitive benefits of physical activity, empirical studies specifically exploring the impact of martial arts on executive functions in school-aged youth remain limited. This indicates a clear research gap in understanding how structured martial arts training can be strategically implemented within educational settings to support cognitive and behavioral outcomes.

To provide a comprehensive background for the present study, the review of literature has been further categorized as follows:

2.1.1 Review of the importance of executive function

2.1.2 The role of physical activity in executive function

2.1.3 Impact of taekwondo and martial arts on executive function

2.1.1 REVIEW OF THE IMPORTANCE OF EXECUTIVE FUNCTION

Bradford et al., (2021) has conducted a study to examine the development of executive functions from adolescence to old age. The research involved 350 participants, ranging in age from 10 to 86, who completed tasks assessing working memory, planning, inhibitory control, and cognitive flexibility. The findings indicated that while working memory remained robust during adolescence and early adulthood, both working memory and inhibitory control exhibited signs of decline as early as 30–40 years old, persisting into old age. These results offer valuable insights for developing interventions to support cognitive function throughout the lifespan.

Conesa & Duñabeitia, (2021) an extensive research study was conducted to evaluate the impact of computer-based game-based instruction on children's executive functioning. A total of 713 Spanish primary school students, comprising 51.3% females with an average age of 10.2 years, were randomly selected for the study. The 8-week training program, implemented in 26 schools, consisted of three sessions lasting 15 to 20 minutes each. Together with their academic performance, the students' executive functions were evaluated both before and after the training by employing questionnaires and chronometric tests. The findings revealed a significant enhancement in inhibition, working memory, and academic performance in the training group compared to the control group. Intriguingly, despite the notable improvement in the training group, there was no discernible difference in the levels of inhibition between the two groups.

Ahmed et al., (2019) research on executive functions and academic attainment by connections that endure from youth to senior age The NICHD Study of Early Child Care (N=1273) provided the data in early Children (54 months) and nonage (15 times). To examine the long-term associations between executive function variables (EF) and academic achievement in early Children (54 months) and late Children (15 times). They discovered that only working memory at 54 months significantly predicted working memory at 15 years and that working memory at one point was the only large EF predictor of accomplishment at 15 years, even after adjusting for early achievement, demographic, and household characteristics. The study's findings indicate a relationship between working memory in preschool and the ability to do mathematics and read by age fifteen. Based on a single dimension, these results indicate that we can predict teenage cognitive and academic achievement as early as 54 months. They also imply that working memory measurements in preschool and adulthood are based on similar skills.

Whitham, (2017) investigated how teaching executive function skills affected student behaviour in the classroom. According to factor analyses, working memory, inhibition, and flexibility are the three distinct but connected components that make up executive function. Eight fourth and fifth graders from a suburban Title I elementary school were directly taught these skills over ten thirty-minute sessions using a spiraling curriculum. They collected data with Peg Dawson and Richard Guare's Questionnaire on Executive Skills for Students. Mixed results were reported by instructors

and students, indicating that the intervention may have had some effect on classroom behaviour following the pre- and post-executive function survey. Five out of eight students reported an increase in executive skills, while six out of eight teacher surveys indicated a favorable but limited change in behaviour.

Bisanz et al., (2013) examined how children in Grades 2 through 4 acquire mathematical skills in relation to executive attention. Children in grades two and three provided the data. 157 pupils finished math and executive attention exercises. The study focused on the function of executive attention, which encompasses the shared characteristics of executive function and executive working memory, in the development of two areas of mathematical proficiency in children: (a) place value and number system knowledge, as well as multi-digit addition and arithmetic procedures, and (b) arithmetic fluency, or the ability to solve simple equations quickly, such as 3+4 and 8-5. A year later, they did the same mathematics exercises again. The relationships between executive attention and (a) concurrent assessments of mathematical knowledge and arithmetic fluency and (b) improvements in performance on these measures one year later were investigated using structural equation modeling. The findings demonstrate the critical role executive attention plays in children's development of automatic access to math facts and their ability to pick up new skills.

Mohammadi et al., (2013) examined the relationship between assessments of executive functioning and academic achievement the goal of learning about this was to look at the connection between children's executive functioning scores and their overall academic achievement. Statistics from children aged 6 to 11 from Sweden, Spain, Iran, and China were previously collected. Using the childhood executive functioning inventory (CHEXI) tools, parents, teachers, and other carers have rated their child's executive functioning. Analysis of the statistics of analysis of variance (ANCOVA) once employed post hoc analysis. The findings supported the previous general assessment that the Chinese group had greater executive impairments than the other samples. The finding that executive functioning deficiencies are worsened in China is probably due to cultural biases.

Dowsett & Livesey, (2000) study, "executive skills" training: effects, was to help preschoolers develop inhibitory control. The study aims to determine if repeated exposure to activities that aid

in the acquisition of progressively complicated rule structures can enhance inhibitory control, even in three-year-old children, as assessed by a go/no-go discriminating learning task. They employed the Wisconsin Card Sort Task modified by (Diamond and Boyer, 1989) as well as a simplified version of the changing paradigm (Logan & Burkell, 1986). The study's findings on the role of experimental factors in the development of inhibitory control are explained in terms of how early experiences with suitable executive tasks and brain development interact.

2.1.2 REVIEW OF THE ROLE OF PHYSICAL ACTIVITY IN EXECUTIVE FUNCTION

Zhou & Tolmie, (2024) conducted accumulating Substantiation from behavioral studies and neuroscience suggests that motor and cognitive development are naturally intertwined. To explore the underpinning mechanisms of this motor–cognition link, they examined the longitudinal relationship of early motor chops and physical activity with after-cognitive skills. The sample was collected from 3188 youngsters from the UK Millennium Cohort Study, accompanied at nine months and 5, 7, and eleven years. Beforehand motor skills were examined at 9 months. Children's diurnal physical exertion position was measured using accelerometers at 7 times and a questionnaire was conducted at 11 times. Cognitive chops, including executive function and academic achievement, were measured at age 11. The results suggest that gross motor skills were positively associated with spatial working memory, whereas fine motor skills were predictive of good English and wisdom issues. Moderate- to vigorous activity was set up to be negatively associated with English performance, although tone-reported activity frequency was appreciatively linked to calculation. Our results highlight the significant part of both gross and fine motor skills in cognitive development. This study also elucidates the limitations of using activity intensity to assess the impact of motor activity on children's cognitive development, suggesting that attention to the goods of specific types of physical activity would better interpret the motor/ cognition link.

Cai et al., (2023) determined a study on effects of physical activity interventions on administrative function in aged grown-ups with madness A meta-analysis of randomized controlled trials. To date quantitative meta-analysis with large samples to probe the effects and implicit chairpersons of

physical activity(PA) on superintendent function(EF) in aged grown-ups with madness is inadequate. Randomized controlled trial meta-analysis. Seniors who had complained or said they had Alzheimer's disease, or who had other similar forms of insanity, were the main source of the data. For relevant research published between January 1, 2010, and March 1, 2022, searches were conducted through the databases of PubMed, Web of Science, the Cochrane Library, and Embase. Every RCT had referred to the EF's results. The size of the commodities was determined by the use of random goods meta-analysis. Three chairpersons participated in group analyses that included the particular EF sub-domains, exercise prescription variables, and sample characteristics. They established that a total of 1366 RCTs were included in the analysis. The formalized mean difference (SMD) = 0.23, 95 confidence interval (CI) 0.05 to 0.41, $p<0.05$, showed that overall EF was improved by PA treatments. While working memory, inhibitory control, and cognitive inflexibility were not significant moderators, the EF sub-domain "planning" was (SMD = 0.31, 95CI0.11 to1.51, $p<0.01$). In terms of exercise tradition characteristics, overall EF performance was improved by resistance training type, moderate intensity, duration ≤ 24 weeks, and short (previously or twice a week) frequency. The length of the session could be a moderator. Old-old, announcement, and both madness and announcement exhibited substantial advantages when it came to sample features. For elderly dementia patients, physical activity can be a crucial intervention to assist prevent EF decrease or improve EF performance.

Andrades et al., (2022) research on a comprehensive evaluation of the impact of exercise, sports, and physical activity on executive function in young individuals with attention deficit hyperactivity disorder. Data on documented treatments given to kids and teenagers with ADHD diagnoses between the ages of 5 and 18 was included in the study. The Web of Science, PubMed, Scopus, EBSCO, and SciELO electronic databases were searched. Analysis of the effects of exercise, sports, and physical activity on executive function in children and adolescents with ADHD is the goal of this systematic review. Researchers have discovered that engaging in sports, exercise, or physical activity helps children and adolescents with ADHD improve their executive function.

Leung et al., (2021) conducted the meta-analysis thoroughly examined the impact of physical activity interventions on executive function in individuals with neurodevelopmental disorders.

Data from 34 studies, involving 1058 participants aged 5–33 years, revealed a significant overall improvement in executive function due to these interventions (Hedges' g = 0.56, p .001). These findings support the effectiveness of physical activity interventions in enhancing executive function among individuals with neurodevelopmental disorders. The results revealed a significant positive impact of physical activity interventions on improving executive function in individuals with neurodevelopmental disorders (Hedges' g = 0.56, p < .001). This meta-analysis provides substantial evidence supporting the effectiveness of physical activity interventions in enhancing executive function in this population.

Alvarez-Bueno et al., (2021) they aimed to investigate whether executive function and cardiorespiratory fitness (CRF) mediate the relationship between academic achievement and moderate-to-vigorous physical activity (MVPA). This involved considering sociodemographic characteristics, academic achievement, anthropometric factors, and executive function components such as inhibition, cognitive flexibility, and working memory, CRF (measured using the 20-meter shuttle run) and physical activity (measured using accelerometry) were part of the data collected from 186 students aged 9–11 years in Cuenca, Spain. The results suggest that the relationship between MVPA, academic success, and CRF, cognitive flexibility, and inhibition can be influenced through CRF using serial mediation models and the Hayes PROCESS macro for analysis. To enhance academic achievement, the study recommends prioritizing CRF and executive function improvements in interventions promoting physical activity.

Doucette et al., (2021) determined to explore the essential executive functions in sports influenced by external pressures. Understanding these processes from the athlete's perspective is vital for further assessments and for creating athlete-centered language to describe executive functions in sports. Data was gathered from 19 Canadian U-Sports athletes, aged 18–25, with 37 female participants, representing soccer (8), rugby (6), volleyball (3), and basketball (2). Through detailed interviews, the athletes shared their experiences and insights on the executive functions in sports. Utilizing NVivo 12 software for data analysis, the study provides a unique contribution to understanding athletes' executive functions in sports and offers significant implications for sports psychologists and related professionals in their future assessments and explanations of executive functions to athletes.

Badami et al., (2021) carried out a randomized clinical experiment to find out if executive functions in kids with attention deficit hyperactivity disorder are affected by perceptual-motor parent-child exercises. Millions of youngsters globally suffer from attention-deficit/hyperactivity disorder (ADHD), which manifests as aggressive, hyperactive, anxious, and attention-deficit symptoms. This study took into account the adverse effects of ADHD drugs while examining the effects of perceptual-motor parent-child exercises on executive skills in children. 36 children with ADHD, ages 7 to 10, and their moms participated in the study. The participants were split into two groups of eighteen, one consisting of the mother and child exercising together and the other of the mother and child exercising alone. The individuals in the groups completed three 45-minute perceptual-motor activities over the course of eight weeks. Data was gathered both before and after the intervention using the computerized version of the Stroop Word Test. The covariance test was employed to evaluate the data, with a significance level of 0.05. The findings imply that mother-and-child activities and perceptual-motor exercises may assist enhance executive function in kids with ADHD.

Campos-Jara et al., (2021) conducted a comprehensive assessment and meta-analysis to investigate the impact of sports-based therapies on children's executive function. The study aimed to explore how specific sports interventions affect the executive traits of adolescents and teenagers. On November 1, 2020, a thorough assessment was carried out to identify published scientific evidence examining the potential impact of after-school sports programs on children's executive functioning. They conducted a comprehensive search across the four main digital databases: Web of Science, PubMed, Scopus, and EBSCO. These searches focused on longitudinal studies evaluating the effects of sports activity interventions on individuals aged 6 to 18. Eight studies, which met the inclusion criteria and involved a total of 424 participants, primarily examined working memory, inhibitory control, and cognitive flexibility. The collective findings indicate that promoting sports participation among healthy children and teenagers can lead to improvements in their executive functions across different developmental stages.

Cha et al., (2020) in their study they supported the idea that moderate exercise can improve the brain efficiency of young adults for executive functions. Using fMRI, the researchers investigated

the effects of both regular and addictive workouts on the participants' executive function network. During a functional magnetic resonance imaging (fMRI) scan, 65 healthy participants took the Wisconsin Card Sorting Test (WCST). Based on their scores on the Korean Exercise Dependency Scale (K-EAS), the participants were divided into three groups: addictive exercise (AE), moderate exercise (ME), and no exercise (NE). The study found that there was no significant correlation between the activation volumes and behavioral assessments. Regular exercise has the potential to reorganize the executive brain network, leading to improved neural efficiency for executive functions. Additionally, exercise can help sustain executive functions and enhance behavioral performance levels.

Byrd-Bredbenner et al., (2020) explored the associations between executive function, cognitive load, and weight-related behaviors in university undergraduates. The study specifically investigated how weight-related behaviors are linked to executive function traits, particularly under high cognitive loads such as specific anxiety. Data was collected from 406 participants who completed an online survey covering health, weight-related behaviors, executive function traits (e.g., cognitive self-control, attention, and adaptability), and cognitive load (specific anxiety). Using k-means cluster analysis, the researchers identified three distinct clusters based on executive function traits. Cluster 1 exhibited the lowest cognitive self-control and adaptability but moderate attention, while Cluster 2 had the lowest attention and moderate self-control and adaptability. In contrast, Cluster 3 displayed the highest executive function traits. Notably, the clusters did not differ significantly in terms of BMI or physical health. However, participants in Cluster 3 demonstrated better internal health, physical activity levels, sleep quality, and eating behaviors. The study revealed that individuals experiencing high cognitive loads, indicated by specific anxiety, had poorer internal health compared to those with low cognitive loads.

Drollette et al., (2020) aimed to shed light on the connection between children's executive abilities, physical exercise, and baseline cognitive performance. By investigating the influence of baseline cognitive performance and executive function demands, the researchers sought to address the existing discrepancies in the literature. Additionally, the study aimed to explore the impact of these variables on how physical activity affected cognition. Data from 3 randomized controlled trials involving 292 participants aged 9 to 13 were analyzed. The trials utilized various tasks to assess executive function under different demands and evaluate the effects of regular physical

activity on cognition. The findings indicated that teenagers with lower baseline cognitive function derived greater cognitive development benefits from physical activity. Furthermore, the primary analysis demonstrated that regardless of executive function circumstances, regular physical exercise positively impacted overall cognitive performance.

Englert et al., (2020) determined to improve kindergarteners' mental functions by combining cognitive and physical training A randomized controlled study in clusters. To assess the efficacy of a six-week combined physical-cognitive intervention to that of a waitlist control group and a sedentary cognitive intervention 189 kids were selected from 14 kindergarten classes and progressed between four and six times (M = 5.34, SD = 0.59) using a between-subjects experimental design. Which were assigned at random to one of the three experimental setups: (a) waiting control group; (b) sedentary cognitive training; or (c) mixed physical and cognitive training. The three primary tasks of a superintendent, namely stirring, inhibition, and updating, were assessed both before and following the treatments. The Hypotheses that a six-week combined physical-cognitive training improves kindergarten students' Efs more than a six-week sedentary cognitive training was investigated in the current study. The study's findings support the viability of combining physical and cognitive therapies to improve kids' daily physical activity levels and cognitive function**.**

Park & Etnier, (2019) conducted a study the beneficial effects of acute exercise on the executive function of adolescents were examined. The study's goal was to examine how moderate-intensity acute exercise affected adolescents' performance in executive function (EF) later on. Data was collected from 22 high school pupils, with an average age of 15.90 years, who volunteered for the study. The study results confirmed that 20 minutes of moderate-intensity exercise can significantly benefit EF performance in high school students, shedding light on the positive effects of exercise on executive function in this age group.

Chang et al., (2019) examined how long-term acute exercise affected late-middle-aged adults' executive function's inhibitory component. In this study, late middle-aged adults' inhibition was investigated in relation to the duration of acute exercise. 40 middle-aged people were given tasks on four different days, arranged in a counterbalanced order of three exercise sessions consisting of single bouts of moderate-to-vigorous cycling. The primary acute exercise duration was 10, 20, and

45 minutes, while the control session consisted of 30 minutes of reading. After each session, the Stroop was administered to assess the inhibition performance. The test results indicate that while shorter and longer exercise sessions had little impact on executive function in the late middle-aged individuals, moderate-to-vigorous intensity acute exercise lasting 20 minutes improved several cognition function domains overall.

Boecker, (2018) conducted a study on how executive manipulation techniques connect to an individual's health outcomes after regular exercise training, including blood lactate profile curves and neuroimaging results. The impact of extended submaximal training on interference control was examined, taking into account training-induced changes in VO2max and blood lactate profile curves (BLC). Data were gathered for this study from 23 middle-aged adult male sedentary (M = 49 years) who finished an exercise training program lasting six months (intervention group, IG). Furthermore, 14 people who had never trained in exercise were enlisted (control group, CG, mean age = 52 years). Using a practical flanker paradigm for functional magnetic resonance imaging (fMRI), interference manipulation was investigated once before and once after the intervention. The outcomes supported regression studies that were published in IG, which found strong correlations between character health attainment and changes in frontal region intelligence activation. These relationships have not been more pronounced for VO2max but rather for BLC.

Chen et al., (2018) they looked at how response inhibition training affected adults' and adolescents' training and switch outcomes. To determine the data, a random sampling technique was utilized to collect statistics from 39 children ages 10 to 12 and 46 adults ages 18 to 24. The individuals' total performance on tasks measuring non-verbal fluid genius, working memory updating, reaction inhibition, interference control, task-switching, and response inhibition was evaluated at some time during the 3- and 6-month follow-up periods and an immediate post-training session. For each child and adult, significant training improvements and clever swap penalties for a corresponding response inhibition mission with unique stimuli have been identified. These findings suggest some techniques for reaction-inhibition training programs to improve cognitive functioning characteristics in children, not adults.

Chia-Liang et al., (2017) worked on "Open-and closed-skill exercise interventions produce different neurocognitive effects on executive functions within the elderly: a 6-month randomized, controlled trial." The purpose of this study was to determine how open- and closed-skill exercise interventions senior adults' neuropsychological performance of executive functions. 64 healthy males were divided into three groups at random: open (table tennis; n = 21), closed (bike riding or brisk walking/jogging; n = 22), and control (n = 21). Neuropsychological [such as latent period (RT) and accuracy rates (AR)] and electrophysiological [such as the event-related potential (ERP) P3 component] parameters were evaluated both at baseline and following a 6-month exercise intervention in a task-switching paradigm variation. At the same time, answer accuracy declined with exercise only at 70% maximum pulse in both experiments and the interval for remembering increased. Research has demonstrated that adolescents' executive function is specifically impacted by moderate-intensity exercise.

Brand et al., (2016) conducted a meta-analysis to examine the immediate effects of moderate aerobic exercise on particular executive function components in particular age and health groups. In order to meta-analyze the effects of exercise on several executive function components in individuals within a given age range and aerobic fitness subgroup, the study was conducted. Statistics compiled from forty experimental research papers were used to examine a small effect of aerobic exercise on time-dependent measures (g =.35) and accuracy (g =.22) in executive function tasks. According to the results, older individuals (g =.67) and preadolescent adolescents (g =.54) benefit more from aerobic exercise than other age groups when response time is the dependent variable. The executive function component and aerobic fitness had little impact on the impact sizes that were received, compared to age. Therefore, elevated cardiovascular fitness does not seem to be necessary for temporary enhancements of the executive control system, and those who are physically fit or not seem to gain the same benefits from exercise. Although it was previously found that humans going through developmental changes have a higher sensitivity of executive function to acute aerobic exercise.

Capranica et al., (2016) examined how physical-cognitive dual-task training affected senior citizens' gait and executive function in a randomized controlled trial. This study examined the effects of twelve weeks of intensive physical-cognitive training on older people's executive cognitive function and gait performance. Three sorts of physical preparation sessions were

conducted on thirty-six solid, dynamic people who were 72.30 ± 5.84 years old. The fundamental focus of the sessions was physical single-task (ST) preparing (n = 16) and physical-cognitive dual-task (DT) preparing (n = 20). They were tested both before and after the intervention for gait (walking with or without navigating obstacles) under both single- and dual-task (ST and DT) circumstances, as well as for executive function (inhibition, working memory) using random number generation. The research backs up the usefulness of group exercise programs for enhancing gait performance in the elderly. Physical-cognitive DT training specifically addresses the aging-related loss of a fundamental executive function necessary for daily activities.

Nagatomi et al., (2015) conducted a study titled "executive function during and after acute moderate aerobic exercise in adolescents." He researched how adolescents' executive functions were affected by brief, moderate-intensity exercise. Experiment (1: N = 28) and Experiment (2: N = 27) involved the selection of 55 Japanese adolescents, who completed a modified flanker task and a modified n-back task to assess working memory and inhibitory control before, during, and following moderate activity treadmill walking. An identical testing sequence was administered when participants sat in a chair in a different session. Experiment 1: 60% of maximal heart rate; Experiment 2: 70% of maximal heart rate. Adolescent executive function is specifically impacted by moderate-intensity exercise, according to the data

Gothe et al., (2014) studied the effects of an eight-week Hatha yoga session on executive function in older persons. The purpose of the study was to examine how an 8-week Hatha yoga intervention affected working memory capacity and task-switching measures of executive function in a randomized controlled experiment. A Hatha yoga intervention or a stretching and strengthening control group comprised 118 community-dwelling older people (mean age = 62.0). Participants were assigned at random to either group. For eight weeks, both groups attended three lessons a week for an hour-long workout. At baseline and follow-up, all individuals underwent standardized executive function assessments, such as the task-switching paradigm, n-back, and running memory span. The Hatha yoga group illustrated significantly faster response times on the mixed and repeat assignment switching trials (halfway $\eta 2 = .04$, p Greater accuracy was observed in the partial recall ratings (partial $\eta 2 = .06$, $p < .01$), the 2-back condition of the n-back (partial $\eta 2 = .08$, $p < .001$), and the single trials (partial $\eta 2 = .05$, $p < .05$). Following eight weeks of yoga practice, participants in

the yoga intervention group demonstrated significantly better performance than their stretching and strengthening counterparts on the executive function measures of flexibility, working memory capacity, and mental set shifting efficiency.

Gothe et al., (2013) carried out research in order to determine the immediate effects of yoga on executive function. The purpose of the study was to examine how acute yoga exercise affected cognitive performance in comparison to aerobic exercise. A baseline examination, an aerobic exercise session, and a yoga exercise session were the three counterbalanced testing sessions that 30 female college-aged participants (mean age = 20.07, SD = 1.95) completed utilizing a regularly used measures design. The flanker and n-back tasks were employed to assess cognitive performance. As compared to the aerobic and baseline circumstances, the results demonstrated that the post-yoga exercise bout cognitive performance was considerably better (i.e., reduced reaction times, greater accuracy) for both working memory and inhibitory tasks. The results of the aerobic exercise and cognition literature were significantly different from the baseline performances, which went against some of the earlier conclusions.

Bherer et al., (2013) attempted to investigate the relationship between exercise depth and health level and the deterioration in executive control after acute bouts of exercise. The research aimed to evaluate the immediate effects of exercise intensity on cognitive function while accounting for significant methodological variables. Data was collected from 37 study participants, aged 20-29 (M = 23.8%; SD = 2.6), of which 9 were men and 18 were women. Once upon a time, subjects were chosen using a straightforward random sampling procedure. According to the results of the physical activity readiness questionnaire (PAR-Q) (Thomas, Reading, & Shephard, 1992) none of the study participants were unable to finish due to any physical limitations. The results of this study show that adolescents in their limit and greater suit are concerned about switching between two healthcare items when engaging in moderate-to-intense cardiovascular exercise. Moreover, at some time during a high-intensity exercise session, people who are not in optimal physical shape demonstrate instability in overall performance during an inhibitory task in comparison to their more physically fit counterparts.

Etnier & Chang ,(2009) examined how exercise affects executive function and provided a quick overview of definitions, problems with measurement, and the status of the research at the time. Control the interaction between exercise and cognition, particularly executive function, and the potential mediating effect of variables including depression, chronic pain, and cardiovascular disease (CVD) and its risk factors. 544 Boston-area women who were 70 years of age or older provided the data. Pain, depressed symptomatology, and heart disease (self-reported medical diagnosis) were assessed using interviewer-administered questions. A blood pressure reading was obtained. To ascertain participation in physical activity, the Physical Activity Scale for the Elderly was employed. An extensive battery of neuropsychological tests was used to assess cognitive function. According to the findings, older persons who exercised more performed noticeably better on all cognitive tests.

2.1.3 IMPACT OF TAEKWONDO AND MARTIAL ARTS ON EXECUTIVE FUNCTION

Charoenwattana et al., (2022) research on the impact of a psychological skill training program on taekwondo athletes' mental preparation. The present analysis has two main objectives: 1) investigate the psychological requirements and develop a psychological ability coaching (PST) package for taekwondo jocks, and 2) investigate the effect of a local time package on a taekwondo athlete's mental preparedness. One of the sections could address the sports science competencies needed by players. Seven consultants designed and verified the local time package. Phase 2 was the division of 26 amateur taekwondo competitors from Japan into two teams. The management cluster received only traditional taekwondo training, which included exercise, skills, and technique. The experimental cluster received coaching in ancient taekwondo together with a Programme supplement of coaching in sports science skills. The course ran for eight weeks, meeting three times a week for thirty to forty-five minutes each. The local time package, which includes breathing control, muscular relaxation, total relaxation, self-talk, and visualization techniques, was one of the tools used in this study. The other was the athletes' mental preparation for competition form. It was discovered with the help of t-test that the experimental cluster outperformed the management cluster in terms of overall mental ready mean score, with significance at 0.05. Finally, the results provide more evidence to support the recommendation that

psychological skill coaching programmes are beneficial for taekwondo players' psychological preparation.

Cho et al., (2022) determined a study on the perception of game psychology skills in Taekwondo athletes and the development of a scale measuring these skills. They tend to gather preliminary information through an open-ended online survey that targets Taekwondo athletes from nine countries (South Korea, China, Malaysia, the United States, Spain, France, Brazil, the United Kingdom, and Taiwan) that World Health Organization participated in international competitions between 2019 and 2020. They tend to extract participants' perceptions of sport psychology skills from 75 survey responses, which are radio-controlled by professional conferences and a thorough literature review. They tend to confirm the construct validity of the Taekwondo psychological ability scale by 840 survey responses. For data analysis, they frequently use V coefficients, multi-group confirming correlational analysis, AN searching structural equation models, parallel analysis, and most probability. Goal setting, confidence, visualization, self-talk, fighting spirit, and concentration are the six fundamental sport psychology qualities that they typically possess. They discovered evidence bolstering the psychometric soundness of an 18-item sport psychological skill scale covering six factors and graded on a 3-point Likert scale for Taekwondo athletes.

Ahn et al., (2022) decided a study using massive data analysis to examine the critical characteristics linked to stress and mental health in Korean Taekwondo student-athletes. "Taekwondo + Student contestant + Stress + Mental health" is enclosed in keywords. Between the first of the Gregorian calendar month 2010 and the thirty-first day of December 2019, they looked for print analyses. On unstructured texts, text-mining analysis was done using TEXTOM 4.5, while social network analysis was done using UCINET vi. Analysis was done on 3149 massive databases totaling 1.346 MB. They carried out frequency analysis and term frequency-inverse document frequency analysis, two types of text-mining analyses. Clusters were identified and the node-linking degree inside the network was inferred for the social network analysis using the degree position and convergence of iterated correlation analysis. In terms of frequency of usage, the top ten terms were: "child," "relief," "mental health," "exercise," "student," "mental stress," "Taekwondo," "health," and "player." Iterated correlation analysis convergence identified six clusters: student, food, physical and mental health, athletic activity, adult Taekwondo center, and

beginning of dream. Finding therapies that reduce stress and enhance mental health among Korean Taekwondo student-athletes is crucial, as demonstrated by their findings.

Gaspard et al., (2021) study on taekwondo enhance children's self-regulation? If so, how? a randomized area experiment. The evidence on taekwondo interventions was obtained through three methods: (a) evaluating the effectiveness of a general introductory taekwondo program; (b) gauging the receptiveness of college students to Taekwondo training; and (c) exploring the impact of taekwondo on self-regulatory mechanisms, including executive functions and motivation. The study gathered data from a diverse group of students at a non-selective primary school in the U.K. (N = 240, ages 7 to 11 years) as part of a randomized controlled trial implementing an 11-week Taekwondo course. The study measured teacher-rated effortful control, impulsivity, prosocial behavior, and behavior problems, as well as computer-based assessments of executive functions and self-reported expectations and values related to self-regulation. The findings demonstrated that children who participated in the taekwondo program had higher expectations and values for using self-regulation, and that these expectations and values served as mediators for the positive effects of the intervention on self-regulation.

Hai-Jun et al., (2020) conducted research on cognitive enhancement (a smart healthcare strategy) to improve memory and executive function in older adults with mild cognitive impairment. The goal of the study was to investigate how long-term Taijiquan workouts would impact older adults with mild cognitive impairment (MCI) in terms of memory and executive function. Selections were made from two villages in Changsha City for 108 older volunteers with MCI, ages 65 to 85. 54 volunteers were assigned at random to each of the two groups: the experimental (EG) and control (CG) groups. They were given handbooks and instructed with MCI-related material. The EG participated in Taijiquan exercises four times a week for around 45 minutes each for four months, while the CG received health information and instructions to continue regular exercise. The Trail Making Test-A (TMT-A) and Auditory Vocabulary Learning Test (AVLT) were utilized to compare memory and executive function before and after the trial. The AVLT long-delay recall score, the TMT-A time-consuming task, and the subjects' general data were all analyzed using the SPSS18.0 program. The data demonstrates that long-term Taijiquan practice can enhance the

cognitive performance of older adults with MCI. It also indicates that the significant improvement of TMT and AVLT indicates improvements in memory and executive function.

Phung & Goldberg, (2019) looked into how mixed martial arts training might help kids with autism spectrum disorder develop their executive functions. The study sought to determine whether a mixed martial arts (MMA) intervention may help youngsters with autism spectrum disorder (ASD) with their executive skills. Random assignments were made to place young people with ASD in waiting list groups (WLC) or MMA intervention teams. Over a 13-week period, the intervention included 26 classification training programs; the WLC team refrained from engaging in martial arts activities between the pretest and posttest. The WLC team's EFs were much lower at follow-up than those of the MMA team, according to the results.

Johnstone and Marí-Beffa, (2018) study martial arts instruction's effects on common adults' attentional networks. A larger pool of more than five hundred members who agreed to participate had been filtered into the final group of participants. The chosen 48 participants are divided into two groups: the non-martial arts group (mean age = 19.63) and the martial arts group (mean age = 19.68), with 21 members each. A straightforward random sample method was applied to determine the subjects. One of the tools they utilized was the Attention Network Test (ANT). Independent samples t-tests and the aspect evaluation of variance ANOVA with martial and non-martial arts were used to determine the differences between the groups. The findings are recognized based on how education affects a certain attentional area via a particular neurological process.

Vanlandewijck et al., (2018) worked on a pilot study to examine the first steps towards an evidence-based categorization system for taekwondo poomsae athletes with intellectual disabilities. This exploratory study's main objective was to assess, in an adequate number of taekwondo poomsae athletes with II, the feasibility, validity, and reliability of an entirely new test. Thirteen poomsae athletes with II (8 males and 5 females) provided the data. Four measures of executive function and cognition were used to evaluate the themes, in addition to a special test designed for this study's purpose to evaluate taekwondo poomsae skills. The results showed that psychomotor speed and poomsae performance (TPPS) significantly correlated, for both the non-

dominant hand (r =.658, p.05) and dominant hand (r =.766, p.05). The results showed a substantial correlation between mean (r =.704, p =.011) and maximum general memory (r =.655, p =.021) and poomsae-specific memory (TPMS). The taekwondo poomsae test was found to be a potentially useful tool for Taekwondo Poomsae athletes with II in a very distant future evidence-based organization due to its excellent reliability, practicality, and content validity.

De Oliveira et al., (2017) carried out research Schoolchildren aged 8 to 11 who do karate may potentially benefit from improved executive function. The ability of a subject to engage in goal-oriented behaviour and carry out voluntary, autonomous, self-organized, and goal-directed acts is referred to as executive functions. While traditional physical training and sports can improve these abilities, there is little research on the effects of martial arts on youths' executive functions. Find out about the statistics that were previously collected from the sixty-six participants that were chosen for this. This group consisted of thirty non-karateka with an assumed age of 11.26 + 0.95 years and 36 male karateka. Response time analysis and the Stroop Test were applied. ANOVA-Tree Method variance evaluation with a 5% Dunnett's posttest setup was previously employed. As a result, teens between the ages of eight and eleven can benefit greatly from supplying karate as a strategy for improving their executive functioning. This resulted in empirical evidence showing that practicing karate has positive effects on cognitive processes (executive skills linked to quick reaction times, selective interests, and conflict resolution) in healthy eight to eleven-year-old adolescents.

Kim, (2015) examined how regular taekwondo practice influenced undergraduate students' Stroop test and brain-derived neurotrophic component. Analyzing the impacts of taekwondo training on neurotrophic components determined from the brain and the Stroop test in undergraduate students was the reason behind this conclusion already. Fourteen male members given the information. The determination of subjects used to be done utilizing a clear random sampling procedure. They were isolated into an work out gather (N = 7) and a control group (N = 7). The subjects gotten eight weeks of coaching in taekwondo works out. Five days a week, for 85 minutes a day, they prepared at an RPE of 11–15 in taekwondo. The training for taekwondo consists of two workouts: a dynamic (20-minute) and a cardio (20-minute). A two-way ANOVA has been utilized for the analyses. These findings are consistent with the theory that regular Taekwondo fitness instruction for eight

weeks might enhance cognitive abilities (Stroop test). In the exercise group (EG), the Stroop test outcomes (word, color) were significantly different ($p < .05$).

Arastoo et al., (2013) conducted the healthy for life taekwondo pilot study, which was a possibility and worthiness think about surveyed executive function and BMI preliminarily. The study aimed to evaluate the middle school physical education (PE) program that uses taekwondo. Two classes were given the information that was gathered. 60 understudies were separated into two groups at random: three PE sessions additionally two taekwondo sessions, or five PE sessions each week. In physical education classes, the California physical fitness tests and the presidential core fitness guidelines were used. Common techniques and variations were taught in a setting that prioritized self-control and recognition during taekwondo classes. They applied it to a fitness assessment gadget (FITNESSGRAM). The prior standard for evaluating power on behavioral consequence measures was a $d = 0.40$ expected impact dimension (Lakes & Hoyt, 2004). Working memory, cognitive flexibility, attention, and inhibitory control are among the executive functions measured by the Hearts & Flowers check. The outcome demonstrates that Taekwondo is a practice that enhances cognitive performance and may be successfully and socially implemented in a public school.

Huijts et al., (2013) examined cognitive enchantment in senior taekwondo beginners. Final report on SEKWONDO study finding out how a year of age-appropriate taekwondo training affected working and executive memory, information processing speed, reaction and motor time, and various other cognitive functions in 24 healthy over 40 volunteers was the aim of this study. Twelve male and twelve female participants, ranging in age from 41 to 71, provided the data. Following the training session, a survey was conducted among the participants regarding their subjective evaluations of different program components. Software from SPSS Inc., version 17.0, was used to analyze the data. This study discovered that taking a weekly, one-hour Taekwondo session for fifteen months enhanced individuals' over-40 cognitive abilities in several ways, most notably their inhibition and information-processing-related cognitive speed. Appropriate for a particular taekwondo training appears to benefit several cognitive domains in those over 40, which suggests that it may provide an inexpensive, secure, and enjoyable means of preventing age-related cognitive decline.

2.2 CONCLUSION OF THE REVIEWS

After reviewing many kinds of literature, several studies have explored many fields, for example, (Andrades et al., 2022) conducted a comprehensive review to determine how physical activity, exercise, and sports affected executive function in young individuals with attention deficit hyperactivity disorder. (Ahn et al., 2022) analyzed the main characteristics associated with stress and mental health in Korean taekwondo student athletes were analyzed using big data. (Cho et al., 2022) has determined sports psychological skill factors and scale development for taekwondo athletes. (Charoen et al., 2022) investigate how a psychological skill training program affects taekwondo athletes' mental preparedness. (Leung et al., 2021) have carried out the present meta-analysis, which thoroughly investigated how physical activity therapies affect executive function in individuals with neurodevelopmental disorders. (Bradford et al., 2021) have studied the executive function developmental pathways from adolescence to old age. (Alvarez-Bueno et al., 2021) examine executive function and fitness as potential mediating factors between academic success and physical exercise. (Doucette et al., 2021) research on a qualitative examination of executive function amid "the structure and chaos of the game" in externally paced sports. (Conesa & Duñabeitia, 2021) have determined the effects of computer-based training on children's executive functions and academic achievement. (Badami et al., 2021) studied how executive functioning in girls with attention-deficit/hyperactivity disorder is affected by perceptual-motor parent-child exercises: a randomized clinical trial. (Gaspard et al., 2021) have ascertained whether taekwondo enhances kids' self-control. If so, in what way? a field study that is randomized. (Campos-Jara et al., 2021) has investigated how sport-based therapies affect kids' executive function through a meta-analysis and comprehensive review. A study by (Byrd-Bredbenne et al., 2020) has determined associations among executive function, cognitive load, and weight-related behaviors in university undergraduates. (Drollette et al.,2020) have determined that baseline cognitive performance moderates the effects of physical activity on executive functions in children. According to (Cha et al., 2020) moderate exercise improves brain efficiency for executive functions in young adults. (Hai-Jun et al., 2020) created a smart healthcare approach for enhancing memory and executive function in elderly people with mild cognitive impairment. (Englert et al., 2020) have decided that combining physical and mental preparation to progress kindergarten children's executive functions: is a cluster randomized controlled trial.

(Park & Etnier, 2019) have studied "The Beneficial Effects of Acute Exercise on Executive Function in Adolescents." (Phung & Goldberg, 2019) have inquired about "Advancing Official Working in Children with Extreme Introverted Range Clutter Through Mixed Martial Arts Training." (Chang et al., 2019) carried on the impacts of intense work out term on the restraint angle of executive function in late middle-aged adults. (Ahmed et al., 2019) researched executive function and academic achievement: longitudinal relations from early childhood to adolescence. (Azaiez, et al., 2019) investigated the effect of taekwondo practice on cognitive function in adolescents with attention deficit hyperactivity disorder. (Boecker, 2018) works on "Executive control processes are associated with individual fitness outcomes following regular exercise training: blood lactate profile curves and neuroimaging findings,". In (Chen et al. 2018, researched the training and transfer effects of response inhibition training in children and adults. (Johnstone and Marí-Beffa, 2018) studied the effects of martial arts training on attentional networks in typical adults. (Vanlandewijck et al., 2018) took initial steps toward evidence-based classification for taekwondo poomsae athletes with intellectual disabilities. (Whitham, 2017) investigated the effects of executive function skills instruction on classroom behavior. According to (De Oliveira et al., 2017) students in grades 8 through 11 who practice karate may have better executive functioning. (Chia-Liang et al., 2017) worked on open- and closed-skill exercise interventions that produce different neurocognitive effects on executive functions in the elderly: a 6-month randomized controlled trial. (Brand et al.,2016) worked on the acute effects of moderate aerobic exercise on specific aspects of executive function in different age and fitness groups and conducted a meta-analysis.

Research was done by (Capranica et al., 2016) using a randomized controlled trial to examine how physical-cognitive dual-task training affected older individuals' executive function and gait performance. (Nagatomi, 2015) researched "Executive Function During and After Acute Moderate Aerobic Exercise in Adolescents." (Kim, 2015) worked on the effect of regular Taekwondo exercise on Brain-derived neurotrophic factor and Stroop test in undergraduate students. (Gothe, et al., 2014) researched the impact of an 8-week Hatha yoga session on executive function in older adults. (Gothe et al., 2013) investigated the acute effects of yoga on executive function. (Arastoo, et al., 2013) worked on the Healthy for Life Taekwondo Pilot Study: a preliminary evaluation of effects on executive function and BMI, feasibility, and acceptability. (Bisanz et al.,2013) considered executive attention in the improvement of math aptitudes in children in Grades 2–4.

(Mohammadi et al., 2013) explored the link between executive functioning ratings and academic achievement in a cross-cultural study (Bherer, 2013) investigated a decline in executive control during acute bouts of work out as a work of work out intensity and wellness level. Results from the SEKWONDO study. (Etnier & Chang, 2009) researched the effect of physical activity on executive function: a brief commentary on definitions, measurement issues, and the current state of the literature. (Dowsett & Livesey, 2000) attempted to support children's development of inhibitory control by examining the results of "executive skills" training. Although there are many youth programmes that aim to reduce behavioral problems and are encouraged by research, there is still a lack of research on the promotion of positive youth development. It's likely that individuals in those studies chose to train in martial arts because it fit with their ethical standards. The goal of the present study is to evaluate how a skill-based Taekwondo training program affects executive functioning in Bahrain adolescents participating in school the acute effect of a 12-week Taekwondo training program that is skill-based and lasts 60 minutes.

2.3 RESEARCH GAP

Although many youth programs aim to reduce behavioral problems and are encouraged by research, there is still a lack of research on the promotion of positive youth development. Individuals in those studies likely chose to train in martial arts because it fit with their ethical standards. The effectiveness of executive function is studied using a variety of tasks, physical activity, goal orientation, self-regulated learning, achievement evaluations, and self-efficacy; however, martial arts are the subject of very few studies. Though previous studies were conducted with other age categories, its implementation with executive function at the school level is still inadequate in Bahrain. Published studies related to the acquisition and implementation of executive function in Bahrain’s educational background are a few to date. To help teachers, coaches, and educators identify talents and support the behaviors needed to plan and achieve goals, there is not enough research. This executive functioning can help educational institutions in strategically adopting and implementing Taekwondo on campus, particularly in Bahrain. In the present study, we assessed to address this knowledge gap by determining the effect of a skill-based Taekwondo training program on executive functions among school-going adolescents in Bahrain. Specifically, the acute effect of a 12-week skill-based Taekwondo training protocol lasting 60 minutes.

CHAPTER III

RESEARCH METHODOLOGY

Chapter III

RESEARCH METHODOLOGY

This chapter focuses on the research methodology employed in this study. It begins with an overview of the research method used, followed by a detailed account of the study's design. The chapter then describes the tools used, including their reliability, validity, and item analysis. Additionally, it outlines the data collection procedure and explains the statistical techniques applied for data analysis.

3.1 DESIGN OF THE STUDY

To achieve the study's objectives, a randomized pre-test, mid-test, and post-test group design was employed. The study involved 80 female participants aged 12 to 16 years from the Indian School of Bahrain. These participants were divided into two groups: an experimental group (N = 40) and a control group (N = 40). A pre-test was administered, after which the experimental group engaged in a taekwondo training program three days a week for 12 weeks. A mid-test was conducted after 6 weeks to assess the progress of the intervention. The taekwondo training program, led by qualified instructor—a 3rd Dan Black Belt and a World Taekwondo Certified Level-2 Coach—consisted of one-hour sessions each day. The training focused on Taekwondo kicks using a kicking pad, steps, and blocking techniques which was designed by the investigator and recommended by various experts. While the experimental group participated in this training for the full 12 weeks, the control group did not receive any training. To evaluate the executive functions of adolescent students in Bahrain, research has developed a custom questionnaire designed with the objective outcome in mind

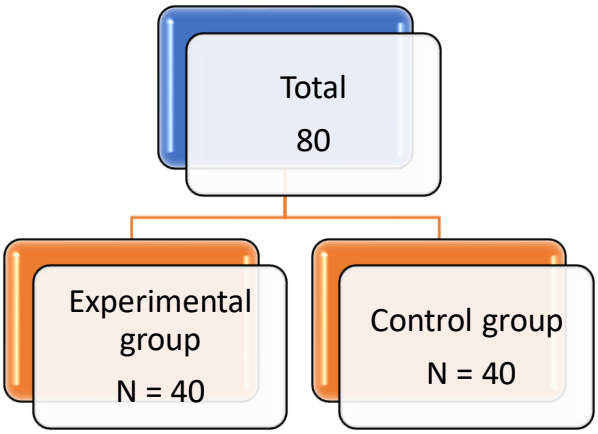
3.2 SAMPLING

For appropriate representation of the population, a purposive random sampling technique was used; the research was of a purely qualitative nature. The research involved 80 adolescent girls, aged 12-16, from the Indian School Bahrain in the Kingdom of Bahrain. Before selection, the purpose of the study was clearly communicated. Initially, 300 female adolescents at The Indian School of Bahrain were introduced to the study, with 99 expressing interests. The subjects were chosen through snowball techniques. Ultimately, 40 students were chosen as subjects, and 40 formed the control group. Further groups are divided into two groups, Experimental group (N =

40) and Control group (N = 40). The experimental group underwent a 12-week, three-day-per-week training program, including a pretest. The 1-hour daily sessions focused on skill-based Taekwondo training, encompassing kicks, steps, and blocking techniques.

Figure:3.1

Procedure of Sampling



3.3 SOURCES OF DATA

The study gathered data from adolescents at The Indian School of Bahrain, representing students of the Kingdom of Bahrain. Permission obtained from the Principal of The Indian School in the Kingdom of Bahrain before collecting the data to conduct training at the school premises. A training schedule developed with the help of taekwondo experts and then created a questionnaire on executive function, which tested for reliability and validity. After publishing the questionnaire "Executive Function Questionnaire for Adolescents" (2023), a pretest conducted with an Experimental group (N = 40) and a Control group (N = 40), and the experimental group underwent a training program for 3 days a week over 12 weeks. After 6 weeks of training, a mid-test was conducted to assess the effectiveness of the intervention. The taekwondo training program was skill-based, consisting of 1-hour sessions each day that included taekwondo kicks on a kicking pad, steps, and blocking. The treatment group participated in the taekwondo training program for 12 weeks, while the control group did not receive any training. The training was overseen by the investigator itself, a black belt 3rd Dan Taekwondo player and a World Taekwondo Certified Level-2 Coach.

3.4 TOOLS

To collect data following tools were used in this study:

'self-made questionnaire on "Executive Function Questionnaire for Adolescents" (2023)

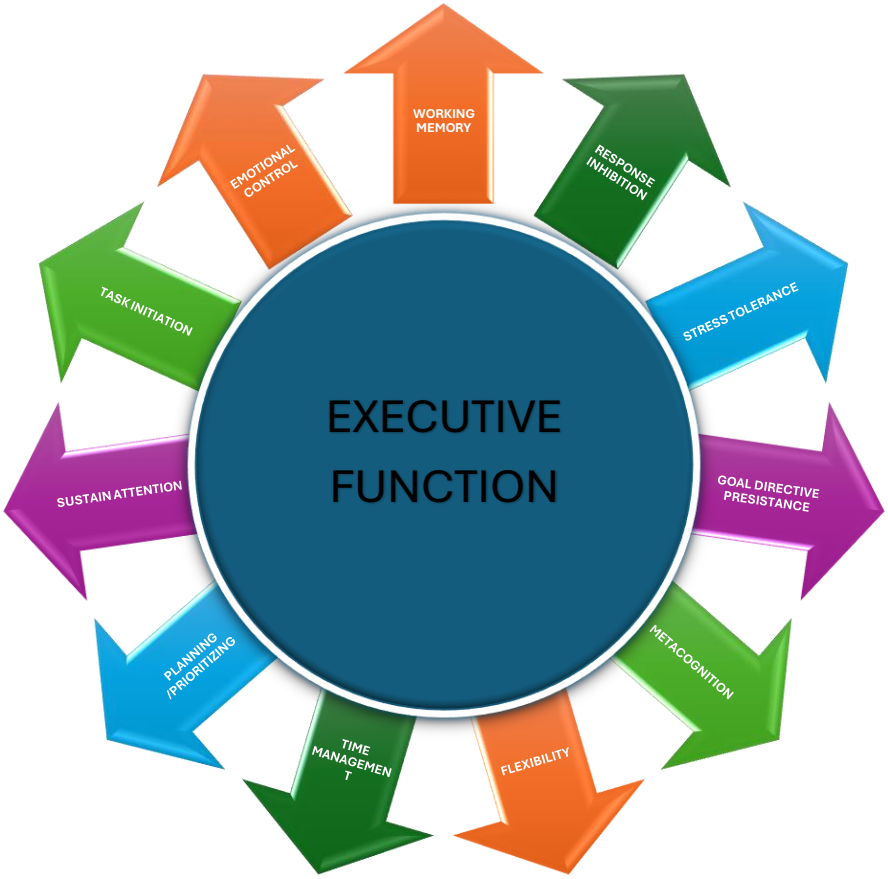
3.4.1 DESCRIPTION OF EXECUTIVE FUNCTION QUESTIONNAIRE FOR ADOLESCENTS

The questionnaire was on "Executive Function Questionnaire for Adolescents" (2023). It is a seven point Likert scale ranging from 1-7 (where, (Strongly Disagree-1, Disagree-2, Tend to Disagree -3, Neutral-4, Tend to agree-5, Agree-6 and Strongly Agree-7). It includes 36 items that asked the respondents how often they experience feelings that relate to Executive Function skill. These items are related to the twelve (12) dimensions of Executive Function i.e., Response inhibition=3, Working Memory=3, Emotional Control=3, Task Initiation=3, Sustain Attention=3, Planning /Prioritizing=3, Organization=3, Time Management=3, Flexibility=3, Metacognition=3, Goal Directive Persistence=3, Stress Tolerance=3.The response inhibition skill subscale assesses the ability of analyses circumstances before jumping to the conclusion E.g. I analyze before I jump to the conclusions. The working memory skill subscale assesses the ability that helps a person to recall information instantly when ever required E.g. I can recall information quickly. The emotional control skill subscale assesses the ability that allows a person to concentrate on a task dedicatedly without letting their personal emotions intervene his commitments. E.g., Emotions never effect on my performance. The task initiation skill subscale assesses the ability to motivate oneself to complete the task on time, accept and overcome new challenges, and to stay rigid with full determination to complete the task. E.g., I smartly handle any task. The sustain attention skill subscale assesses the ability that can be described in a person who cannot be distracted by surrounding. E.g., I put my full dedication in my work. The planning /prioritization skill subscale assesses the ability that is required to complete one task successfully on time. E.g., I keep time schedules for my work. The organization skill subscale assesses the is the ability that is very essential in a task completion this skill helps to execute the task in a smooth way keeping all the information and required materials easily reachable E.g., I plan all my work. The time management skill subscale assesses that which lead a person in such a way that procrastination will never have a place in their life. They always give priority to time E.g., I plan all my work. The flexibility skill subscale assesses the ability to accept changes, adapt the available solution and improvise

according to circumstances to overcome the situation. They always give priority to time E.g., I can deal with any uncertainties. The metacognition skill subscale assesses the ability to evaluate their won performance level and effectiveness of their work. it is like self-questioning and nurturing their abilities for better inputs. E.g. I can deal with any uncertainties. The goal directed persistence skill subscale assesses the ability the capacity of a person's will power to stay rigid on their path to achieve their goals without being distracted. E.g. I always make sure to achieve the benchmark of my goal. The stress tolerance skill subscale assesses the ability is the ability to perform under pressure. E.g. The frequency of stress is always controlled by my mind.

Figure:3.2

Executive Function skills



3.4.2. RELIABILITY OF THE SCALE

The 'self-made questionnaire on executive function skills for adolescents had been adapted by the investigator**.** The investigator had determinate the reliability by using test retest and split half method. The reliability coefficient of the scale is .96 and by using test retest method the value which was found to be was .89 which was significant at 0.01 level of significance. The values of the variables Cronbach's alpha coefficients are displayed in Table1.

Table 3.4.1: - Cronbach's alpha coefficient for the variables

Reliability statistics	
Cronbach's Alpha	No of Items
.959	36

3.4.3. VALIDITY OF THE SCALE

The draft scale was transferred to 20 experts from the affiliated field through electronic correspondence to gain expert opinions on content validity, and 10 of these experts replied. The experts were asked to estimate each statement that was planned to be included in the dimension tool and to give their opinions. In the evaluation that was asked to be performed regarding the connection of each item for measuring the trait aimed to be measured, Keep, Modify, and delete. The opinions of the experts who gave an opinion to an item on the expert opinion form were regarded as "essential".

Table 3.4.2. List of lay experts

S. No.	Name	Expert	Designation	
1	Dr Bhaskar Bora	Academician	MBBS, DFSRH, DRCOG, MRCGP, MBA, MSc Psychology	London, United Kingdom

			Motivational Speaker.	
2	Dr. Fatima Fayaz	Academician	Lecturer	Kingdom of Bahrain
3	Dr. Harish Mittu	Academician	Associate Professor	Lovely Professional University, Phagwara, India
4	Dr. Mahamood Salam	Academician	Assistant Professor	Salahaddin University, Iraq
5	Dr. V. Kaul	Academician	Assistant Professor	Lovely Professional University, Phagwara, India

Figure:3.3

Development of the Scale

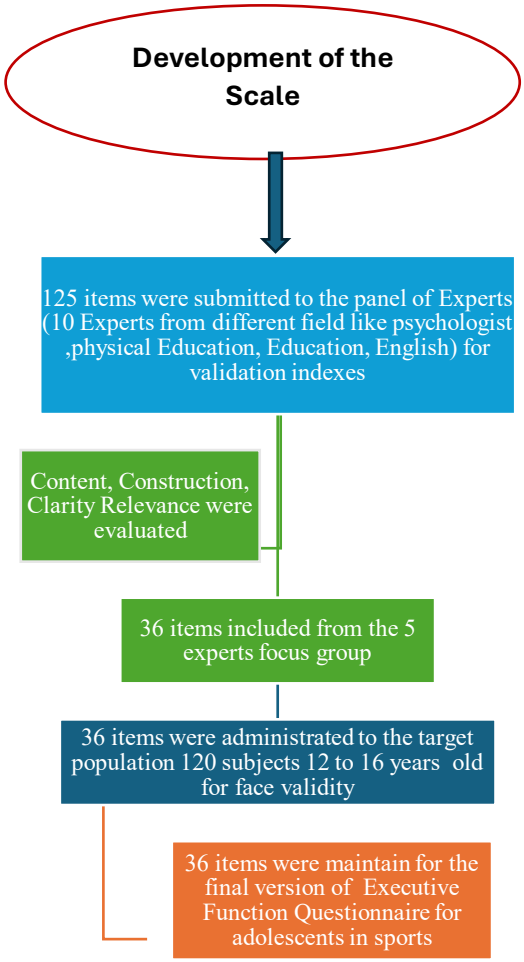


Table 3.4.3: - Minimum content validity index values that the items are required to have to be included in the scale (Lawshe, 1975)

Number of experts	Minimum value	Number of experts	Minimum value
5	0.99	13	0.54
6	0.99	14	0.51
7	0.99	15	0.49
8	0.78	20	0.42
9	0.75	25	0.37
10	0.62	30	0.33
11	0.59	35	0.31
12	0.56	40+	0.29

Given that the number of specialists involved in the present study was 5, CVR values above 0.99 were accepted according to Table 1.

The face validity had been used for this scale. 125 items were submitted to the panel of Experts (10 Experts from different field like psychologist, physical Education, Education, and English) for Content, Construction and Clarity Relevance were evaluated validation indexes. The experts gave their views regarding different items. After content validity of executive functions questionnaire Out of120 items only 36 items were included from the 5 experts focus group with the help of Lawshe's Content Validity Ratio (CVR).

$$CVR = \frac{ne - (N/2)}{(N/2)}$$

where CVR = content validity rate, ne = number of Experts indicating "essential", and N = total number of Experts. The CVR value is a number between -1 and 1, where a value that leans towards 1 indicates that experts generally agree on the individual item.

A total of 36 items were estimated by 5 experts for this study, and each item's content validity index was determined (Table2). Depending on the number of experts, the minimal value (0.99) in Table 2 was compared to the content validity rate (CVR) obtained for each item in Table 3, and the items with a value more than this minimal value were approved (A). As a result, the seeker scale form compared of 36 items since the CVR values of 125 of the 36 items were greater than the minimal value.

Table 3.4.4- Content validity index values of the items to be included in the scale depending on the number of experts

Sr. No		N	NE	*CVR=Ne-N/2)/N/2	CVR	Decision
1	I analyze before I jump to the conclusions	5	5	(5-2.5)/2.5	1	A
2	I do not jump to the conclusion without analyzing	5	3	(3-2.5)/2.5	0.2	R
3	Before use I analyze whole skill	5	1	(1-2.5)/2.5	-0.6	R
4	I think multiple time before I speak	5	1	(1-2.5)/2.5	-0.6	R
5	I never celebrate before I win	5	0	(0-2.5)/2.5	-1	R
6	My actions are always based on fact	5	1	(1-2.5)/2.5	-0.6	R
7	I play for a positive end	5	1	(1-2.5)/2.5	-0.6	R
8	I am aware of my goal	5	5	(5-2.5)/2.5	1	A
9	I do not jump directly to the judgement	5	1	(1-2.5)/2.5	-0.6	R
10	I always present myself with facts	5	5	(5-2.5)/2.5	1	A
11	My action is well attended	5	1	(1-2.5)/2.5	-0.6	R
12	I do not anticipate	5	1	(1-2.5)/2.5	-0.6	R
13	I do not take any decision without reason	5	0	(0-2.5)/2.5	-1	R
14	I analyze before I jump to the conclusions	5	1	(1-2.5)/2.5	-0.6	R

15	**I can recall information quickly**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
16	**I have strong memory**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
17	**I do not forget past anything what I know**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
18	**I can solve familiar problems quickly**	**5**	**1**	**(0-2.5)/2.5**	**-0.6**	**R**
19	**Usually I do not forget facts, dates, and details**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
20	**I used to remember the techniques**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**A**
21	**My brain can hold briefly new information**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**A**
22	**Doing everyday tasks and skills I never face any difficulty**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
23	**My brain always plays a vital role in focus and attention**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
24	**I never forget any tasks to do**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
25	**I have strong commitment**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
26	**I always keep my words**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
27	**I do what I say /speak**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
28	**I stick to my words**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
29	**Reminders not required for me**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
30	**I do not need reminders**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**

31	**I do not need anyone to remain my work /commitments**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
32	**When I do task, nothing matters**	**5**	**3**	**(3-2.5)/2.5**	**0.2**	**R**
33	**During task time I never switch or shifts my mood**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
34	**I determined to perform better**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
35	**I am focus on my work**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
36	**I can manage my feelings in task time / due time**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
37	**Nothing can distract me from my work**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
38	**Emotions never effect on my performance**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
39	**I am determined to perform better**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
40	**Completion of task is important for me**	**5**	**0**	**(2-2.5)/2.5**	**-1**	**R**
41	**I focused on the task more than the distraction**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
42	**I do not get distracted**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
43	**During my performance time emotions does not matter for me**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
44	**I have very emotional intelligence**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
45	**I do my work /task as soon as possible**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**

46	**Whatever may be task I try to finish it earlier**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
47	**I stay perseverant until the tasks are complete**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
48	**I find way out from any difficult situation**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
49	**Whatever the task maybe I find out easy way**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
50	**I smartly handle any task**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
51	**Once I start a task I continue till end.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
52	**I do not delay doing any task**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
53	**I do not keep any of my work for last minutes**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
54	**I do not procrastinate any task**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
55	**I do not give excuses**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
56	**I do finish my work on time**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
57	**I am always punctual**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
58	**I stick on my work schedule**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
59	**My sustainability towards my work is rigid**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
60	**I am focused on my work**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
61	**I never distracted from my work**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
62	**I am very sincere towards my work**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**

63	**I put my full dedication in my work**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
64	**If I take up a challenge, I make sure I finish it**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
65	**I am always proactive**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
66	**I am vigilance towards work**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
67	**I can attend and focus a task for a continuous stretch of time**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
68	**I always stick to my plan**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
69	**I cling to my plan**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
70	**I follow my plans**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
71	**I can handle multiple task**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
72	**My focus is always on bull's eyes of the work**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
73	**I focus on the momentous work**	**5**	**3**	**(3-2.5)/2.5**	**0.2**	**R**
74	**I do micro productivity**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
75	**I organized my task into small and measurable**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
76	**I keep time schedules for my work**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
77	**I am well organized**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
78	**I am a disciplined person**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
79	**I plan all my work**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
80	**I don't do any unorganized work**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**

81	**I never postpone my task till due date.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
82	**I have never been a disobedient student**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
83	**Whenever I am assigned a project, I finish it as soon as possible.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
84	**I complete my assignment on time.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
85	**I finish my assignment before completion date.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
86	**I am punctual.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
87	**I do my daily task on time.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
88	**I don't delay any task.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
89	**I utilize my time effectively.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
90	**I believe that it is the time to do.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
91	**Procrastination is not my kind of work.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
92	**My work is based on schedule.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
93	**I am punctual on my practical classes.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
94	**I never postpone my task till due date.**	**5**	**4**	**(4-2.5)/2.5**	**0.6**	**R**
95	**Under any circumstances I adjust with the situation.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**

96	**I can deal with unexpected situations.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
97	**I can adapt and always adapt the changes in my schedule as per requirement.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
98	**I am able and always willing to adapt changes in my schedule.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
99	**I can deal with any uncertainties.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
100	**I can transit from one activity to another and can deal with any new and different situations.**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
101	**Unexpected situations always thrill me.**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
102	**I can adapt the changes in my activities.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
103	**My transition abilities between activities and dealing capacity with different situation is good.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
104	**I evaluate my performance & strategies on regularly and try to improve.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
105	**I evaluate my thoughts to develop my behaviour.**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**

106	**I always consider myself as a thinker and learner.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
107	**I always observe my decisions.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
108	**I evaluate situations and calculate risk factors before I jump into it.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
109	**Before using any skill, I always evaluate its effectiveness.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
110	**I am selfish towards my goal**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
111	**I never allow immediate pleasures to be the hurdles of my goals**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
112	**My goals are always set in a high-level way**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
113	**I always make sure to achieve the benchmark of my goal**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
114	**I keep on working to achieve my goals not being affected by difficult situation**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
115	**My goals always give me sleepless night**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
116	**My goals are always for long terms even destructions like short terms pleasure always try to pass thought**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**

	my path, but I never fall for it.					
117	**My goals are always prioritized then other demands and competing desire**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
118	**I enjoy working in a pressurized circumstance.**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
119	**I can work in a compose manner whatever the situation is.**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
120	**My endurance to work in a confined situation is high.**	**5**	**1**	**(1-2.5)/2.5**	**-0.6**	**R**
121	**Wellness of my mind and behaviour is always stable even during a situation of bottleneck stress.**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
122	**I can manage to be steady emotionally and mentally in a crisis.**	**5**	**2**	**(2-2.5)/2.5**	**-0.2**	**R**
123	**I never keep a void in my mind for stress to overcome**	**5**	**0**	**(0-2.5)/2.5**	**-1**	**R**
124	**The frequency of stress is always control by my mind**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**
125	**I can work promisingly controlling my anxiety**	**5**	**5**	**(5-2.5)/2.5**	**1**	**A**

****CVR = content validity rate,**

N = total number of Experts.

Ne=number of SM E (number of Experts indicating "essential")(subject matter expert indication essential E=1 denoted with)

*****Decision A = Accepted (0.99 and above), R = Rejected (Lawshe 1975)**

The findings of the content validity rate analysis the experts gave their views regarding different items. There were 125 items on the original questionnaire at the start of the study. Following the evaluation of the face and content validity, 89 items with a lower CVR (0.99) were eliminated, examined and revised. Ultimately, the 36 item final draft of the questionnaire was authorized.

3.4.4. SCORING OF THE SCALE

There were 36 items in this scale. Each statement had 3 alternatives answers. The respondent had to select any one option of each statement as per his/her degree of agreement towards a particular statement. The statements were scored as 1,2,3,4,5,6,7 To find out the score of the respondent the weightages assigned to him/her on all items were added. The sum of the scores is burnout score.

3.4.5. ADMINISTRATION OF THE SCALE

The instructions printed in the test booklet were sufficient to take care of the questions that are asked. No time limit should be given for the scale. However, most of the groups should finish it in about 10 minutes. Before administering the scale, it was advisable to emphasize orally that responses should be checked as quickly as possible and sincere operation is required. The group should be told that the results of the scale help in self-knowledge and that responses would always remain strictly confidential. It should be emphasized that there was no right or wrong answer to the statements. The statements or items were framed to understand the differences in the individual's reactions to various situations and were not meant to rank them as good or bad, right, or wrong. It should be duly emphasized that all items must be answered. It was not desirable to tell the subjects the exact purpose for which the test is used. Though the scale was self-administering, it has been found to be useful to read out the instructions printed on the test booklet to the subjects.

3.5. INSTRUCTIONS FOR SCORING

Manual scoring is done conveniently; hence no scoring key is provided. Each item or statement should be scored. The scores below are the average score for each competency area and can range from 1 to 7. The higher the score, the stronger your skills in that area. A score of 3 or lower means that you have rated the items on this scale as "Strongly Disagree," " Disagree," and " Tend to Disagree," so any competency area with a score of 3 or less may be problematic for you. The sum of the scores was the occupational Executive Function skill Score.

3.6 COLLECTION OF DATA

Prior to the administration of pre-test on the criterion variable, a meeting of all selected subjects and concerned authority were called by the investigator to explain in detail about the purpose of the study along with the testing procedure and the training program. It was taken care that every sample performs it without any difficulty. The selected sample was divided into two groups, namely experimental group and controlled randomly with blind fold draw. The treatment groups had gone through one-hour skill-based Taekwondo training for twelve weeks whereas, controlled group was not given any of the training. Pre-tests were conducted on all the 80 (N=80) subjects and after the pre-test, a training program of twelve weeks was implemented to the treatment groups, whereas control group was not exposed to any sort of training. After completing 6 weeks of training, mid test data was collected from those treatment group subjects that had gone through the complete training program and control group subjects to see the direction of the intervention. After completion of the experiment A post-test was conducted on the criterion variables among the subjects. Post-test data was collected from those treatment group subjects that had gone through the complete training program for a period of 12 weeks and control group.

Qualified a black belt 3rd Dan Taekwondo player and a World Taekwondo Certified Level-2 Coach female were provide the training. The training programmes were imparted in the morning from 7:50 AM to 8:50 AM 3 days a week for Adolescents as per the permission of the concerned authorities.

Data was collected by administrating the above-mentioned questionnaires of **“Executive Function Questionnaire for Adolescents”** of Bahrain.

3.7. TRAINING PROGRAM

Training Intervention (Taekwondo Training) Method

A 12-week skill-based taekwondo training program was conducted three times a week. Each 60-minute session was structured with a Rating of Perceived Exertion (RPE) ranging from 3 to 10. The sessions included 5 minutes of warm-up, 10 minutes of basic physical fitness training, 35 minutes of taekwondo skills practice, and 10 minutes of cool-down exercises involving stretching. The basic physical fitness training included activities such as shuttle runs and jumping jacks. Taekwondo skill training was divided into several components: 10 minutes of basic movements (which included six basic movements and a trunk punch in the riding stance), 10 minutes of Poomsae based on Taegeuk chapters 1–2, and 15 minutes of kicking techniques that covered basic Taekwondo kicks, steps, and self-sparring. The taekwondo training program, led by a qualified instructor—a 3rd Dan Black Belt and a World Taekwondo Certified Level-2 Coach—consisted of one-hour sessions each day. The training focused on Taekwondo kicks using a kicking pad, steps, and blocking techniques. While the experimental group participated in this training for the full 12 weeks, the control group did not receive any training.

3.7.1 Taekwondo Training Schedule Experts

Sl. No.	Name	Expert	Experience	Place
1	Abdulla Isa ALDOY	President of Bahrain Taekwondo Federation	32 years of experience as coach	Kingdom of Bahrain
2	Mr. Dwipen Barman	Taekwondo NIS Coach	17 years of experience as coach	SAI, STC, Kokrajhar, Assam
3	Mr. Leopoldo Basio	Taekwondo Head Coach, Bahrain National Team	15 years of experience as coach	at Aldoy International Sports & Martial Arts Centre – Dismac,

				Kingdom of Bahrain
4	Mr. Tamas Sethi	Taekwondo NIS Coach	15 years of experience as coach	SAI, JLN New Delhi
5	Mr. Mari Karbak	Taekwondo NIS Coach	11 years of Experience as coach	Sports Authority of India, Training Centre, Arunachal Pradesh
6	Mr. Karuna Saikia	Taekwondo NIS Coach	10 years of Experience as coach	Sarusajai Stadium Guwahati, Assam.

3.7.2 The skill based Taekwondo training program is shown in the table below-

1st week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRNG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	**Physical Conditioning**. 1.Warming up 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch,Wrist Circles ,Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch ,Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles) 2.Specific warm up 10min. (Basic physical fitness training, Shuttle-run, jumping jack)	15 min.	Basic Endurance.	Repetition/ Circuit	High/**Med**/ Low
	Basic Training 1. Basic Step: - a) Basic Posture (*Gibon-junbi*) b) Close stance (*Moa-seogi*), c) Parallel stance (*Naranhi-seogi*) d) Sparring Posture (*Gyeorumsae/Gyeorugi-junbi*)- 30min. 2.Cool Down -15min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/ Low
TUESDAY 7:50 to 8:50 AM	**Ladder Drill** 1. Warming up 5min. 2. Ladder Exercises-20min. 3. Stretching -5 min.	30min.	Agility / Co-ordination.	Interval.	**High**/Med/ Low
	Basic Training 1. Basic Kick: - a) Inward Kick (*An-chagi*), b) Outward Kick (*Bakkat-chagi*), - 20 min. 2. Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/ Low
THURSDAY 7:50 to 8:50 AM	**Target Pad kicking Drill** 1. Warming up 10min. 2. Basic Kick - 20min.	30min.	Specific Skill Development.	Repetition.	High/**Med**/ Low
	Fun game / recreational game 20min. Cool Down- 10min.	30min.	Recreational.	Game.	High/Med/ **Low**

2nd week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	**Physical Conditioning**. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles ,Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch ,Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles 2. Specific warm up -10min. (Basic physical fitness training, Shuttle-run, , jumping jack)	15 min.	Basic Endurance.	Repetition/ Circuit	High/**Med**/ Low
	Basic Training 1. Basic Blocking (*Makki*): - a) Middle Block (Momtong-*makki*) b) Outward Block (*Momtong-Bakkat-makki*) c) Upward Block (*Olgul -makki*)- 35min. 2. Cool Down -10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/ Low
TUESDAY 7:50 to 8:50 AM	**Cone Drill** 1. Warming up -5min. 2. Cone Drills: -3Cone Drill- a) L drill (3x3), b) Complete circle (3x3) c) 5-10-5Pro agility drill (3x3)- 20min. 3. Stretching 5 min.	30min.	Agility/ Speed Endurance	Interval.	**High**/Med/ Low
	Basic Training. 1.Basic Kick: - a) Front (Snap) Kick (*Ap-chagi)* b) Axe Kick (*Naeryeo-chagi)*, - 20min. 2. Cool Down -10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/ Low
THURSDAY 7:50 to 8:50 AM	**Target Pad kicking Drill** 1. Warming up 10min. 2. Basic Blocking -20min.	30min.	Specific Skill Development	Repetition.	High/**Med**/ Low
	Fun game / recreational game 20min. Cool Down- 10min.	30min.	Recreational.	Game.	High/**Med**/ Low

3rd week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	**Physical Conditioning**. 1.Warming up -5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles ,Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch ,Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles) 2.Specific warm up -10min. (Basic physical fitness training Push-up, Sit-up, Shuttle-run,)	15 min.	Basic Endurance.	Repetition/ Circuit	High/**Med**/ Low
	Basic Training 1. Basic Stance: - a) Forward Stance (*Apkubi*) b) Walking Stance (*Ap-seogi*) c) Riding Stance (*Juchum-seogi*)-35min. 2. Cool Down 10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/ Low
TUESDAY 7:50 to 8:50 AM	**Ladder Drill** 1. Warming up 5min. 2. Ladder Ex-20min. 3. Stretching -5min.	30min.	Agility/ Explosive Strength	Repetition.	**High**/Med/ Low
	Basic Training 1. Basic Kick: - a) Turning/Roundhouse Kick (*Dollyeo-chagi*) b) Pushing Kick (*Mireo-chagi*)-20min. 2. Cool Down- 10min.	30 min.	Specific Skill Development	Repetition.	High/**Med**/ Low
THURSDAY 7:50 to 8:50 AM	**Basic Training**. 1. Warming up 10min. 2. Basic Blocking - 10min. 3. Basic Steps -10min.	30min.	Specific Skill Development	Repetition.	High/**Med**/ Low
	Active stretching /Meditation	30min.	Relaxation /Stress free	Recovery	High/Med/ **Low**

4th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	**Physical Conditioning**. 1. Warming up 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles ,Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch ,Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles) 2. Specific warm up-10min. (Basic physical fitness training, Bounds, Hopping, Shuttle-run,)	15 min.	Basic Endurance.	Repetition/ Circuit	High/**Med** /Low
	Basic Training 1. Basic kick: - a) Skipping Kick (*Balbucheo-chagi*) b) Side Kick (*Yop-chagi)*-35min. 2.Cool Down 10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med** /Low
TUESDAY 7:50 to 8:50 AM	**Cardiovascular / Own Body Wt. Strength training**, 1. Warming up 5min. 2. Circuit training (push-ups, sit-ups, squats, lunges) – 20min. 3. Stretching 5 min.	30min.	cardiovascular/strength.	Circuit.	**High**/Med /Low
	Basic Training 1. Basic Blocking a) Low Block (*Arae-makki*) b) Single Knifehand Block (*Hansonnal-makki*) – 20min. 2. Cool Down- 10min.	30 min.	Specific Skill Development	Repetition.	High/**Med** /Low
THURSDAY 7:50 to 8:50 AM	**Target Pad kicking Drill** 1. Warming up 10min. 2. Basic Kick- 20min.	30min.	Specific Skill Development.	Repetition.	High/**Med** /Low
	Fun game/ recreational game – Interamurals-20min. Cool Down- 10min.	30min.	Recreational.	Game/ Recovery	High/**Med** /Low

5th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles) 2. Specific warm up -10min. (Basic physical fitness training, Side shuffles, Backpedal, Karaoke, Lunges)	15 min.	Basic Endurance.	Repetition/Circuit	High/**Med**/Low
	Basic Training Basic Stance: -Back stance (dwitkubi) Left Stance (Wen seogi) Right stance (Oreun seogi)-35min Cool Down -10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/Low
TUESDAY 7:50 to 8:50 AM	1. Warming up 5min. 2. Cone Drills: - 4Cone Drill- X drill 3x3, D drill 3x3 Cross Pattern agility drill 3x3- 20min. 3.Stretching 5 min.	30min.	Agility/Coordination/Speed Endurance	Interval.	**High**/Med/Low
	Basic Training 1.Basic Kick: - Back (Thrust) Kick (Dwi-chagi) Double Kicks (Narae-chagi) - 20min. 2. Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/Low
THURSDAY 7:50 to 8:50 AM	Target Pad kicking Drill 1. Warming up 10min. 2. Basic Kick- 20min.	30min.	Specific Skill Development.	Repetition.	High/**Med**/Low
	stretching /Meditation	30min.	Relaxation /Stress free	Recovery	High/Med/**Low**

6th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles) Specific warm up -10min. (Basic physical fitness training, Shuttle-run, , jumping jack)	15 min.	Basic Endurance.	Repetition/ Circuit	High/**Med**/Low
	Basic Training Basic Punching: - Front Hand Middle Punch (momtong-bandae-jireugi) Reverse (Rear Hand) Middle Punch (momtong baro-jireugi)-35min. Cool Down -10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/Low
TUESDAY 7:50 to 8:50 AM	Ladder Drill Warming up 5min. Ladder Exercise-20min. Stretching 5 min.	30min.	Agility / Co-ordination.	Repetition.	**High**/Med/Low
	Basic Training Basic Punching: - Face Punching (Olgul jireugi) UnderneathPunching (Arae jireugi)-20min. Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/Low
THURSDAY 7:50 to 8:50 AM	Target Pad kicking Drill 1. Warming up 10min. 2. Basic Kick- 20min.	30min.	Specific Skill Development.	Repetition.	High/**Med**/Low
	Fun game/ recreational game -20min. Cool Down- 10min.	30min.	Recreational.	Recovery	High/**Med**/Low

7th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles) Specific warm up 15min. (Basic physical fitness training Push-up, Sit-up, Shuttle-run, jumping jack)	20 min.	Basic Endurance .	Repetition/ Circuit	High/***Med***/ Low
	Basic Training 1. Basic Blocking Inner Wrist Outer Block (Anpalmok-bakkat-makgi)High Outside Block(olgul-bakkat-makgi)-30min. 2.Cool Down- 10min.	40 min.	Accuracy and Perfection .	Repetition.	High/**Med**/ Low
TUESDAY 7:50 to 8:50 AM	Cardiovascular / Own Body Wt. Strength training, Warming up 5min. Circuit training (Squats, High knees Running in place, Planks)-10min. Stretching 5 min.	20min.	Agility / Co-ordination .	Interval/ Circuit	**High**/Med/ Low
	Basic Training 1. Basic Kick Counter-Kick (Bada-chagi) Rear Foot Counter-kick (Dwitbal-bada-chagi) Front Foot Counter-kick (Apbal-bada-chagi)-30min. 2. Cool Down- 10min.	40 min.	Specific Skill Development.	Repetition.	High/**Med**/ Low
THURSDAY 7:50 to 8:50 AM	Target Pad kicking Drill 1. Warming up 10min. 2. Basic Kick- 20min.	30min.	Specific Skill Development.	Repetition.	High/**Med**/ Low
	Fun game/ recreational game – Interamurals-20min. Cool Down- 10min.	30min.	Recreational.	Recovery/ Game	High/**Med**/ Low

8th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles)Specific warm up 10min (Basic physical fitness training Push-up, Sit-up, Shuttle-run, jumping jack)	15 min.	Basic Endurance.	Repetition/ Circuit	**High**/Med /Low
	Basic Training Basic Stance: - Side Stance (Yeop-seogi), Forward Stance (Apgubi),Walking Stance (Ap-seogi)- 35min. 2.Cool Down- 10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med** /Low
TUESDAY 7:50 to 8:50 AM	Cone Drill 1. Warming up -5min. 2. Cone Speed Drills: -5Cone Drill- Corner cut drill (3x3), 5 Cone drill (3x3) 5 Cone Star Pattern drill (3x3)- 20min. 3. Stretching -5 min.	30min.	Agility / Co-ordination.	Repetition.	**High**/Med /Low
	Target Pad kicking Drill 1. Basic Kick -20min. 2. Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med** /Low
THURSDAY 7:50 to 8:50 AM	Poomsae Warming up -10min.Taegeuk chapters 1- (1to9 step)- 20min.	30min.	General Endurance.	Continuous.	High/**Med** /Low
	Fun game/ recreational game – Interamurals-20min, Cool Down- 10min.	30min.	Specific Skill Development.	Recovery/ Game	High/**Med** /Low

9th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles). 2. Specific warm up -10min. (Basic physical fitness training, Shuttle-run, jumping jack)	15 min.	Basic Endurance.	Repetition/ Circuit	High/**Med**/Low
	Target Pad kicking Drill 1. Basic Kick -35min 2. Cool Down -10min.	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/Low
TUESDAY 7:50 to 8:50 AM	Ladder Drill Warming up 5min. Ladder Exercise-20min. Stretching 5 min.	30min.	Agility / Co-ordination/ Speed Endurance.	Interval.	**High**/Med/Low
	Poomsae Taegeuk chapters 1- (9to18 step)- 20min Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/Low
THURSDAY 7:50 to 8:50 AM	Target Pad kicking Drill Warming up 10min. Basic Kick -30min.	40min.	General Endurance.	Continuous.	High/**Med**/Low
	Active stretching /Meditation	20min.	Relaxation /Stress free	Recovery	High/Med/**Low**

10th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles)Specific warm up -10min. (Basic physical fitness training Push-up, Sit-up, Shuttle-run,)	15 min.	Basic Endurance.	Repetition/ Circuit	**High**/Med/ Low
	Basic Training Basic Stance -35min. Cool Down 10min	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/ Low
TUESDAY 7:50 to 8:50 AM	Cardiovascular / Own Body Wt. Strength training, Warming up 5min. Circuit training (Squats, High knees Running in place, Planks)-20min. Stretching 5 min.	30min.	Agility / Co-ordination.	Circuit	**High**/Med/ Low
	Poomsae Taegeuk chapters 1- (1to18 step)- 20min. Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/ Low
THURSDAY 7:50 to 8:50 AM	Poomsae Warming up 5min. Taegeuk chapters 2- (1to9 step)- 25min.	30min.	General Endurance.	Continuous.	High/**Med**/ Low
	Fun game/ recreational game – 20min. Cool Down- 10min.	30min.	Relaxation /Stress free	Recovery	High/Med/ **Low**

11th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOAD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles)2. Specific warm up - 10min. (Basic physical fitness training, Bounds, Hopping, Shuttle-run,)	15 min.	Basic Endurance.	Repetition	High/**Med**/Low
	Basic Training Basic Punching -20min. Basic Blocking-15min. Cool Down -10min	45 min.	Accuracy and Perfection.	Repetition.	High/**Med**/Low
TUESDAY 7:50 to 8:50 AM	Target Pad kicking Drill Warming up-10min. Basic Kick -20min.	30min.	Specific Skill Development.	Repetition.	High/**Med**/Low
	Poomsae Taegeuk chapters 2- (9to18 step)- 20min. Cool Down- 10min.	30 min.	Specific Skill Development.	Repetition.	High/**Med**/Low
THURSDAY 7:50 to 8:50 AM	Target Pad kicking Drill 1. Warming up 10min. 2. Basic Kick- 20min.	30min.	General Endurance.	Continuous.	**High**/Med/Low
	Poomsae 1. Taegeuk chapters (2) -20min. 2. Cool Down- 10min.	30min.	Specific Skill Development.	Repetition.	High/Med/**Low**

12th week

DAY /TIME	TRAINING	DURATION OF ACTIVITY	TRAINING		TRG. LOD
			MEANS	METHODS	
SUNDAY 7:50 to 8:50 AM	Physical Conditioning. 1. Warming up- 5min. (Head Turns, Head Tilt, Head Rotation, Neck Stretch, Neck Rolls, Chin Up & Down, Arm Circles, Arm Swings, Wrist Stretch, Wrist Circles, Open Arm Chest Stretch, Chest Stretch, Shoulder Stretch, Shoulder Rolls, Upper Back Stretch, Obliques Stretch, Hip Circles, Bent Over Twist, Biceps Stretch, Lunges, Standing Leg Circles, Ankle Circles)2. Specific warm up -10min. (Basic physical fitness training, Side shuffles, Backpedaling, Karaoke, Lunges)	15 min.	Basic Endurance.	Repetition/ Circuit	**High**/Med/Low
	Poomsae 1. Taegeuk chapters (1-2) -35min 2. Cool Down- 10min.	45 min.	Accuracy and Perfection.	Competition.	High/**Med**/Low
TUESDAY 7:50 to 8:50 AM	Cone Drill 1. Warming up -5min. 2. Cone Drills: - 6 Cone Back peddle drill (3x3), 5 Cone Snake drill (3x3) 8 Cone Agility drill (3x3)- 20min. 3.Stretching -5 min.	30min.	Agility / Co-ordination.	Repetition.	**High**/Med/Low
	Fun game/ recreational game – Interamurals-20min. Cool Down- 10min.	30 min.	Recreational.	Game	High/**Med**/Low
THURSDAY 7:50 to 8:50 AM	Target Pad kicking Drill 1. Warming up 10min. 2. Basic Kick- 30min.	40min.	Accuracy and Perfection.	Competition.	High/**Med**/Low
	stretching /Meditation-20min.	20min.	Relaxation /Stress free	Recovery	High/Med/**Low**

3.7.1 PHYSICAL CONDITIONING

- **Basic warm up exercise (Process of basic stretching exercise from head to toe)**

1. **Head Turns**: In the warm-up session it was instructed to the subjects to look left, look right; repeat this exercise 10 times.
2. **Head Tilt**: Individuals are told to ear to be left shoulder, ear to right shoulder; keep shoulders down and neck relaxed, repeat this exercise repeat 10 times.

3. **Head Rotation:** The participants in the warm-up are advised to face ahead. Slowly turn your head to the right as far as you can comfortably, then again turn your head to the right side also. Repeat this activity 5 times starting from the right side and 5 times starting from the left side.

4. **Neck Stretch**: The subjects were told to tilt their heads towards the shoulder while standing upright with their feet hip-width apart. Put your hand on your head and pull lightly until your neck stretches. Repeat on the opposite side after holding this position for ten to fifteen seconds.

5. **Neck Rolls:** The participants in the warm-up are advised to begin with their head straight and looking forward. Start rotating your head back while inclining it gently to the right. Continue to roll your head down and then leave. Lift your head to the starting position and then reverse the movement. Aim to do this exercise 5 times in each direction.

6. **Chin Up & Down**: Relax your shoulders, drop your chin to your chest, then lift your chin to the ceiling. Repeat this motion 10 times.

7. **Arm Circles**: The participants were instructed to stretch out wide arms to make small & big circles and move their arms forward and backward. Repeat this 10 times.

8. **Arm Swings**: With your feet shoulder-width apart, your knees slightly bent, and your arms out to the sides in a horizontal position, stand up straight. After crossing your arms in front of

you, swiftly retract them as far as possible. Once the set is finished, repeat this back-and-forth motion ten times.

9. **Wrist Stretch:** It was instructed the subjects to Stand and raise their right arm to shoulder height. Keep your elbow straight. Hold your right hand with your left and gently bend your wrist backward until you feel the stretch in your forearm. Hold, then bend the wrist downward. Change arms and repeat. Do this 10 times.

10. **Wrist Circles:** Ask subjects to create a fist and extend one arm forward with the palm pointing down for ten to fifteen seconds, rotate your wrist in small, deliberate circles. Switch directions and rotate the wrist for ten to fifteen seconds in the other direction. To properly engage the wrist muscles, maintain a smooth and steady motion. Repeat the exercise using the other arm. Spin ten more times.

11. **Open Arm Chest Stretch**: The subjects were told to stand with feet shoulder-width apart and arms extended straight out to the sides at shoulder height. Slowly open your arms wider, pulling the shoulder blades together to stretch the chest muscles. Keep your back straight and engage your core for stability. Hold the stretch for 15-30 seconds, breathing deeply and evenly. Slowly bring your arms back to the starting position and relax.

12. **Chest Stretch**: Stretch one arm across your torso and maintain its straight position. With the opposite arm, take hold of the elbow and slowly bring it towards your chest. After holding for ten to twenty seconds, switch to the opposite side. Place your left palm on the wall with your body's side facing the wall. Turn your body slowly to the right until your left shoulder and chest start to ache. After holding for ten to twenty seconds, switch to the opposite side.

13. **Shoulder Stretch**: Maintain a straight arm as you extend it across your torso. Take hold of the elbow with the opposing arm and slowly draw it in towards your chest. Switch to the other side after ten to twenty seconds of holding.

14. **Shoulder Rolls:** The subjects were to stand upright, with their feet shoulder-width apart and their arms by their sides. Make big, slow circles with your shoulders as you turn them forward. Do the motion five times in a forward and five reverse directions.

15. **Upper Back Stretch:** The participants were expected to Place their feet shoulder-width apart and stand upright. Put your hands together and point your thumbs downward. Reach forward, erecting your arms and rounding your shoulders. For ten to twenty seconds, hold the stretch. Ten times over repeat.

16. **Obliques Stretch:** The participants had to Legs shoulder-width apart, so they stood tall. While raising your left arm, place your right hand on your hip. After you feel your obliques stretching, shift your torso to the right. Repeat on the other side after holding the stretch for 20 to 30 seconds. On each side, repeat ten times.

17. **Hip Circles:** The participants had to stand. Both feet should be somewhat broader than shoulder-width apart when they stand upright. Hold your hands on your hips while bending your knees slightly. Make large, slow rotations with your hips. After finishing a set in one direction, move on to the next.

18. **Bent Over Twist:** Standing upright, with feet slightly wider than shoulder-width apart, and raising arms to the sides was the instruction given to the subjects. Touch your right foot with your left hand as you bend and twist your torso to the right. After finishing one side, go back to the beginning position. Repeat ten times.

19. **Biceps Stretch:** The participants received instructions. Put their hands together behind their backs and stand erect. Raise their hands so that the palms are facing down and straighten their arms. Five times, raise your arms and hold for ten to twenty seconds.

20. **Lunges:** They were to stand with their feet hip-width apart, step forward with their right foot, and then gradually bend both of their knees until their rear knee is barely over the ground. Keep for ten to twenty seconds. Five times over.

21. **Standing Leg Circles:** Participants were asked to maintain a straight posture while keeping their arms at their sides and their feet shoulder-width apart. Lift one leg to around knee height and begin spinning it clockwise while maintaining pointed toes. Turn anticlockwise in the other direction, then swap legs and repeat the sequence with five right legs and five left legs.

22. **Ankle Circles:** Participants were instructed to stand straight, place their feet hip-width apart, and keep their arms at their sides. As you move your weight to your right leg, plant your left toe on the ground. Make tiny circles with your ankles as you begin to rotate your left foot. Use your right foot to complete the exercise again.

3.7.2 SPECIFIC WARM UP EXERCISE

Basic physical fitness training,

1. **Shuttle-run:** The 30-foot (9.15m) Agility Shuttle Run is a test of agility, in which the participants were instructed to run back and forth between two parallel lines as fast as possible. 3 sets of 10-15 reps.

2. **Jumping Jack**: Stand upright with your legs together, arms at your sides, bend your knees slightly, and jump into the air. As you jump, spread your legs to be about shoulder-width apart. Stretch your arms out and over your head. Jump back to starting position. 3 sets of 10-15 reps.

3. **Push-up:** keeping a prone position, with the hand's palms down under the shoulders, the balls of the feet on the ground, and the back straight, pushes the body up and lets it down by an alternate straightening and bending of the arms. 3 sets of 10-15 reps.
4. **Sit-up:** lying on your back with your knees bent, Put your fingertips on the back of your ears. Lift your torso up as close to your thighs as possible. 3 sets of 10-15 reps.

5. **Bounds: Stand** on your right leg. Jump laterally to your left. Land on your left foots, soon as you land on your left foot jump back laterally to your right foot. This completes one repetition .3 sets of 10-15 reps.

6. **Jumping Jack:** Stand upright with your legs together, arms at your sides. Bend your knees slightly and jump into the air. As you jump, spread your legs to be about shoulder-width apart. Stretch your arms out and over your head. Jump back to starting position. 3 sets of 10-15 reps.

7. **Hopping:** a springing action that involves taking off from one foot and landing on that same foot. jump upward on one foot or make a series of jumps on one foot. 3 sets of 10-15 reps.

8. **Squats:** Stand with feet a little wider than hip width, toes facing front, drive your hips back bending at the knees and ankles and pressing your knees slightly open, sit into a squat position while keeping your heels and toes on the ground, chest up and shoulders back. Strive to eventually reach parallel, meaning knees are bent to a 90-degree angle. Press onto your heels and straighten your legs to return to a standing upright position. 3 sets of 10-15 reps.

9. **Backpedal:** Keep your hips low at about 1/4 of a squat position, Take small steps backward continuously. Continue for the desired time or distance. 3 sets of 30 meters distance.

10. **Karaoke:** Cross your right foot over and in front of your left foot with your arms out to your sides, Step open and out to the side with your left foot, Cross your right foot behind your left foot. Continue moving laterally then repeat the movement in the opposite direction.

11. **High knees Running in place:** Keep your arms at your sides, feet hip-width apart. Slowly lift one knee at a time, begin swinging your arms while maintaining a slow march. Pick up your pace, lifting your knees quickly while maintaining good form. 3 sets of 10-15 reps.

12. **Plank:** Begin in the position, face down with your forearms and toes on the floor. Your elbows are directly under your shoulders and your forearms are facing forward. Your head is relaxed, and you should be looking at the floor, drawing your navel toward your spine. Keep your torso straight and rigid and your body in a straight line from your ears to your toes with no sagging or bending. This is the neutral spine position. Ensure your shoulders are down, not creeping up toward your ears. Your heels should be over the balls of your feet. 3 sets of 10 sec.

13. **Side shuffles:** Stand with your feet a little wider than hip-width apart, bend your hips and knees back and point your toes forward. Take a few quick steps to the left and then touch your left foot with your left hand, Repeat on the right side. 3 sets of 10-15 reps.

3.7.3 CONE DRILLS

1. **L drill:** Participants were instructed to start by getting down in a three-point stance next to Cone #1. On the command 'Go', he runs to Cone #2, bends down and touches a line with his right hand. Then he turns and runs back to Cone #1, bends down and touches that line with his right hand. Then he runs back to Cone #2 and around the outside of it, weaves inside Cone #3, then around the outside of Cones #3 and #2 before finishing at Cone #1. The player must run forward while altering his running direction, as opposed to strictly stopping and starting in opposite directions. Each time they perform the #3-cone drill for a different side. **3 sets of 3 reps.**

2. **Complete circle:** Cones are set up 5 yards, Participants were instructed to starts by getting down in a three-point stance next to Cone #1, sprint forward to Cone #2, sprint back to Cone #1, and around Cones #3 then sprint past Cone #2. **3 sets of 3 reps.**

3. **5-10-5Pro agility drill:** Participants were instructed to start at the goal line facing up field, Sprint to 5-yard line and back, Sprint to 10-yard line and back, Sprint to 5-yard line and back. Touch the 5- and 10-yard lines with your left foot and the goal line with their right foot. **3 sets of 3 reps.**

4. **X drill:** Four cones are set up 5 yards apart as ‘X’. Participants were instructed to start at cone #1, sprint to cone #3, shuffle slide to cone #2, drop-step and sprint to cone #4, and shuffle slide back to cone #1. **3 sets of 3 reps.**

5. **D drill:** Four cones are set up 5 yards apart as ‘D’. The subjects were told to start at cone #1, sprint to cone #2, carioca to cone #3, backpedal to cone #4, and shuffle slide back to cone #1.

Emphasis is placed on maintaining a low body position and a quick transition between stages**. 3 sets of 3 reps.**

6. **Cross Pattern agility drill:** Four cones are set up 5 yards apart as, participants were instructed to start at cone #1, sprint to cone #3, backpedal to cone #4, sprint to cone #2, and backpedal back to cone #1. Emphasis is placed on maintaining a low body position and a quick transition between stages. **3 sets of 3 reps.**

7. **6 Cone Back pedal drill:** Four cones are set up 5 yards apart. The instruction given to the subjects start at cone #1, Start at the bottom right cone. Follow the path of arrows around the cones, making sharp cuts at each corner. Emphasis is placed on maintaining a low body position and a quick transition between stages**. 3 sets of 3 reps.**

8. **5 Cone Snake drill:** The subjects were told to a row of barriers is set up end to end for a total distance of approximately 10 yards. Start with both feet on the right side of the barriers of cone #1Start at the bottom right cone. Sprint to and around cone #2, Sprint to and around cone #5, print to and around cone #3, Sprint to and around cone #4, Sprint to and around cone #5, Sprint to cone #1**.3 sets of 3 reps.**

3.7.4. LADDER EXERCISES

A standard agility ladder is 15 feet long and 20 inches wide.

1. **Single Foot in Each Square Ladder Exercise:** The instruction given to the subjects lace one foot in each square, alternating. Be sure to pick up your feet and move the full length of the ladder. The higher you can pick your knees up while running through the ladder**, 3 sets of 3 reps.**

2. **Two Feet in Each Square Ladder Exercise:** The subjects were told to place two feet in each square before moving onto the next. You need to stay on the balls of your feet and move your feet quickly for this agility ladder drill. Similar to the single foot in each square, the extra challenge to this move is to also pick up your knees. Think high knees down the ladder. **3 sets of 3 reps.**

3. **Lateral Stepping Ladder Exercise**: The subjects were told to stand lateral to the agility ladder with your right foot ready to lead. Start going down the agility ladder by placing two feet in each square. Stay on the balls of the feet and as you move laterally; you want to keep your toes and hips facing forward the entire time until you reach the end of the ladder. Do the same thing on the other side, leading with the left foot. Facing.**3 sets of 3 reps.**
4. **Jumping Jack Feet Ladder Exercise:** The instruction given to the subjects Jump two feet together inside a square, then jump out while moving down the ladder. Just as you would do regular jumping jacks, continue to use your arms in an overhead position to increase the heart rate. Stay on the balls of the feet as you jack them out and in down the entire ladder. 3 sets of 3 reps.

3.8 TAEKWONDO SKILL TRAINING BASIC TRAINING

3.8.1 BASIC STEP

1. **Basic Posture (Gibon-junbi)** On this basic posture espoused before starting most poomsae. The subjects were asking to a ready posture starting in a state of moa- seogi for the bases by moving the left bottom one step to the side. Draw the open hands over to the position of the solar supersystem and, as one breathes out, sluggishly transfer both fists to the position of danjeon.

2. **Closed Stance (Moa-seogi)** A stance with the inside edges of both bases fully closed together and both knees uncurled. The subjects were told to before or after poomsae, this posture is espoused to concentrate the pantomime's mind and relieve his or her physical pressure. When only the balls of the bases are closed together, it's called apchuk- moa- seogi, and only the bottoms of the wheels are closed together, dwichuk- moa- seogi.

3. **Parallel stance (Naranhi-seogi)** A stance where both bases are resemblant to each other. The subjects were told to stance with both knees uncurled, the center of graveness kept in the middle and the inside edges of both bases facing together. When the end of toes faces inward, it's called anjjong- seogi (Inward Stance) and when they face outward

4. **Sparring Posture (Gyeorumsae/Gyeorugi-junbi)** The subjects were instructed to make a posture freely taken by two opponents before sparring starts standing sideways, one clenches both fists with the frontal arm bent about 90 ° and a hand lifted to the position of the shoulder. The other arm is placed in front of the solar supersystem, one fist range down. This posture is supposed to make it obnoxious and protective.

5. **Forward Stance (Apgubi)** The subjects were told on this stance with the center of graveness on the frontal leg. The instruction given to the subjects to shift the center of graveness forward and load much of the weight on the supporting frontal leg.

6. **Riding Stance (Juchum-seogi)** A stance where both feet are resemblant, both legs slightly bent with the range of two- one foot between them. When looking down at the knees of both legs which are fraudulent, they should be on the same line with the ends of feet. The trunk and both knees and shins should be upright.

7. **Walking Stance (Ap-seogi)** Participants were asked to maintain a stance of taking one walking step forward. The range between the two feet is about the length of one walking step and the center of gravity remains in the middle with the trunk in an upright position.

8. **Side Stance (Yeop-seogi)** Participants were asked to maintain stance of rotating the right or left bottom vertically to the inside edge of the other bottom from narani- seogi resemblant stance. With both knees uncurled, the range between the two bases is about the length of one bottom. The end of the advancing bottom should be at a right angle to the other bottom.

3.8.2 BASIC KICK: -

1. **Inward Kick (An-chagi)** In this technique, the subjects were asked to begin in a fighting stance with feet shoulder-width apart, weight evenly distributed Lift their kicking leg and bend the knee, chambering the foot toward their buttocks with toes pointing slightly inward. Pivot on their supporting foot, turning the heel inward for stability and balance. Extend the kicking leg inward toward the target, striking with the inside edge of the foot.

Quickly retract the leg back to the chambered position after making contact. Return to their fighting stance, ensuring balance and readiness for the next movement.

2. **Front (Snap) Kick (Ap-chagi)** The subjects were performed by start in a fighting stance with feet shoulder-width apart and weight balanced evenly. Lift the knee of the kicking leg up towards chest, keeping the foot relaxed and toes pointed upward. Snap the foot forward quickly and forcefully, aiming to strike with the ball of the foot. Contact the target using the ball of foot, ensuring a sharp and precise motion. Retract the kicking leg immediately back to the chambered position to prepare for the next move. Return to fighting stance smoothly, maintaining balance and readiness for further action

3. **Axe Kick (Naeryeo-chagi)** Participants were asked to begin in a fighting stance with their weight balanced and feet shoulder-width apart. Lift their kicking leg straight up, bending the knee slightly to prepare for the downward motion. Extend the leg upward and then swing it downward in a controlled, chopping motion. Strike with the heel or the blade of the foot, aiming to contact the target in a powerful, axe-like motion. Recoil the leg back up to the chambered position to minimize recovery time. Return to again fighting stance, ensuring stability and readiness for the next technique.

4. **Pushing Kick (Mireo-chagi)** The instruction is given to the subjects to start in a fighting stance with feet shoulder-width apart and weight evenly distributed. Chamber the kicking leg by lifting the knee up slightly, keeping the foot relaxed and the toes pointing forward. Extend the leg forward with a pushing motion, using the sole of the foot to contact the target. Push the target away with a strong, controlled thrust while maintaining balance. Retract the leg back to the chambered position to prepare for the next move. Return to again fighting stance, ensuring stability and readiness for further actions.

5. **Turning/Roundhouse Kick (Dollyeo-chagi)** This kick is performed by the subjects from beginning in a fighting stance with your feet shoulder-width apart and weight evenly distributed. Pivot on the supporting foot while turning your body to face the target, rotating

your hips for maximum power. Chamber the kicking leg by lifting the knee towards their chest and positioning the foot sideways. Extend the leg in a circular motion, striking the target with the top of the foot or the ball of the foot. Retract the leg quickly back to the chambered position after contact to prepare for the next move. Return to your fighting stance smoothly, maintaining balance and readiness for further techniques.

6. **Side (Thrust) Kick (Yeop-chagi)** The individuals are instructed to start in a fighting stance with feet shoulder-width apart and weight evenly distributed. Lift your knee of the kicking leg to chamber it, ensuring the foot is positioned sideways. Extend the leg straight out to the side in a thrusting motion, aiming to strike with the heel or the side of the foot. Push the foot forward with controlled force, targeting the side of the opponent or the target. Recoil the leg back to the chambered position swiftly after making contact. Return to your fighting stance, ensuring balance and readiness for the next move.

7. **Back (Thrust) Kick (Dwi-chag)** Participants were asked to perform in a fighting stance with their weight balanced and feet shoulder-width apart. Lift the kicking leg by bending the knee and chambering it behind you, keeping the foot relaxed and toes pointed downward. Pivot on the supporting foot to turn your body slightly away from the target for better alignment. Extend the leg straight back with a thrusting motion, striking the target with the heel or the sole of the foot. Return to their fighting stance, maintaining stability and readiness for further techniques.

8. **Skipping Kick (Balbucheo-chagi)** The instruction given to the subjects Start in a fighting stance with feet shoulder-width apart and weight evenly distributed. Prepare by hopping forward with your supporting foot to gain momentum, bringing the kicking leg up. Chamber the kicking leg by lifting the knee towards your chest while keeping the foot relaxed. Extend the leg in a swift, snapping motion toward the target, striking with the ball of the foot or the top of the foot. Quickly retract the leg back to the chambered position after making contact. Land back in your fighting stance, ensuring balance and readiness for the next move.

3.8.3 BASIC PUNCHING

1. **Face Punching (Olgul jireugi)** It was told to the participants to begin in a fighting posture with their hands raised in the guard position, their knees slightly bent, and their feet shoulder-width apart. Maintaining your other hand up to shield your face, chamber one fist near your hip. Strike the target directly with your striking fist, rotating your body and hips to produce power. With the wrist kept straight, completely extend the arm and contact the target utilizing the knuckles. To defend oneself and get ready for the following move, quickly pull the hitting fist back into the guard posture. While keeping your balance and poised to use more techniques, return to your fighting stance.

2. **Front Hand Middle Punch (momtong-bandae-jireugi)** The participants were instructed to start in a fighting stance with hands up and feet shoulder-width apart. Chamber the front hand by pulling it back to your hip, while keeping the other hand up in a defensive stance. Extend the front fist straight toward the target, rotating the arm and wrist to ensure a straight punch. Contact the target using the knuckles, while keeping the elbow slightly bent for power and accuracy. Retract the hand quickly back to the defensive stance and maintain your stance, ready for the next technique.

3. **Underneath Punching (Arae jireugi)** Participants were asked to begin in a fighting stance with feet shoulder-width apart and hands up, ready in a protective position. Prepare one fist by pulling it back to your side while keeping the other hand up for defense. Lower your body slightly and thrust the punching fist upward in an underneath motion towards the target. Extend the arm fully, contacting the target using the knuckles, while ensuring a firm and controlled punch. Quickly retract the fist back to the side and maintain your stance, prepared for the next move.

4. **Reverse (Rear Hand) Middle Punch (momtong baro-jireugi)** The instruction is given to the subjects to start in a fighting stance with feet shoulder-width apart and both hands up in a defensive position. Prepare the rear hand by pulling it back to your hip while keeping the front hand up for protection. Rotate your body and hips to generate power as you thrust

the rear fist forward toward the target. Extend the rear arm fully, contacting the target using the knuckles, ensuring a strong and accurate punch. Quickly retract the fist back to the hip and return to your fighting stance, ready for the next move.

3.8.4 BASIC BLOCKING

1. **Inward Block (An-makgi)** The adolescents were asked to begin in a fighting stance with their feet shoulder-width apart and their hands up in a defensive position. Prepare the blocking arm by pulling it back to the opposite shoulder, with the fist closed and the palm facing inward. Rotate the blocking arm inward across your body, using the forearm to intercept an incoming attack. The block should move from the outside to the inside. Ensure the arm is bent slightly at the elbow and that the blocking motion is firm and controlled to effectively deflect the attack. Return the arm to the starting position after the block is executed, maintaining balance and readiness.

2. **Upward Block (Ollyeo-makgi)** Subjects were instructed to begin in a fighting stance with feet shoulder-width apart and hands up in a defensive position. Prepare the blocking arm by pulling it down and across your body to your opposite hip, with the fist closed and the palm facing downward. Rotate the arm upward and outward in a sweeping motion, using the forearm to block an incoming attack from below. Ensure the arm is slightly bent at the elbow and the block is executed with firm and controlled movement to effectively deflect the attack. Return the arm to the starting position after completing the block, maintaining balance.

3. **Outward Block (Bakkat-makgi)** The instruction is given to the subjects to start in a fighting stance with their feet shoulder-width apart and hands up for defense. Prepare your blocking arm by pulling it back to your side, with the fist closed and palm facing inward. Rotate the arm outward across your body in a sweeping motion, extending it fully to block the incoming attack. Keep the arm slightly bent at the elbow and execute the block with a firm, controlled motion. Ensure the arm is slightly bent at the elbow for impact absorption and effective blocking. Return the arm to the starting position while maintaining balance.

4. **Low Block (Arae-makki)** The participants received instructions to start in a fighting stance with feet shoulder-width apart and hands up in a defensive position. Prepare the blocking arm by pulling it back to your side, with the fist closed and palm facing upward. Sweep the arm downward in a controlled motion, keeping it straight and aligned to block low attacks.
5. **Single Knife hand Block (Hansonnal-makki)** The subjects were asked to start in a ready stance, with their hands at their sides. Prepare the block by retracting the extended arm back to the shoulder. Execute the block by swinging the arm outwards and slightly upwards with the knife edge of the hand. Ensure the wrist is aligned and your body is engaged for stability and power. Return to a guarding position or transition to the next technique smoothly.

3.8.5 POOMSAE BASED ON TAEGEUK CHAPTERS 1–2

1. The first training pattern (Poomsae) in Taekwondo is Taegeuk Iljang. For grades in the 8th Kup Yellow Belt and 7th Kup Green Stripe, Taegeuk Iljang is necessary. All of Taekwondo's fundamental techniques, including the middle section punch, front kick, and elemental blocks, are used throughout the pattern's 18 movements and 20 techniques.

Taegeuk Il-Jang (태극 1장) is the first form in the Taegeuk series of Taekwondo patterns. It symbolizes the "Heaven" or "Sky" and serves as an introduction to basic techniques, stances, and movements. Below is a step-by-step breakdown of Taegeuk Il-Jang:

1. Ready Stance (Joong-Gun)

- Description: Stand with your feet together and arms at your sides.
- Instruction: This is your starting position. Stand tall, calm, and focused, ready to begin the form.

2. Left Low Block (Arae-makki)

- Description: Step forward with your right foot into a left front stance. Perform a left low block with the left hand.

- Instruction: Extend your left arm downwards to block a low attack. Keep your stance strong and your arm straight. This move protects against low strikes and prepares you for the next technique.

3. Right Low Block (Arae-makki)

- Description: Step forward with the left foot into a right front stance. Execute a right low block with the right hand.
- Instruction: Similar to the previous move but with the right side. Ensure your block is strong and precise. This ensures that you can defend yourself from attacks coming from different directions.

4. Left Inside Block (An-makki)

- Description: From the right front stance, perform a left inside block with the left hand.
- Instruction: Bring your left hand inward to block an attack coming from the outside. This move helps intercept and redirect attacks aimed at your torso.

5. Right Inside Block (An-makki)

- Description: Continue in the left front stance and execute a right inside block with the right hand.
- Instruction: Execute the inside block with your right hand. Ensure you are maintaining balance and that the block is clean and effective.

6. Left High Block (Olgul-makki)

- Description: Step forward with the right foot into a left front stance and perform a left high block with the left hand.
- Instruction: Raise your left arm to block a high attack. The high block should be executed with precision and strength to protect against attacks aimed at your head.

7. Right High Block (Olgul-makki)

- Description: In the left front stance, execute a right high block with the right hand.
- Instruction: Perform the high block with your right hand. Maintain proper alignment and ensure the block is high enough to protect your head.

8. Left Downward Strike (Naeryo-chigi)

- Description: While in the right front stance, perform a left downward strike with the left hand.
- Instruction: Strike downward with the left hand. This move simulates a powerful downward attack, reinforcing the use of your whole body to generate force.

9. Right Downward Strike (Naeryo-chigi)

- Description: Perform a right downward strike with the right hand while in the left front stance.
- Instruction: Execute the downward strike with your right hand, ensuring it is strong and controlled. This move complements the previous downward strike and helps in solidifying your striking technique.

10. Left Inside Block (An-makki)

- Description: Step forward with the right foot into a left front stance and perform a left inside block with the left hand.
- Instruction: Repeat the inside block with your left hand. Focus on a precise and controlled block as you transition between techniques.

11. Right Inside Block (An-makki)

- Description: While in the left front stance, perform a right inside block with the right hand.
- Instruction: Execute the inside block with your right hand, ensuring your body is stable and your movement is accurate.

12. Left Low Block (Arae-makki)

- Description: Step forward with the right foot into a left front stance and execute a left low block with the left hand.
- Instruction: Perform the low block again with your left hand. Ensure the block is strong and effective, maintaining proper stance and technique.

13. Right Low Block (Arae-makki)

- Description: In the left front stance, perform a right low block with the right hand.
- Instruction: Repeat the low block with your right hand. This reinforces your ability to block low attacks from different angles.

14. Left Punch (Jirugi)

- Description: Execute a left punch with the left hand while in the right front stance.
- Instruction: Punch forward with the left hand. Focus on speed and accuracy while keeping your stance stable and strong.

15. Right Punch (Jirugi)

- Description: Perform a right punch with the right hand while in the left front stance.
- Instruction: Deliver the punch with your right hand. Ensure your punch is powerful and that you maintain a proper stance.

16. Left Low Block (Arae-makki)

- Description: Step forward with the right foot into a left front stance and perform a left low block with the left hand.
- Instruction: Execute the low block with the left hand once more. This move reinforces your blocking technique and helps in transitioning smoothly between techniques.

17. Right Low Block (Arae-makki)

- Description: In the left front stance, execute a right low block with the right hand.

- Instruction: Complete the low block with your right hand. This ensures you can handle attacks from different directions effectively.

18. Return to Ready Stance (Joong-Gun)

- Description: Return to the ready stance with feet together and hands at your sides.
- Instruction: Finish the form by standing tall and relaxed, demonstrating control and readiness. This signifies the end of the form and reinforces proper posture and composure.

Practice Tips:

- Consistency: Practice each movement slowly at first to ensure proper technique.
- Focus: Concentrate on the precision of each block, strike, and punch.
- Breathing: Coordinate your movements with your breathing for better control.
- Repetition: Repeat the form regularly to build muscle memory and improve fluidity.

By following this detailed explanation, students were gain a clear understanding of each movement in Taegeuk Il-Jang and how to execute the form effectively.

2. The second training pattern (Poomsae) in taekwondo is called Taegeuk iijang Grade 6 Kup Green Belt requires Taegeuk Iijang.Iijang's 18 movements (23 techniques) are executed with a fluidity that is at once comfortable and firm. To aid the developing pupil advance their balance and combination skills, Taegeuk Iijang entails a bigger change between the postures than the first Taegeuk.

Taegeuk Il-Jang: Explanation of 18 Movements

1. Ready Stance (Joong-Gun)

- Description: Stand with feet together and hands at your sides.
- Instruction: Begin in this neutral position. Stand tall, stay relaxed, and focus your mind. This stance prepares you to start the form.

2.Left Low Block (Arae-makki)

- Description: Step forward with the right foot into a left front stance. Perform a left low block with the left hand.
- Instruction: Extend your left arm downward to block a low attack. Make sure your block is firm and your stance is strong to protect against low attacks

3.Right Low Block (Arae-makki)

- Description: Step forward with the left foot into a right front stance. Execute a right low block with the right hand.
- Instruction: Repeat the low block, this time with your right hand. Ensure the block is powerful and the stance is stable.

4. Left Inside Block (An-makki)

- Description: From the right front stance, perform a left inside block with the left hand.
- Instruction: Bring your left arm inward to block an attack coming from the outside. This block redirects the attack and sets you up for the next movement.

5. Right Inside Block (An-makki)

- Description: Continue in the left front stance and execute a right inside block with the right hand.
- Instruction: Perform the inside block with your right hand. Focus on making the block precise and controlled.

6. Left High Block (Olgul-makki)

- Description: Step forward with the right foot into a left front stance and perform a left high block with the left hand.
- Instruction: Raise your left arm to block a high attack. Ensure the block is high and strong, providing protection for your head.

7. Right High Block (Olgul-makki)

- Description: In the left front stance, execute a right high block with the right hand.
- Instruction: Perform the high block with your right hand. Keep your body aligned and the block strong to defend against high attacks.

8. Left Downward Strike (Naeryo-chigi)

- Description: While in the right front stance, perform a left downward strike with the left hand.
- Instruction: Strike downward with your left hand. This move simulates a powerful downward attack, so ensure your strike is effective and controlled.

9. Right Downward Strike (Naeryo-chigi)

- Description: Perform a right downward strike with the right hand while in the left front stance.
- Instruction: Deliver a downward strike with your right hand. Make sure the strike is strong and precise, reinforcing your technique.

10. Left Inside Block (An-makki)

- Description: Step forward with the right foot into a left front stance and execute a left inside block with the left hand.
- Instruction: Repeat the inside block with your left hand. Focus on accuracy and proper form as you transition between techniques.

11. Right Inside Block (An-makki)

- Description: In the left front stance, perform a right inside block with the right hand.
- Instruction: Execute the inside block with your right hand. Maintain stability and ensure your block is effective.

12. Left Low Block (Arae-makki)

- Description: Step forward with the right foot into a left front stance and perform a left low block with the left hand.
- Instruction: Perform the low block again with your left hand. Ensure that it is executed with strength and precision.

13. Right Low Block (Arae-makki)

- Description: In the left front stance, perform a right low block with the right hand.
- Instruction: Complete the low block with your right hand, maintaining proper form and power.

14. Left Punch (Jirugi)

- Description: Execute a left punch with the left hand while in the right front stance.
- Instruction: Punch forward with your left hand, focusing on speed and accuracy. Ensure that your stance supports the punch.

15. Right Punch (Jirugi)

- Description: Perform a right punch with the right hand while in the left front stance.
- Instruction: Deliver a punch with your right hand, maintaining proper alignment and power.

16. Left Low Block (Arae-makki)

- Description: Step forward with the right foot into a left front stance and execute a left low block with the left hand.
- Instruction: Repeat the low block with your left hand, reinforcing your blocking technique and ensuring effectiveness.

17. Right Low Block (Arae-makki)

- Description: In the left front stance, perform a right low block with the right hand.
- Instruction: Execute the low block with your right hand. This move ensures you are prepared to handle low attacks from different angles.

18. Return to Ready Stance (Joong-Gun)

- Description: Return to the ready stance with feet together and hands at your sides.

- Instruction: Finish the form by standing relaxed and composed, demonstrating control and readiness. This position signifies the completion of the form.

Practice Tips:

- Slow Practice: Begin by practicing each movement slowly to perfect your technique.
- Accuracy: Focus on the accuracy of each block, strike, and punch.
- Breathing: Coordinate your breathing with your movements to enhance control.
- Repetition: Regular practice helps build muscle memory and improve fluidity. By following this explanation, students can better understand the purpose and execution of each move in Taegeuk Il-Jang, ensuring a strong foundation for their Taekwondo practice.

3.9 STATISTICAL TREATMENT

A paired sampled t/z-test was used to analyze the data.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

CHAPTER IV

Analysis and Interpretation of Data

This chapter includes two different sections, the first section interprets the results of the study, and the second section includes discussion of the results. The present study has incorporated the effect of skill based taekwondo training program on executive functions among school going adolescents of Bahrain. A total of 80 females between the age group of 12-16 years from the Indian School of Bahrain were selected as subjects. There are two groups that are separated further: the Experimental group (N = 40) and the Control group (N = 40). The experimental group underwent a 12-week program consisting of three days of training per week, along with a pretest. The skill-based Taekwondo training program was conducted for 1 hour each day and was composed of Taekwondo kicks on a kicking pad, steps, and blocking. Data for the present study were obtained using an "Executive Function Questionnaire for Adolescents" self-made questionnaire to measure the effect of taekwondo training program in executive function skills on school going adolescents in Bahrain. Data were analyzed as per the objectives and hypotheses of the study. The results sections of this study comprise viz., pre, mid, and post-test mean, Analysis of Covariance, Hypotheses testing, t-test comparisons, and adjusted mean values. Analysis and interpretation of the data are shown below Hypotheses wise:

4.1 RESULT AND INTERPRETATION PERTAINING TO EXECUTIVE FUNCTION

To determine the significant difference if any in executive function of Experimental group and one Control group independent t-test was used in pre-test, mid- test and post-test and have shown in the table below-

Table 4.1.1

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group Among School Going Adolescents of Bahrain

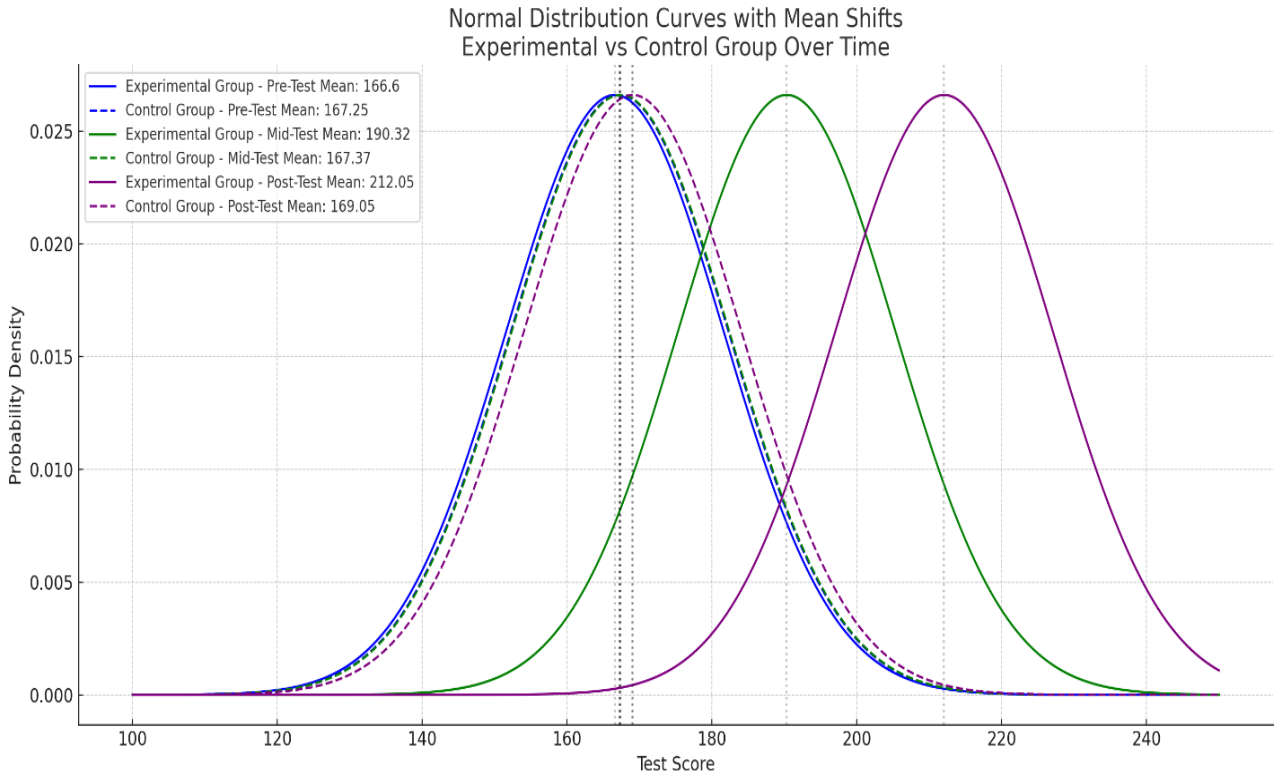
Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	166.6	25.77	6.98841	.093	.926
	Control group	40	167.25	35.90			
Mid-test (6 weeks of training)	Experimental group	40	190.32	30.49	7.463	3.075	.003**
	Control group	40	167.37	36.02			
Post-Test (After 12 weeks of training)	Experimental group	40	212.05	19.04	6.44	6.93	0.00**
	Control group	40	167.35	36.03			

*** at 0.05 and ** at 0.01; DF=78, z-table = 1.66 at 0.05**

Table 4.1.1 Presents t-value for comparing the adjusted means on executive function in Experimental group and Control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .093 (<1.66 at 0.05) and the p-value is .926 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in executive function between the experimental group and control group during the pre-test. On **mid test** it was found that the calculated t-value is 3.075 (>1.66 at 0.05) and the p-value is .003 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in executive function between the experimental group and control group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that the calculated t-value is 6.93 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in executive function between the experimental group and control group during the

post-test. It is evident from the above table that the mean score of executive function on Experimental Group (mean after 6weeks =190.32 and mean after 12 weeks =212.05) is higher than the mean score of executive function on Control Group(mean after 6weeks =167.37and mean after 12 weeks =169.05) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain," accepted.

Normal Distribution Analysis: Experimental vs Control Group



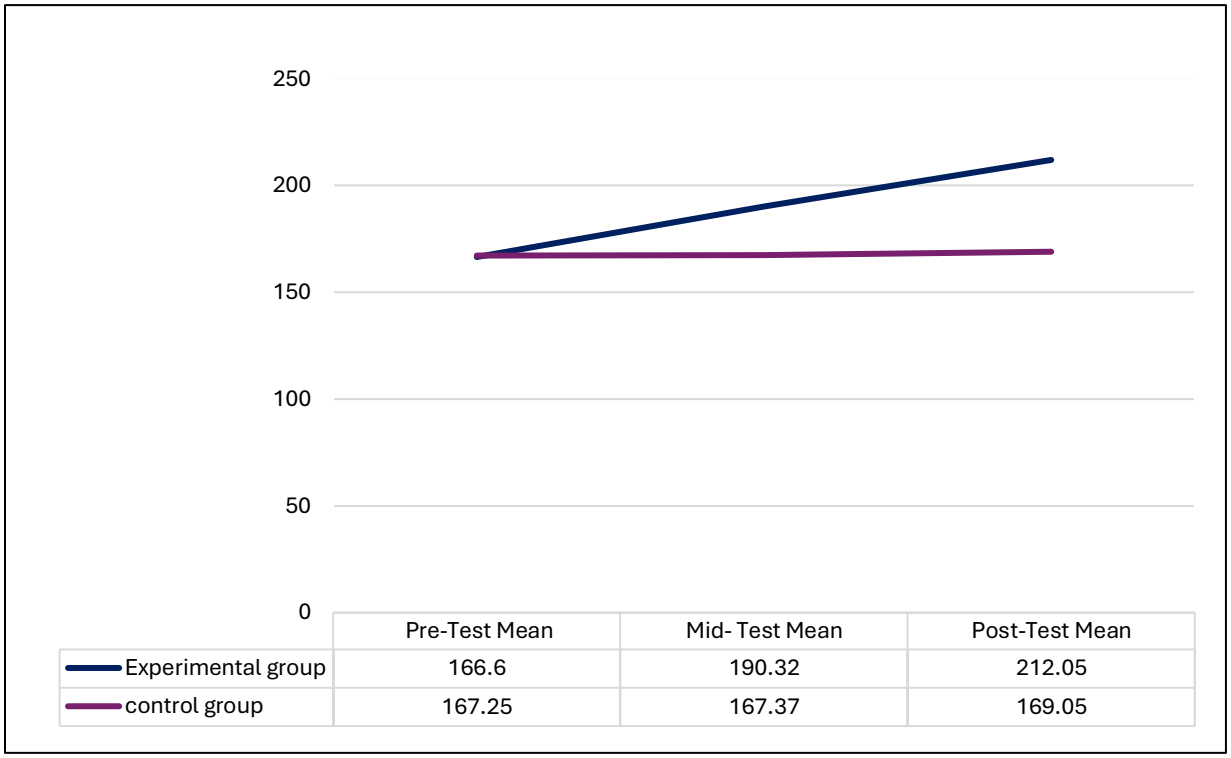
Key Insights:

1. The Experimental Group shows a significant rightward shift in the distribution overtime, indicating an improvement in scores.
2. The Control Group's distribution remains relatively unchanged at all stages.
3. The gap between the two groups becomes more pronounced at the Post-Test stage, suggesting the effectiveness of the intervention applied to the experimental group

The above-mentioned normal distribution analysis compares the distribution of test scores for two groups: Experimental and Control. The data are presented at three time points: Pre-Test, Mid-Test, and Post-Test. The normal distribution curves are plotted to visualize how the experimental group shows improvement, while the control group remains largely stable across these stages.

Table 4.1.1

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in Executive Function of Experimental Group and Control Group among School Going Adolescents of Bahrain



	Pre-Test Mean	Mid- Test Mean	Post-Test Mean
Experimental group	166.6	190.32	212.05
control group	167.25	167.37	169.05

Table 4.1.2

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Response Inhibition Among School Going Adolescents of Bahrain

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	13.22	3.61	.81899	.488	.627
	Control group	40	13.62	3.71			
Mid-test (6 weeks of training)	Experimental group	40	15.35	3.50	.80800	2.135	.036*
	Control group	40	13.62	3.71			
Post-Test (After 12 weeks of training)	Experimental group	40	16.97	2.24	.68704	4.876	0.00**
	Control group	40	13.62	3.71			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.2 Presents t-value for comparing the adjusted means on the variable response inhibition in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .488 (<1.66 at 0.05) and the p-value is .627 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in response inhibition between the Experimental Group and Control Group during the Pre-test. On **mid test** it was found that the calculated t-value is 2.135 (>1.66 at 0.05) and the p-value is .036 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in response inhibition between the Experimental Group and Control Group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that the calculated t-value is 4.876 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which

are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in response inhibition between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of response inhibition on Experimental Group (mean after 6weeks =15.35 and mean after 12 weeks =16.97) is higher than the mean score of response inhibition skill on Control Group(mean after 6weeks =13.62 and mean after 12 weeks =13.62) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on response inhibition of school going adolescents of Bahrain," accepted.

Table 4.1.2

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function response inhibition between the experimental and control groups among school-going adolescents in Bahrain

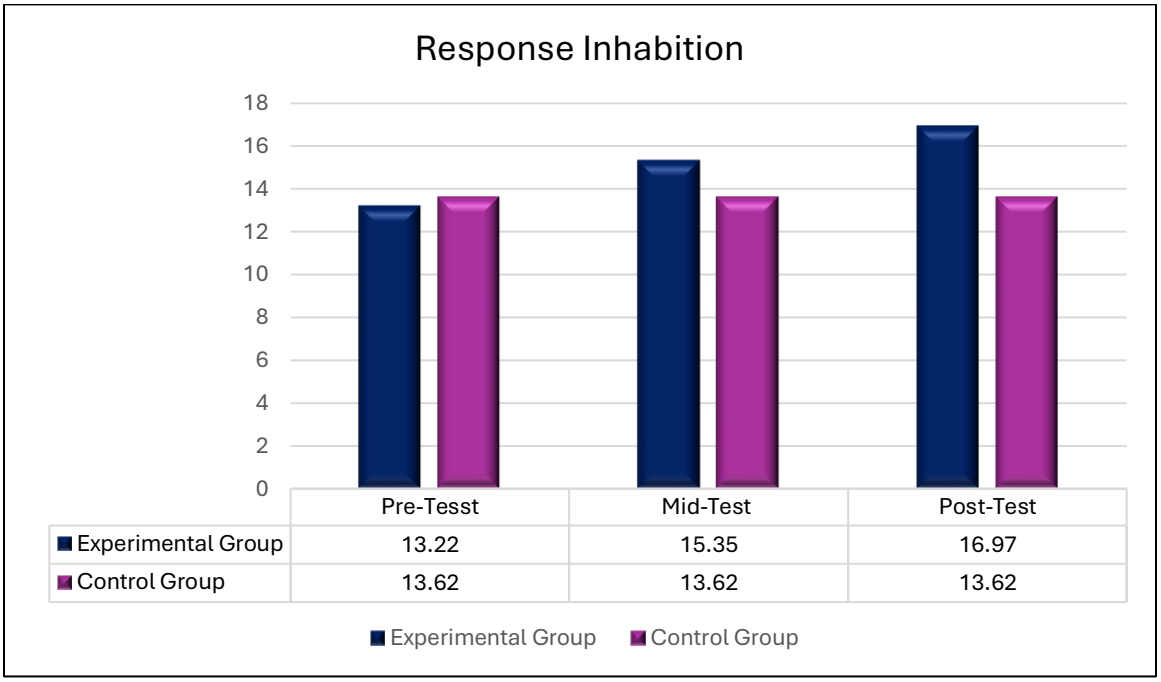


Table 4.1.3

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Working Memory among School Going Adolescents of Bahrain

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	13.55	2.81	.68016	.037	.971
	Control group	40	13.57	3.25			
Mid-test (6 weeks of training)	Experimental group	40	14.92	2.80	.67963	1.986	.051
	Control group	40	13.57	3.25			
Post-Test (After 12 weeks of training)	Experimental group	40	16.85	2.45	.64494	5.078	0.00**
	Control group	40	13.57	3.25			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.3 Presents t-value for comparing the adjusted means on the variable working memory in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .037 (<1.66 at 0.05) and the p-value is .971 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in working memory between the Experimental Group and Control Group during the Pre-test. On **mid test** it was found that the calculated t-value is 1.986 (>1.66 at 0.05) and the p-value is .051 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is a significant difference in working memory between the Experimental Group and

Control Group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that the calculated t-value is 5.078 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in working memory between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of working memory on Experimental Group (mean after 6weeks =14.92 and mean after 12 weeks =16.85) is higher than the mean score of working memory skill on Control Group(mean after 6weeks =13.57 and mean after 12 weeks =13.57) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on working memory of school going adolescents of Bahrain," accepted.

Table 4.1.3

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Working Memory Among School Going Adolescents of Bahrain

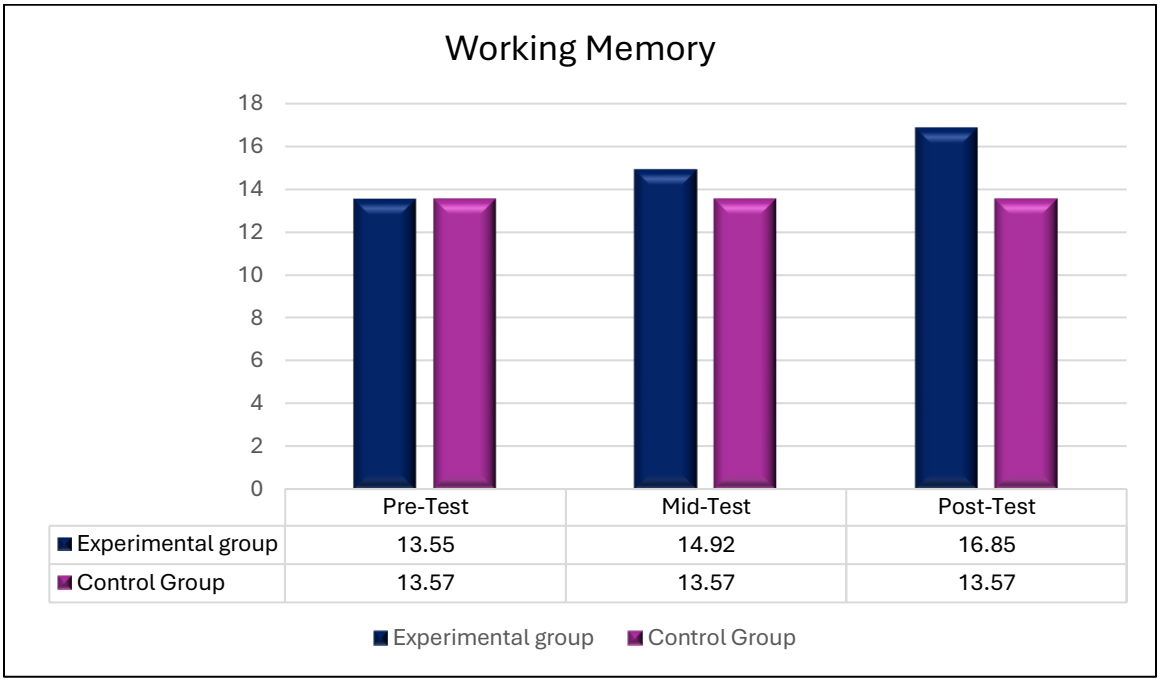


Table 4.1.4

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Emotional Control among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	(p value)
Pre -test (Before the training)	Experimental group	40	15.32	3.56	.68016	.037	.971
	Control group	40	14.10	4.12			
Mid-test (6 weeks of training)	Experimental group	40	16.05	2.87	.79481	2.453	.016*
	Control group	40	14.10	4.12			
Post-Test (After 12 weeks of training)	Experimental group	40	18.30	2.27	.74507	5.637	.000**
	Control group	40	14.10	4.12			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.4 Presents t-value for comparing the adjusted means on the variable emotional control in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .037 (<1.66 at 0.05) and the p-value is .971 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in emotional control between the Experimental Group and Control Group during the Pre-test. On **mid test** it was found that the calculated t-value is 2.453 (>1.66 at 0.05) and the p-value is .016 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in emotional control between the Experimental Group and Control Group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it

was found that the calculated t-value is 5.637 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in emotional control between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of emotional control on Experimental Group (mean after 6weeks =16.05 and mean after 12 weeks =18.30) is higher than the mean score of emotional control skill on Control Group(mean after 6weeks =14.10 and mean after 12 weeks =14.10) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on emotional control of school going adolescents of Bahrain," accepted.

Table 4.1.4

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Emotional Control among School Going Adolescents of Bahrain

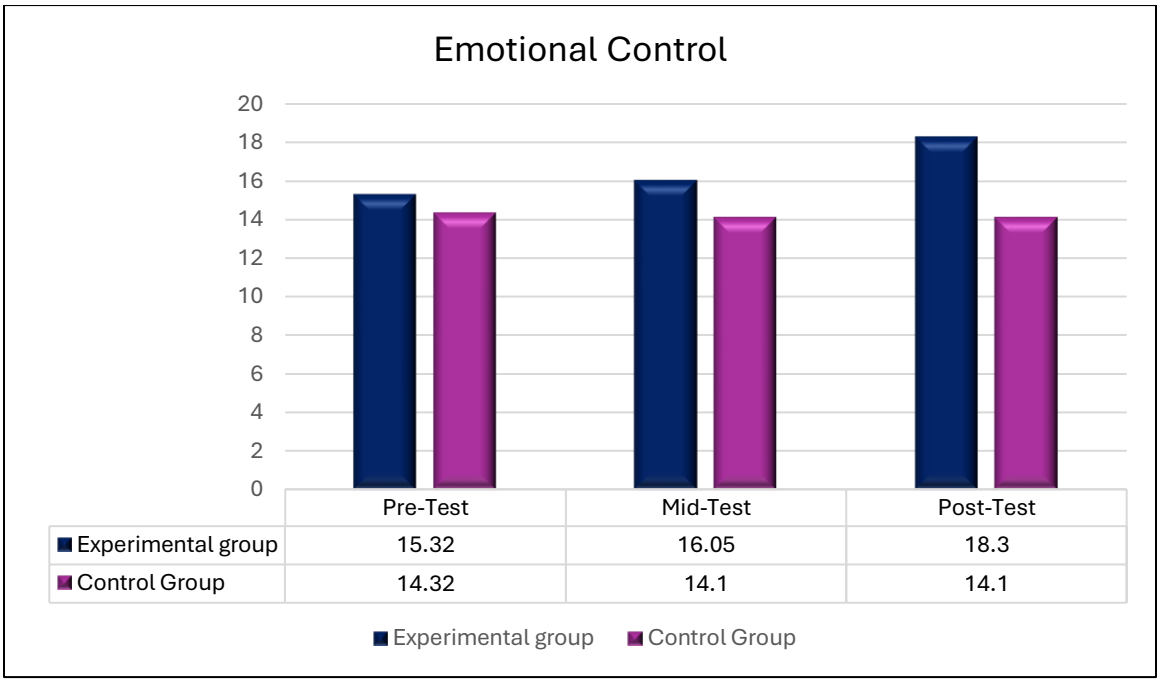


Table 4.1.5

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Task Initiation Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	(p value)
Pre -test (Before the training)	**Experimental group**	40	13.00	3.57	.86491	.029	.977
	Control group	40	13.02	4.14			
Mid-test (6 weeks of training)	**Experimental group**	40	15.42	2.87	.83157	2.886	.005*
	Control group	40	13.02	4.12			
Post-Test (After 12 weeks of training)	**Experimental group**	40	17.60	2.318	.75046	6.096	.000**
	Control group	40	13.02	4.14			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.5 Presents t-value for comparing the adjusted means on the variable task initiation in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .02937 (<1.66 at 0.05) and the p-value is .977 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in task initiation between the Experimental Group and Control Group during the Pre-test. On **mid test** it was found that the calculated t-value is 2.886 (>1.66 at 0.05) and the p-value is .005 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in task initiation between the Experimental Group and Control Group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was

found that the calculated t-value is 6.096 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in task initiation between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of task initiation on Experimental Group (mean after 6weeks =15.42 and mean after 12 weeks =17.60)is higher than the mean score of task initiation skill on Control Group(mean after 6weeks =13.02 and mean after 12 weeks =13.02) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on task initiation of school going adolescents of Bahrain," accepted.

Table 4.1.5

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the Variable Task Initiation among School Going Adolescents of Bahrain

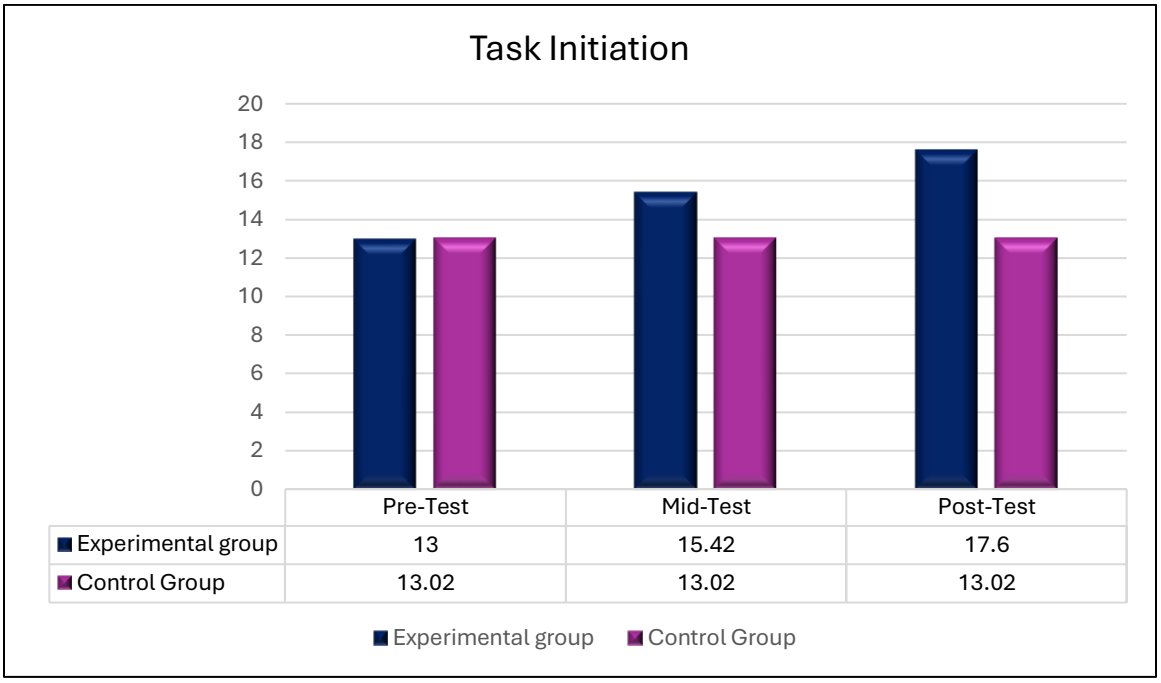


Table 4.1.6

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Sustain Attention Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	(p value)
Pre -test (Before the training)	**Experimental group**	40	14.50	3.50	.91630	.737	.464
	Control group	40	15.17	4.61			
Mid-test (6 weeks of training)	**Experimental group**	40	16.57	3.28	.89498	1.564	.122
	Control group	40	15.17	4.61			
Post-Test (After 12 weeks of training)	**Experimental group**	40	18.47	2.33	.82732	3.989	.000**
	Control group	40	13.77	4.37			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.6 Presents t-value for comparing the adjusted means on the variable sustain attention in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .737 (<1.66 at 0.05) and the p-value is .464 (<.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in sustain attention between the Experimental Group and Control Group during the Pre-test. On **mid test** it was found that the calculated t-value is 1.564 (<1.66 at 0.05) and the p-value is .122 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in sustain attention between the Experimental Group and Control Group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was

found that the calculated t-value is 3.989 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in sustain attention between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of sustain attention on Experimental Group (mean after 6weeks =16.57 and mean after 12 weeks =18.47) is higher than the mean score of sustain attention skill on Control Group(mean after 6weeks =15.17 and mean after 12 weeks =13.77) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on sustain attention of school going adolescents of Bahrain," accepted.

Table 4.1.6

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Sustain Attention among School Going Adolescents of Bahrain

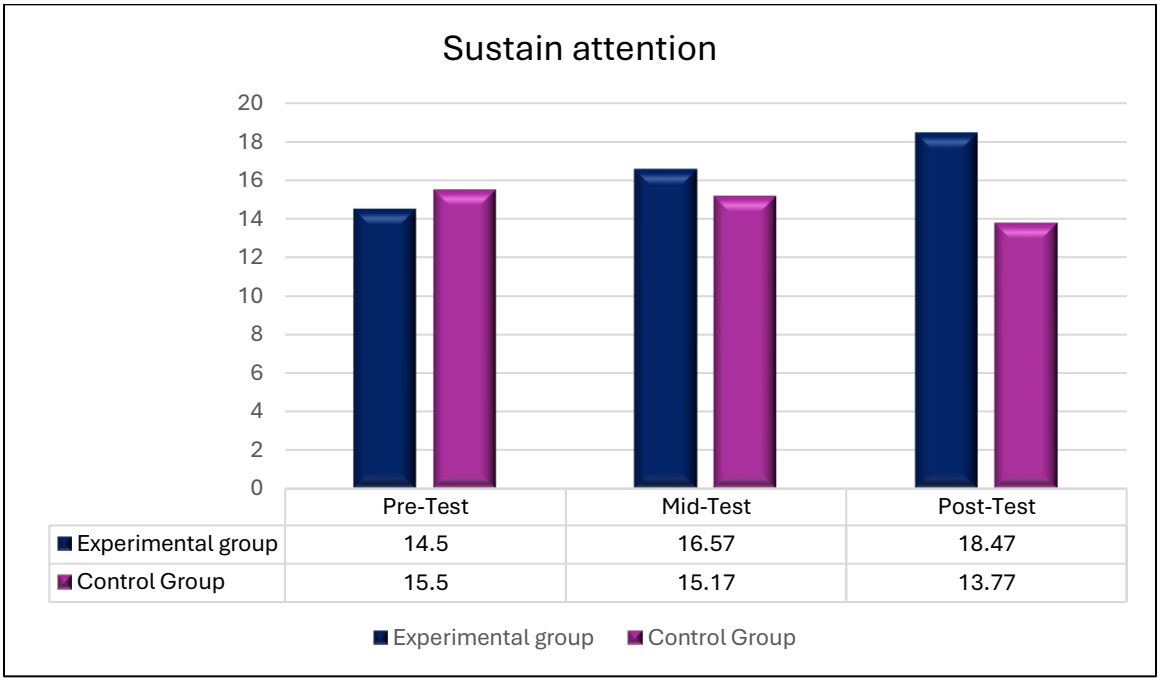


Table 4.1.7

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Planning Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	(p value)
Pre -test (Before the training)	**Experimental group**	40	13.75	2.85	.82527	.030	.976
	Control group	40	13.77	3.44			
Mid-test (6 weeks of training)	**Experimental group**	40	15.15	3.29	.86531	1.589	.116
	Control group	40	13.77	4.37			
Post-Test (After 12 weeks of training)	**Experimental group**	40	17.50	2.33	.78323	4.756	.000**
	Control group	40	13.77	4.37			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.7 Presents t-value for comparing the adjusted means on the variable Planning experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .030 (<1.66 at 0.05) and the p-value is. 976 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in Planning between the Experimental Group and Control Group during the Pre-test. On **mid test** it was found that the calculated t-value is 1.589 (<1.66 at 0.05) and the p-value is .116 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in Planning between the Experimental Group and Control Group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that the

calculated t-value is 4.756 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in Planning between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of Planning on Experimental Group (mean after 6weeks =15.15 and mean after 12 weeks =17.50) is higher than the mean score of planning /prioritizing skill on Control Group(mean after 6weeks =13.77and mean after 12 weeks =13.77) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on Planning of school going adolescents of Bahrain," accepted.

Table 4.1.7

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Planning among School Going Adolescents of Bahrain

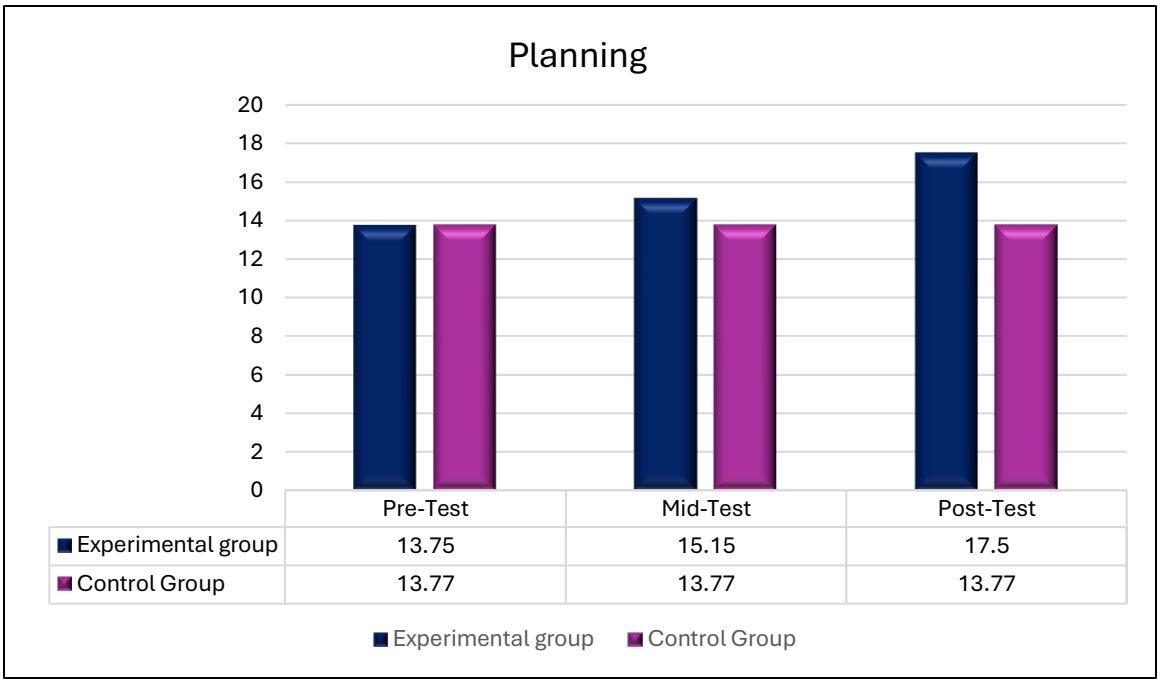


Table 4.1.8

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Organization Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	(p value)
Pre -test (Before the training)	**Experimental group**	40	12.15	3.48	.77505	.452	.653
	Control group	40	12.50	3.44			
Mid-test (6 weeks of training)	**Experimental group**	40	14.42	3.78	.82717	2.206	.030
	Control group	40	12.60	3.60			
Post-Test (After 12 weeks of training)	**Experimental group**	40	17.15	2.33	.68158	6.676	.000**
	Control group	40	12.60	3.60			

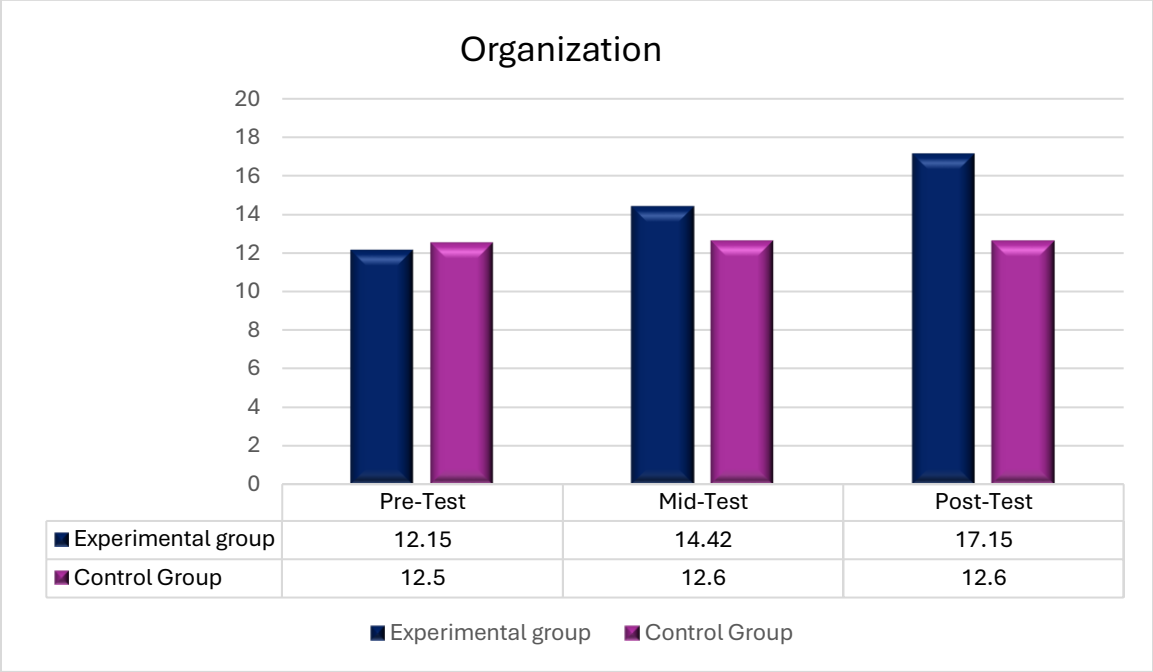
*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.8 Presents t-value for comparing the adjusted means on the variable organization in experimental group and control group during pre, mid and post testing. On th**e pre-test** it was found that the calculated t-value is .452 (<1.66 at 0.05) and the p-value is .653 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in organization between the experimental group and control group during the pre-test. On **mid test** it was found that the calculated t-value is 2.206 (>1.66 at 0.05) and the p-value is .030 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in organization between the experimental group and control group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that

the calculated t-value is 6.676 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in organization between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of organization on Experimental Group (mean after 6weeks =14.42 and mean after 12 weeks =17.15) is higher than the mean score of organization skill on Control Group (mean after 6weeks =12.60 and mean after 12 weeks =12.60) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on organization of school going adolescents of Bahrain," accepted

Table 4.1.8

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Organization among School Going Adolescents of Bahrain



	Pre-Test	Mid-Test	Post-Test
Experimental group	12.15	14.42	17.15
Control Group	12.5	12.6	12.6

Table 4.1.9

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Time Management Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	14.40	3.88	.88628	.197	.844
	Control group	40	14.57	4.04			
Mid-test (6 weeks of training)	Experimental group	40	16.22	3.58	.85438	1.93	.057
	Control group	40	14.57	4.04			
Post-Test (After 12 weeks of training)	Experimental group	40	17.87	2.59	.75962	4.34	0.00**
	Control group	40	14.57	4.04			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.9 Presents t-value for comparing the adjusted means on the variable time management in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .197 (>1.66 at 0.05) and the p-value is .844 (>.05) which are not statically significant at 0.05 level of significance. it was revealed that there is no significant difference in time management between the experimental group and control group during the pre-test. On **mid test** it was found that the calculated t-value is 1.931 (>1.66 at 0.05) and the p-value is .057 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there

is no significant difference in time management between the experimental group and control group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that the calculated t-value is 4.344 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in time management between the experimental group and control group during the post-test. It is evident from the above table that the mean score of time management on Experimental Group (mean after 6weeks =16.22 and mean after 12 weeks =17.87) is higher than the mean score of time management skill on control group(mean after 6weeks =14.57 and mean after 12 weeks =13.62) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on time management of school going adolescents of Bahrain," accepted.

Table 4.1.9

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Time Management among School Going Adolescents of Bahrain

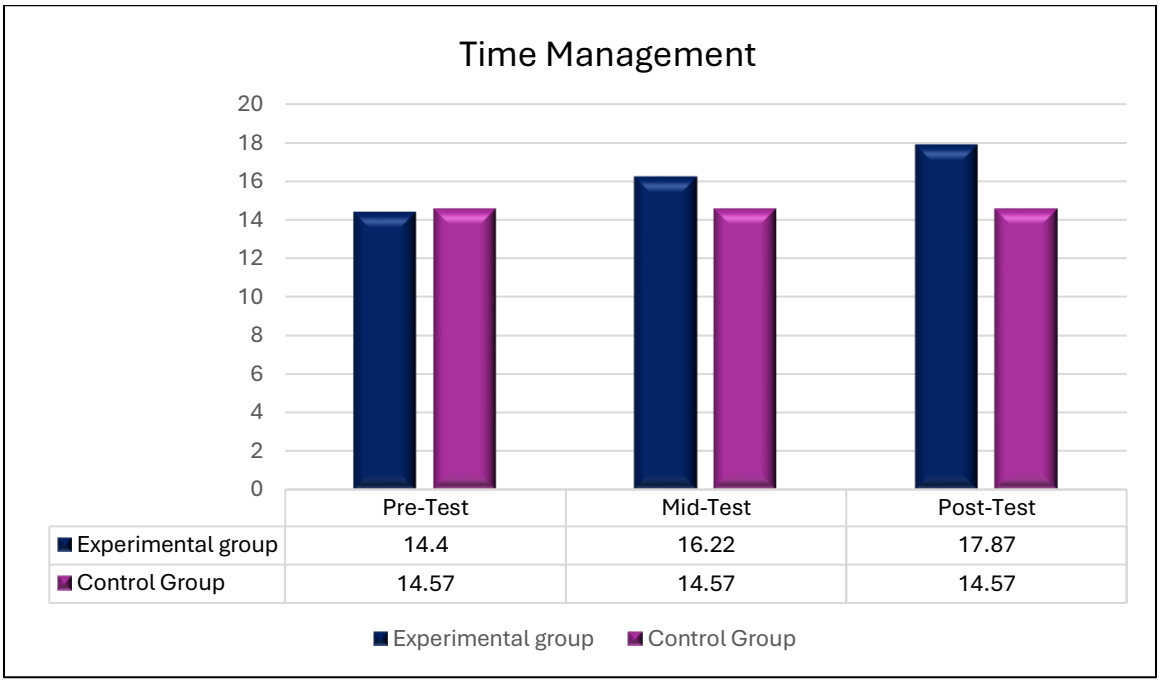


Table 4.1.10

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Flexibility Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	13.95	2.92	.78768	.413	.681
	Control group	40	14.27	4.03			
Mid-test (6 weeks of training)	Experimental group	40	16.27	3.49	.84351	2.371	.020*
	Control group	40	14.27	4.03			
Post-Test (After 12 weeks of training)	Experimental group	40	17.87	2.59	.74780	4.814	0.00**
	Control group	40	14.27	4.04			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.10 Presents t-value for comparing the adjusted means on the variable flexibility in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is .413 (<1.66 at 0.05) and the p-value is .681 (>.05) which are not statically significant at 0.05 level of significance. it was revealed that there is no significant difference in flexibility between the experimental group and control group during the pre-test. On **mid test** it was found that the calculated t-value is 2.371 (>1.66 at 0.05) and the p-value is .020 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is significant difference in flexibility between the experimental group and control group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it was found that the

calculated t-value is 4.814 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in flexibility between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of flexibility on Experimental Group (mean after 6weeks =16.27 and mean after 12 weeks =17.87) is higher than the mean score of flexibility skill on Control Group (mean after 6weeks =14.27 and mean after 12 weeks =14.27) Therefore, the research Hypotheses that there is significant effect of skill based taekwondo training program on flexibility of school going adolescents of Bahrain," accepted.

Table 4.1.10

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Flexibility among School Going Adolescents of Bahrain

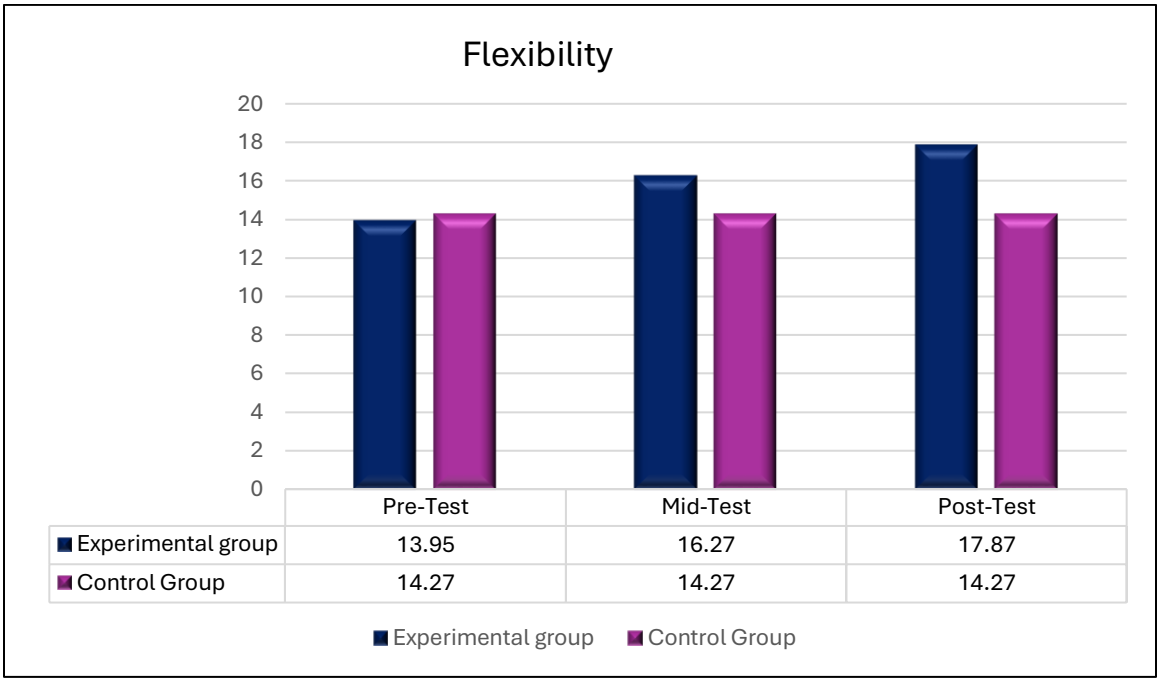


Table 4.1.11

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Metacognition Among School Going Adolescents of Bahrain–

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	14.22	2.92	.91636	1.091	.279
	Control group	40	15.22	4.03			
Mid-test (6 weeks of training)	Experimental group	40	16.72	3.30	.86583	1.704	.092
	Control group	40	15.25	4.36			
Post-Test (After 12 weeks of training)	Experimental group	40	18.05	2.08	.76581	3.689	0.00**
	Control group	40	15.22	4.37			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.11 Presents t-value for comparing the adjusted means on the variable metacognition skill in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is1.091 (<1.66 at 0.05) and the p-value is. 279 (>.05) which are not statically significant at 0.05 level of significance. It was revealed that there is no significant difference in metacognition skill between the Experimental Group and Control Group during the pre-test. On **mid test** it was found that the calculated t-value is 1.704 (>1.66 at 0.05) and the p-value is.092 (>.05) which are not statically significant at 0.05 level of significance. It revealed that there is no significant difference in metacognition skill between the experimental group and control group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it

was found that the calculated t-value is 3.689 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in metacognition skill between the experimental group and control group during the post-test .It is evident from the above table that the mean score of metacognition skill on Experimental Group (mean after 6weeks =16.72 and mean after 12 weeks =18.05) is higher than the mean score of metacognition skill on Control Group (mean after 6weeks =15.25 and mean after 12 weeks =15.22) Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on metacognition skill of school going adolescents of Bahrain," accepted.

Table 4.1.11

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Metacognition Skill among School Going Adolescents of Bahrain

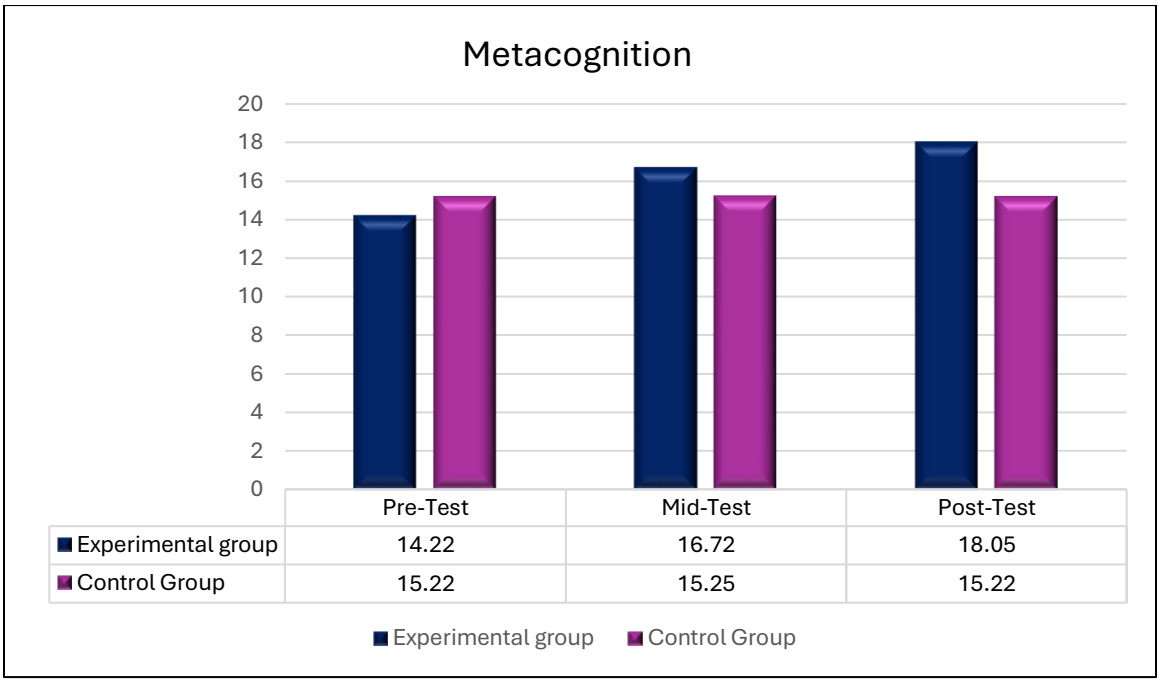


Table 4.1.12

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Goal Directive Persistence Among School Going Adolescents of Bahrain –

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	15.20	2.92	.76451	.752	.454
	Control group	40	14.62	3.84			
Mid-test (6 weeks of training)	Experimental group	40	16.32	2.98	.76968	2.209	.030*
	Control group	40	14.62	3.84			
Post-Test (After 12 weeks of training)	Experimental group	40	17.60	2.66	.74031	4.019	0.00**
	Control group	40	14.62	3.84			

*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.12 Presents t-value for comparing the adjusted means on the variable goal directive persistence in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is.752 (<1.66 at 0.05) and the p-value is .454 (>.05) which are not statically significant at 0.05 level of significance. It was revealed that there is no significant difference in goal directive persistence skill between the experimental group and control group during the pre-test. On **mid test** it was found that the calculated t-value is 2.209 (>1.66 at 0.05) and the p-value is .030 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in goal directive persistence skill between the experimental group and control group during the mid-test. After 12 weeks of skill

based taekwondo training program **post-test** it was found that the calculated t-value is 4.019 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in goal directive persistence skill between the Experimental Group and Control Group during the post-test. It is evident from the above table that the mean score of goal directive persistence skill on Experimental Group (mean after 6weeks =16.32 and mean after 12 weeks =17.60) is higher than the mean score of goal directive persistence skill on Control Group (mean after 6weeks =14.62 and mean after 12 weeks =14.62) .Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on goal directive persistence skill of school going adolescents of Bahrain," accepted.

Table 4.1.12

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Goal Directive Persistence Skill among School Going Adolescents of Bahrain

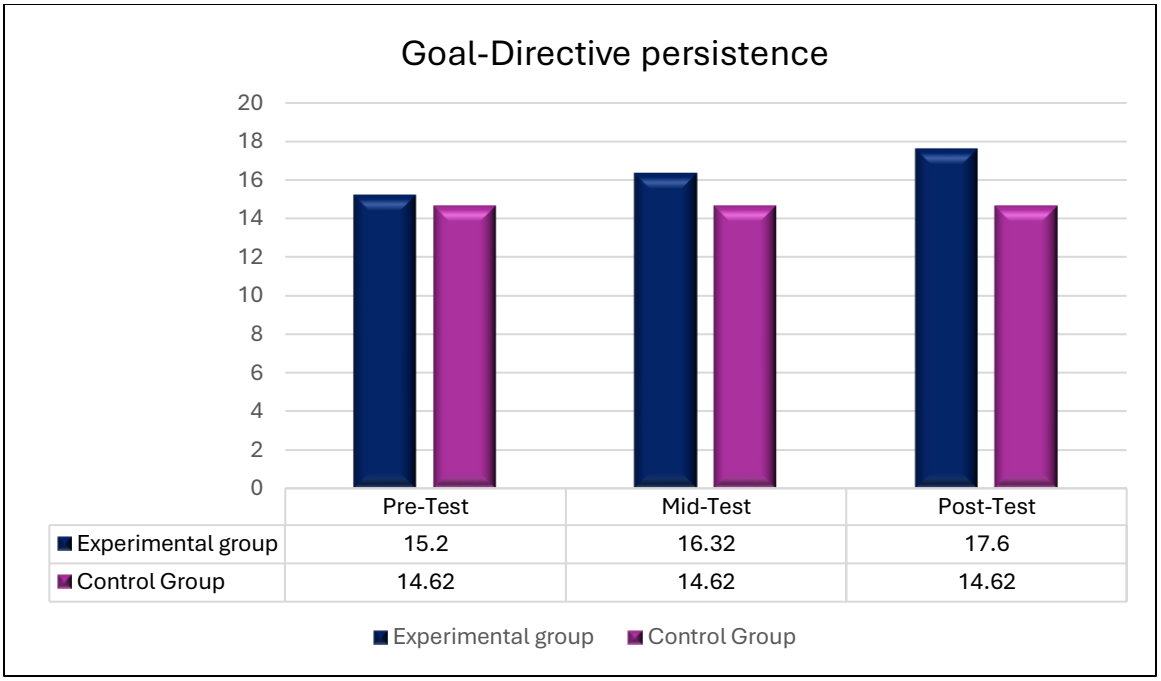


Table 4.1.13

Analysis of Mean, SD and t- test Showing the Difference in Executive Function of Experimental and Control Group on the Variable Stress Tolerance Among School Going Adolescents of Bahrain–

Time of assessment	Groups	N	Mean	Standard Deviation	Standard Error	t-ratio	p-value
Pre -test (Before the training)	Experimental group	40	12.77	3.51	.88714	.620	.537
	Control group	40	13.32	4.37			
Mid-test (6 weeks of training)	Experimental group	40	15.80	3.27	.86357	3.503	.001*
	Control group	40	12.77	4.37			
Post-Test (After 12 weeks of training)	Experimental group	40	17.80	2.17	.77185	6.510	0.00**
	Control group	40	12.77	4.37			

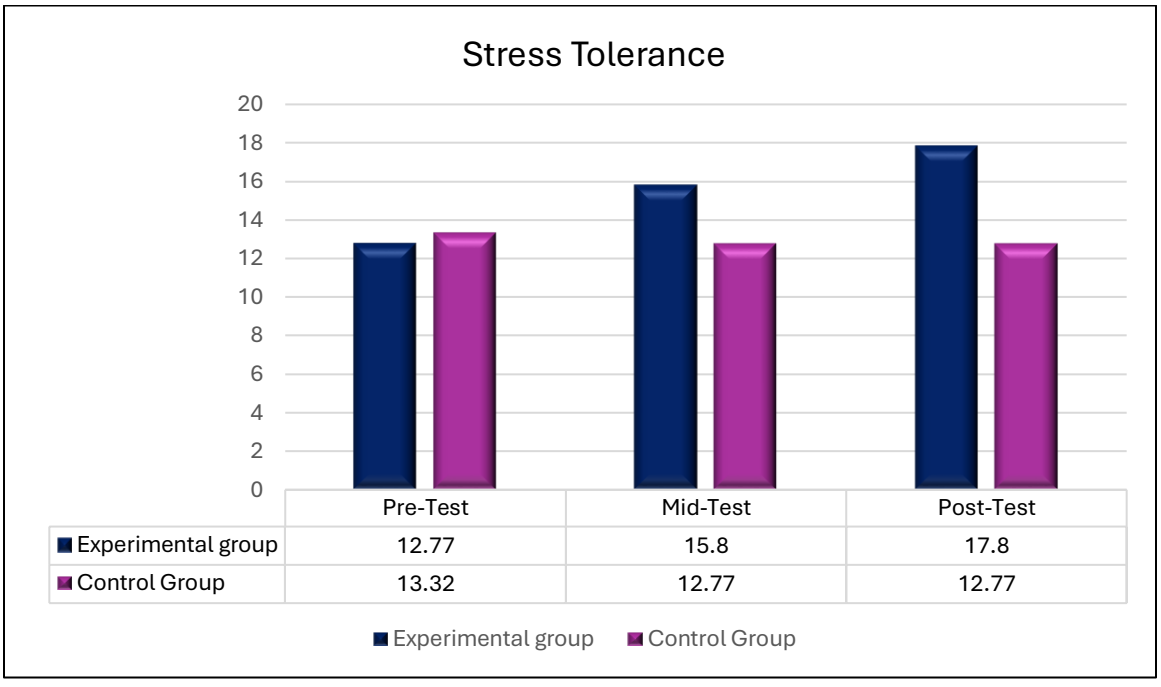
*** at 0.05 and ** at 0.01; DF =78, z-table = 1.66 at 0.05**

Table 4.1.13 Presents t-value for comparing the adjusted means on the variable stress tolerance in experimental group and control group during pre, mid and post testing. On the **pre-test** it was found that the calculated t-value is.752 (<1.66 at 0.05) and the p-value is .454 (>.05) which are not statically significant at 0.05 level of significance. It was revealed that there is no significant difference in stress tolerance skill between the experimental group and control group during the pre-test. On **mid test** it was found that the calculated t-value is 3.503 (>1.66 at 0.05) and the p-value is .001 (<.05) which are statically significant at 0.05 level of significance. It revealed that there is a significant difference in stress tolerance skill between the experimental group and control group during the mid-test. After 12 weeks of skill based taekwondo training program **post-test** it

was found that the calculated t-value is 6.510 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in stress tolerance skill between the experimental group and control group during the post-test. It is evident from the above table that the mean score of stress tolerance skill on Experimental Group (mean after 6weeks =15.80and mean after 12 weeks =17.80) is higher than the mean score of stress tolerance skill on Control Group (mean after 6weeks =12.77 and mean after 12 weeks =12.77) .Therefore, the research Hypotheses "There is significant effect of skill based taekwondo training program on stress tolerance skill of school going adolescents of Bahrain," accepted.

Table 4.1.13

Graphical presentation of pre-test, mid-test, and post-test means results showing the differences in executive function of Experimental Group and Control Group on the variable Stress Tolerance Skill among School Going Adolescents of Bahrain



4.2 DISCUSSION OF THE RESULTS

4.2.1 Discussion Pertaining to the Effect of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group Among School Going Adolescents of Bahrain

The findings clearly demonstrate that the study's primary goal was to enhance student performance on executive function of school going adolescents of Bahrain, Table **4.1.1** the above table that the mean score of executive function total score on Experimental Group (mean before training =166.6, mean after 6weeks =190.32and mean after 12 weeks =212.05) is higher than the mean score of Executive Function skill on Control Group (mean before training =167.25, mean after 6weeks =167.37and mean after 12 weeks =169.05). Therefore, based on these adjusted mean values we found before giving taekwondo training there was no significant difference observed between the Experimental Group and Control Group on effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain. Then we found after 6weeks of giving taekwondo training on there was significant difference observed between the Experimental Group and Control Group on effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain. Based on above mention adjusted mean values we found after 12 weeks of taekwondo training on Experimental Group there is significant differences on effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain. The results showed a significant difference between the Experimental Group and Control Group on effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain. The above findings are persistent with prior studies of (Chia-Liang et al., 2017) discovered that physical activity increases working memory's reaction time. Additionally, the study showed that adolescents' executive function is selectively affected by moderate-intensity exercise. Furthermore, as per (Fan, C. Y. 2018) which highlighted the outcomes of taekwondo training effects on teacher- and parent-rated interest on ADHD (attention deficit/hyperactivity disorder) children (particularly boys) and inhibition on normally growing children as judged by parents. Furthermore, medication functioned as a mediator to support the effects of TKD on participants' attention. Executive Function skills on a computer-administered

assignment revealed greater accuracy at the congruent trial (d = 2.00, p =.02) for Taekwondo pupils, according to (Arastoo et al., 2013). A modest, non-giant effects size (d = −.51, p =.16) was produced by differences in mean revisualized alternate ratings for BMI z ratings. Most college students studying taekwondo expressed positive opinions of the sport and felt that their mental and physical fitness had improved. (Andrades et al., 2022) examined a variety of data pertaining to the effects of exercise, sports, and physical activity on executive function in kids and teenagers with ADHD. Children and adolescents diagnosed with ADHD see improvements in their executive function when they engage in physical activity, exercise, or sports. Moreover, (Leung and colleagues ,2021) conducted the meta-analysis widely observed the effects of physical activity therapies on people with neurodevelopmental disorders' executive function. The effects of physical exercise therapies on executive function in individuals with neurodevelopmental disorders is supported by analysis. (Alvarez-Bueno et al., 2021) Additionally, they have discovered that the relationship between academic success and moderate-to-intense physical exercise may not be direct but rather be mediated by cognitive flexibility, cardiorespiratory fitness, and inhibition through CRF. Enhancement of CRF and executive function should be the main goals of physical exercise therapies. Moreover (Campos-Jara et al., 2021) evaluated that healthy kids and teens must be influenced to do sports activities to enhance their executive functions at each stage of their development. In addition, sports programs have been unable to change the young generation. Even though different methods assess executive function in varying ways, the observed increase in function is consistent with previous findings that indicate a change in cognitive abilities in children due to participation in sports activities (Tomporowski, 2008). A study by (Phung & Goldberg ,2019) which focused on the improvement of executive functions in children with autism spectrum disorder through mixed martial arts training reported that the MMA group showed significantly higher executive functions at the follow-up compared to the waiting list group (WLC The effect of an eight-week hatha yoga session on executive function in older individuals was found in this setting (Gothe et al., 2014). Participants in the yoga intervention group demonstrated significantly better performance on the executive function measures of flexibility, mental set-shifting efficiency, and working memory capacity after 8 weeks of yoga practice sessions when compared to their stretching and strengthening counterparts. The space that offers opportunities an acute workout, such as 20 minutes of moderately intense treadmill jogging (Sibley et al., 2006) 30 minutes of cycling (Ferris et al., 2007) or 10 minutes of riding, may possibly improve the results of the Stroop

check test. The findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the Variable Time Management of school going female adolescents of Bahrain. The results demonstrate a discrepancy in the time control sub-dimension, but the study's ramifications in the time planning, time enemies, and standard time control sub-dimensions are identical to those of (İşcan and Andıç ,2009). Female students outperform male students in the time management sub-dimension, according to (İşcan and Andıç's ,2008) findings. This study aims to fill that gap and provides a resource of effect of skill based taekwondo training program on executive functions among school going adolescents of Bahrain. However, study contributes to the literature by improvising the treatment program in executive function.

Although skill-based taekwondo training involves difficult coordination exercises, particularly for teenagers, it may be beneficial for training reactive executive function and other variables that were examined using a determination test. Our research leads us to the conclusion that skill-based taekwondo training programs have a good effect on school-age female adolescents' executive function. However, appropriately dosed combat sports and martial arts have been suggested as alternatives to enhance one's health (Castillo-Fuentes, et al., 2019). For instance, a study has shown that six to twelve weeks of tai chi can significantly enhance metabolic, cognitive, and pain perception in both men and women of various ages. Additionally, it can enhance sleep quality and mental well-being. Martial arts and combat sports are apparently PA strategies that satisfy the needs of older adults in terms of muscle strength, cardiorespiratory capacity, flexibility, agility, and postural balance (Chung et al., 2018). These particular activities involve upper and lower extremity-based attack and defense movements as well as choreographies or forms (a sequence of arm and leg movements that simulate an imaginary combat) that permit performing dynamic low-effects actions at moderate to vigorous intensities (Lee & Lee,2010).

The above findings are persistent with prior studies which reveals that Experimental group were considered the skill based taekwondo training program was the most effective treatment program on executive function of school going Female adolescents.

4.2.2 Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Response Inhibition Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.2** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 4.876 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are statically significant at 0.05 level of significance. It was revealed that there is a significant difference in response inhibition between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found After 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment program on executive function of school going adolescents of Bahrain. Sports and games had a prevailing effect on the response inhibition (Cima, et al.,2016) experiencing a season's well worth of sub concussive hits does seem to have an effect on the unique executive function of response inhibition. In contact-sports athletes, but different elements except head effect facts may also play an essential function in those damaging effects. Regarding this notion (Mohammad et al., 2015) found that acute aerobic exercise along with moderate intensity can improve the response inhibition ability. The giant high quality education effects on go/no-pass inhibition overall performance in our observe contrasts with the non-giant switch effects said via way of means of (Johnstone et al., 2010). However, the maximum vital issue can also additionally be the involvement of workout or bodily pastime that, withinside the schooling group, become mixed with motor inhibition. Interestingly, in a current study, (Jäger et al.,2014) observed that 20 min of playful physical (sports) sports that contained cognitive attractive factors associated with elements of govt functioning (including Inhibition) had an instantaneous fantastic effects at the overall performance on a automatic undertaking measuring the capability to disregard distracting information (interference control).The potential of an easy-to-use and ecologically valid training game to improve the inhibition capacity of children on related response inhibition tasks but not on tasks measuring other aspects of inhibition, such as interference control (Chen et al., 2015). Therefore, results of the study contribute to the literature by improvising the treatment program in executive function on the variable response inhibition skill.

4.2.3. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Working Memory Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.3** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 5.078 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance It was revealed that there is a significant difference in working memory between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found After 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment program on executive function on the variable working memory of school going adolescents of Bahrain. There are several previous studies exploring the effects of executive function skills on working memory skill. Systematically looking at the working memory gadget withinside the discipline of sports, overview gives an outlook of doubtlessly fruitful studies regions on working memory in sport (Furley, 2010). Physical activity is a vital aspect of people's well-being. Higher working memory ability become assumed to emerge withinside the contributors training Physical activity in comparison to the much less non activity ones (Ceciliani et al.,2021). The effect of sport-related concussion on working memory capacity gymnastics training had general facilitative effects on spatial operating reminiscence at each behavioral and neurophysiological ranges in children (Chang et al., 2015). Several research have proven that athletes display advanced overall performance in widespread cognitive capabilities in comparison to non-athletes. In athletes, the visuospatial working memory is a critical feature for fast reaction to every situation and experience. The visuospatial operating reminiscence of strategic athletes become higher than that of non-athletes and static athletes. Visuospatial operating reminiscence would possibly play a vital function in figuring out athletic overall performance in Strategic recreation types, making advanced visuospatial operating reminiscence a key benefit for strategic athletes (Choi et al., 2022). Thus, based on the findings it can be concluded that taekwondo training program is pivotal for the implementation of executive function on the variable working memory.

4.2.4. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Emotional Control Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.4** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 5.637 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in emotional control between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found after 12 weeks (post-test) of taekwondo training on Experimental Group mean value is higher than the Control Group. The results of the exploratory analyses suggest that the skill based taekwondo training program was considered as the most effective treatment program on executive function on the variable emotional control skill of school going adolescents of Bahrain. The significant positive training effect on emotional control skill regular and acute workout can cause a stepped forward competence to address traumatic conditions and terrible mood (Sudeck et al., 2018). On the opposite hand, a low exercise-particular have an effect on law is related with depressive disorders, tension disorders, insomnia and interest deficit hyperactivity disorder (Gross et al., 2019) on other hand found male athletes who compete in group sports activities could have extra evolved emotional abilities than the ones in individual sports activities: group sports activities male athletes have extra advanced self-awareness and self-regulation talents than person sports activities male athletes. (Akelaitis & Malinauskas, 2018) These outcomes advise that specifically the ones people which have discovered how to make use of exercise as an adaptive affect regulation strategy can profit from potential benefits of regular exercise on life to control our emotional skill.

4.2.5. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Task Initiation Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.5** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that calculated t-value is 6.096 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in task initiation between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found

after 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable task initiation of school going adolescents of Bahrain. There are several previous studies exploring the effects of executive function skills on task initiation skill. (Lenoir et al., 2007) has assignment constraints on visible seek conduct and decision-making ability in children football players. Without delay he found overall performance had been determined among players and nonplayers and throughout football players who differed in ability level. Whereas the Proportion Trainer pastime is intransigent with admire to task-initiation and motion problem, scientific and eye-monitoring measures display that inside those inflexible task constraints the students develop a vast variety of idiosyncratic sensorimotor schemes by which to discover and enact the movement form (Abrahamson & Abdu, 2020). This finding agrees with the ecological-dynamics framework of constraints-based sports pedagogy (Button et al., 2016) and supports coordination-dynamics analyses of individual pathways toward effecting the neuromuscular realization of a goal movement (Fuchs et al., 2012). This article tried to carry out taekwondo training program is pivotal for the implementation of executive function on the variable task initiation.

4.2.6. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Sustain Attention Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.6** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that calculated t-value is 3.989 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in sustain attention between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found After 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable sustain attention of school going adolescents of Bahrain. There are several previous studies exploring the effects of executive function skills on sustain attention skill. (Hajar et al., 2019) has reviewed the

most studies showed positive relationships between physical activity and sustained attention. In addition to being defined as a skill for maintaining focus and performance for a relatively long period of time, it is also the capacity to reply speedy to the goal stimulus in addition to the inhibition of responding to different stimuli (Mirsky et al., 1991). (Selouki et al., 2011) showed a comparison between motor function and sustained attention in children. (Alilou et al., 2012) has compared executive functions and sustained attention in students. (Azizpour et al., 2014) have compared the sustained attention and reaction speed of patients with multiple sclerosis. Sustained attention advanced normal in phrases of decreased fee errors; this will indicate much less mindlessness and less attentional slip-ups in 'actual life' (Robertson et al., 1997). Our experimental field studies support the established findings that the skill based taekwondo training program was considered as the most effective treatment program on executive function on the variable sustain attention of school going adolescents of Bahrain.

4.2.7. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Planning Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.7** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 4.756 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in Planningbetween the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found After 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable Planningof school going adolescents of Bahrain**.** Planningallows developers to efficiently gain insight into their work and effectively frame priorities for planning and improvement (Felten, et al.2013). (Bieleke, et al.,2021) identify the potentials and pitfalls of using if-then plans to enhance sports-related performance, discuss promising routes for future research, and derive practical implications for athletes and coaches. However, a wonderful courting is determined among help structures for coaches and profession awareness, profession planning, and profession transition

needs (Lavallee, 2006). Acute resistance exercise has a positive effect on cognition and contributes to improved quality of planning, working memory, and inhibition aspects of executive function (Chang et al., 2021). Acute exercise benefits planning, and the types of planning and the time points at which they were assessed modulate the relationship between acute exercise and executive function (Chang, et al., 2013).

Our results expand the existing literature by demonstrating that the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable Planningof school going adolescents.

4.2.8. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Organization Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.8** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 6.676 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in organization between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found after 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment program on executive function on the variable organization of school going adolescents of Bahrain. (Epstein, et al.,2013) shows that centered educational competencies interventions have the capability to enhance usual educational performance among children with attention-deficit/hyperactivity disorder with the help of 8-week organization skills intervention. Children with ADHD show off multi setting, broad-primarily based totally organizational impairment (Harmon et al.,2018). it's been cited that organizational troubles can be related to ability deficits (now no longer having the ability) and overall performance deficits (now no longer having sufficient motivation to carry out the skill) in addition to with the neurocognitive features that can underlie unique organizational skills (Abikoff et al., 2013). A sports psychology representative and the issues encountered in addition to the significance of growing and keeping right limitations inside the organization, problems associated

with the goodness of healthy among the expert recreation organization and the game psychology representative are addressed (Neff,1990).In other hand training improves the learning and individual performance of sport managers, as well as the organizational performance of in five Canadian national sport organizations (NSO)(Millar & Stevens, 2012). In this context we can include our study to contribute to the literature by improvising the treatment program in executive function on the variable organization skill.

4.2.9. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Time Management Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.9** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 4.34 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in time management between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found after 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment program on executive function on the variable time management of school going adolescents of Bahrain. It can be said that this research matches up with the study results of (Yağmur and Ocak, 2012) wherein physical trainer and game university students' recreation sports and different branch students' leisure activities are compared. Where they have found stated that physical education and sport college students use the time more efficiently than the different branch students. (Ebrahimi ,2014) tested the time management skills of head nurses and staff nurses and stated that head nurses are more successful about time management. (Kibar, 2014) found that third grade students are extra a success than the 4th grade students in phrases of time control skills. The reviewed studies are presented and discussed in four general areas: how time has been conceptualized, how time has been measured, what is recognized approximately how time is spent in bodily schooling and recreation settings, and what continues to be left to be recognized approximately time-associated events (Metzler,1989). However, results

of the study contribute to the literature by improvising the treatment program in executive function on the variable time managements skill.

4.2.10. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Flexibility Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.10** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 4.814 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in flexibility between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found after 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable flexibility of school going adolescents of Bahrain. It can be said that this research matches up with the study results of (Benjamin, et al.,2014) Has discover on measures of cognitive flexibility, running memory, and verbal fluency on musicians and non-musicians. They found that musically trained children showed enhanced performance on measures. As (Merritt et al.,2002) believed that the more intensive activities improve the higher order of thinking skills of primary grade students. (Brezovszky et al.,2019) has confirmed that experimental group outperformed the manipulate institution on adaptive range understanding and math fluency. various outcomes of the schooling in one of a kind grade level, with greater reported development of students' adaptive quantity expertise in grade fives. However, results of the study contribute to the literature by improvising the treatment program in executive function on the variable time flexibility skill.

4.2.11. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Metacognition Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.11** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 3.689 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in metacognition skill between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found After 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable metacognition skill of school going adolescents of Bahrain. We have seen that the model comparison approach allows many different model comparisons even in the case of simple experiments. In our discussion of our example in terms of face-to-face studying contexts, the big consequences of metacognition and studying techniques on students' studying fulfillment were extensively studied (Asikainen et al., 2018; Efklides, 2018; King & McInerney, 2016). In reading the self-regulated gaining knowledge of strategies (metacognitive factors), numerous research has corroborated that scholars with higher ranges of self-law executed better getting to know outcomes (Chatzistamatiou et al., 2015; González et al., 2016). Moreover (Keshavarz & Ghamoushi,2014) has study of metacognitive awareness of reading strategies among monolingual and bilingual Iranian English literature learners which revealed significant differences between monolingual and bilingual. Metacognition appeared to be related to organizational skill of learning, and with the manner freshmen rate their ability. Finally, the results indicated that skill based taekwondo training have positive effect on female Adolescence.

4.2.12. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Goal-directed persistence Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.12** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 4.019 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was

revealed that there is a significant difference in goal-directed persistence skill between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found after 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment program on executive function on the variable goal-directed persistence skill of school going adolescents of Bahrain. The novelty of the goal-directed resilience education defined right here is underscored whilst different investigators comment on the absence of research on goal-directed action in clinical and mental health research (Brandstätter, et al.,2012). The pursuit of personally meaningful goals is essential for individuals' well-being and life adjustments (Brunstein et al., 1999). The results of the study play a crucial role in enhancing the existing literature and the treatment program in executive function on the variable goal-directed persistence skill.

4.2.13. Discussion Pertaining to the Effects of Skill Based Taekwondo Training Program in Executive Function of Experimental and Control Group on the Variable Stress Tolerance Among School Going Adolescents of Bahrain –

The results of Analysis of Covariance Table **4.1.13** demonstrate significant difference among experimental group and control group at the post-test stage of after 12 weeks of skill based taekwondo training program it was found that the calculated t-value is 6.510 (>1.66 at 0.05) and the p-value is. 0.00 (<.05) which are not statically significant at 0.05 level of significance. It was revealed that there is a significant difference in Stress Tolerance skill between the Experimental Group and Control Group during the post-test. However, based on these adjusted mean values we found after 12 weeks of taekwondo training on Experimental Group mean value is higher than the Control Group. Therefore, based on these findings the skill based taekwondo training program was considered as the most effective treatment Program on executive function on the variable stress tolerance skill of school going adolescents of Bahrain. Multiple studies have revealed a concerning decline in the mental well-being of college students attributed to stress, leading to higher rates of depression (Lonville et al., 2008; Dyson & Renk, 2006; Benton et al., 2002). Furthermore, a study demonstrated notable enhancements in motor reactivity, stress tolerance, and divided attention following a 5-month karate training period (Böckelmann et al., 2016). Our findings support

previous research indicating that intense training or external stress can elevate physiological stress, resulting in reduced levels in elite athletes (Andou et al., 2011). This study contributes to the existing literature by refining the treatment program for executive function regarding stress tolerance skills.

CHAPTER V

SUMMARY

AND

CONCLUSIONS

CHAPTER V

SUMMARY AND CONCLUSIONS

5.1 SUMMARY

The purpose of the present study was to measure the effect of skill based taekwondo training program on executive functions among school going children of Bahrain. Divide it into two sections in order to achieve the goal of the study. Thus, considering the aim of the present study, different objectives were set up. In the context various objectives of the study different hypotheses were framed. A total of 80 females aged twelve to sixteen, were chosen to be the subjects from the Indian School of Bahrain. Further groups are divided into two groups, Experimental group (N = 40) and Control group (N = 40). A pretest was conducted, and the experimental group was undergoing their respective training program for 3 days a week for 12 weeks. The one-hour, skill-based Taekwondo training program included blocking, stepping, and Taekwondo kicks on a kicking pad. Data for the present study were obtained using an executive function questionnaire to measure the effect of taekwondo training program in executive function skills on school going adolescents in Bahrain. This study has shown the difference between the trained taekwondo players and normal school going students of Bahrain. It has shown significant results for the effect of skill-based taekwondo training program on executive function of school going adolescents. This insolvency makes precise of all the preceding chapters, in addition with the conclusion, suggestion and application of the present research work.

Chapter 1. Taekwondo is a martial art that fosters both mental and physical growth. Taekwondo training significantly impacts executive function, particularly in adolescents, by fostering crucial cognitive and behavioral skills. For adolescents, who are in a critical developmental stage for executive function, Taekwondo offers structured practice that enhances attention, impulse control, and emotional regulation. The disciplined nature of Taekwondo requires young practitioners to concentrate on complex techniques and adhere to rigorous routines, which strengthens their ability to focus and manage distractions. Maintaining a balanced improvement in fundamental fitness parameters facilitated by regular Taekwondo training (Per Cho et al., 2018). Furthermore, the sport's emphasis on self-control and goal setting helps adolescents develop persistence and resilience, crucial for navigating academic and social challenges. Benefits of martial arts,

especially Taekwondo, for children and adolescents, despite the numerous intentional edges associated with the sport receiving more attention from adults (Lakes & Hoyt, 2004). By facing and overcoming physical and mental obstacles in training, adolescents learn to regulate their emotions and perform under pressure, thereby improving their stress tolerance. Overall, Taekwondo training provides adolescents with valuable tools for self-regulation and goal achievement, supporting their growth into more capable and resilient individuals. The study investigates how a skill-based Taekwondo training program influences executive functions in school-going adolescents in Bahrain. The program, tailored to enhance specific Taekwondo skills, aims to improve cognitive abilities such as attention, working memory, and cognitive flexibility. Preliminary findings suggest that participation in this structured physical activity positively impacts these executive functions, potentially leading to better academic performance and improved behavioral outcomes. The research highlights the benefits of integrating skill-based sports training into educational settings, emphasizing its role in holistic adolescent development. Overall, the study underscores the value of Taekwondo as more than just a physical exercise, illustrating its broader cognitive and educational benefits.

Chapter 2 Dealt with the review of literature that was related to the theme of the study. The literature on the impact of skill-based Taekwondo training on executive functions among adolescents suggests several key benefits. Studies indicate that Taekwondo, with its focus on technique, precision, and discipline, enhances cognitive functions such as attention and working memory. This is attributed to the complex nature of the sport, which requires mental focus and the ability to execute intricate movements. Research highlights that taekwondo training fosters self-regulation and impulse control, which are critical components of executive function. By engaging in repetitive practice and strategic thinking during training, adolescents often experience improvements in their ability to plan, organize, and execute tasks effectively. Additionally, the structured and goal-oriented nature of taekwondo may contribute to better cognitive flexibility, allowing adolescents to adapt to new situations and solve problems creatively. Studies also suggest that engaging in physical activities like taekwondo helps reduce stress and anxiety, which in turn creates a more favorable environment for cognitive performance and learning. The sport demands quick thinking and adaptability, as practitioners must frequently adjust strategies based on opponents' actions. This dynamic environment promotes cognitive flexibility, enabling adolescents to switch between tasks and thoughts more efficiently. Overall, the literature

underscores the positive relationship between taekwondo training and enhanced executive functions, advocating for its inclusion in school programs to support holistic development in adolescents. Several studies have documented these benefits. For example, controlled trials have shown that martial arts training can lead to improvements in executive functions compared to other forms of physical activity. Additionally, longitudinal studies suggest that the cognitive benefits of taekwondo extend beyond the training period, potentially leading to long-term enhancements in executive functions.

The literature supports the notion that Taekwondo training offers significant cognitive benefits, particularly in enhancing executive functions among adolescents. By enhancing focus, memory, flexibility, and self-control, Taekwondo supports developmental programs designed to improve cognitive and behavioral outcomes in young people. Research was done by (Capranica et al., 2016) using a randomized controlled trial to examine how physical-cognitive dual-task training affected older individuals' executive function and gait performance. (Nagatomi, 2015) researched "executive function during and after acute moderate aerobic exercise in adolescents." (Kim, 2015) worked on the effect of regular taekwondo exercise on Brain-derived neurotrophic factor and Stroop test in undergraduate students. (Gothe, et al., 2014) researched the impact of an 8-week hatha yoga session on executive function in older adults. (Gothe et al., 2013) investigated the acute effects of yoga on executive function. (Arastoo, et al., 2013) worked on the healthy for life taekwondo pilot study: a preliminary evaluation of effects on executive function and BMI, feasibility, and acceptability. (Bisanz et al.,2013) considered executive attention in the improvement of math aptitudes in children in Grades 2–4. (Mohammadi et al., 2013) explored the link between executive functioning ratings and academic achievement in a cross-cultural study (Bherer, 2013) investigated a decline in executive control during acute bouts of work out as a work of work out intensity and wellness level. Results from the SEKWONDO study. (Etnier & Chang, 2009) researched the effect of physical activity on executive function: a brief commentary on definitions, measurement issues, and the current state of the literature. (Dowsett & Livesey, 2000) attempted to support children's development of inhibitory control by examining the results of "executive skills" training. Although there are many youth programmes that aim to reduce behavioral problems and are encouraged by research, there is still a lack of research on the promotion of positive youth development. It's likely that individuals in those studies chose to train in martial arts because it fit with their ethical standards.

Although many youth programs aim to reduce behavioral problems and are encouraged by research, there is still a lack of research on the promotion of positive youth development. Individuals in those studies likely chose to train in martial arts because it fits with their ethical standards. The effectiveness of executive function is studied using a variety of tasks, physical activity, goal orientation, self-regulated learning, achievement evaluations, and self-efficacy; however, martial arts are the subject of very few studies. Though previous studies were conducted with other age categories, its implementation with executive function at the school level is still inadequate in Bahrain. Published studies related to the acquisition and implementation of executive function in Bahrain's educational background are a few to date. To help teachers, coaches, and educators identify talents and support the behaviors needed to plan and achieve goals, there is not enough research. This executive functioning can help educational institutions in strategically adopting and implementing Taekwondo on campus, particularly in Bahrain. The goal of the present study is to evaluate how a skill-based Taekwondo training program affects executive functioning in Bahrain adolescents participating in school the acute effect of a 12-week Taekwondo training program that is skill-based and lasts 60 minutes.

Objectives of the Study

The objectives of the study are to investigate whether skill-based taekwondo training program effect on executive function of school going adolescents of Bahrain.

1. To identify the effect of skill-based taekwondo training program on executive function of school going adolescents of Bahrain
2. To find out the effects of skill-based taekwondo training program on the response inhibition skill of adolescents of Bahrain
3. To determine the effects of skill-based taekwondo training program on working memory skill and their impact on adolescents of Bahrain
4. To understand the effects of skill based taekwondo training program for emotional control skill and its impact on the adolescents of Bahrain
5. To study the impact of skill-based taekwondo training program process on the task initiation skill of adolescents of Bahrain

6. To study the impact of skill based taekwondo training program on the sustained attention skill of the adolescent of Bahrain
7. To identify the effect of skill based taekwondo training program on planning skill of the adolescents of Bahrain
8. To evaluate the effects of skill based taekwondo training program on the organization skill of the adolescent of Bahrain
9. To find out the effects of skill-based taekwondo training program on time management skill on adolescents of Bahrain
10. To study the impact of skill based taekwondo training on the flexibility skill of the adolescents of Bahrain.
11. To identify the skill based taekwondo training on metacognition skill of the adolescents of Bahrain.
12. To determine the effect on goal directed persistence skill on adolescents while implementing skill based taekwondo training process.
13. To study the impact of skill based taekwondo training on the stress tolerance skill of the adolescent of Bahrain.

Hypotheses of the Study

H1 - There is significant effect of skill based taekwondo training program on executive function of school going adolescents of Bahrain.

H2 - There is significant effect of skill based taekwondo training program on response inhibition of school going adolescents of Bahrain

H3 - There is significant effect of skill based taekwondo training program on working memory of school going adolescents of Bahrain

H4 - There is significant effect of skill based taekwondo training program on emotional control of school going adolescents of Bahrain

H5 - There is significant effect of skill based taekwondo training program on flexibility of school going adolescents of Bahrain

H6 - There is significant effect of skill based taekwondo training program on sustained attention of school going adolescents of Bahrain

H7 - There is significant effect of skill based taekwondo training program on task initiation of school going adolescents of Bahrain

H8 - There is significant effect of skill based taekwondo training program on planning of school going adolescents of Bahrain

H9 - There is significant effect of skill based taekwondo training program on organization of school going adolescents of Bahrain

H10 - There is significant effect of skill based taekwondo training program on time management of school going adolescents of Bahrain

H11 - There is significant effect of skill based taekwondo training program on goal-directed persistence of school going adolescents of Bahrain.

H12 - There is significant effect of skill based taekwondo training program on metacognition of school going adolescents of Bahrain.

H13 - There is significant effect of skill based taekwondo training program on stress tolerance of school going adolescents of Bahrain.

Chapter 3 Detailed the research methodology, covering various aspects such as the research design and sampling techniques used. The chapter outlines the research instruments and statistical analysis approach used in the study, which employed a pre-test, mid-test, and post-test randomized group design. The study involved 80 females from the Indian School of Bahrain, divided into an experimental group (n = 40) and a control group (n = 40). The experimental group underwent a taekwondo training program, 3 days a week for 12 weeks, including skills such as kicks, steps, and blocks, led by a qualified instructor. The control group received no training. Data were collected at pre-test, mid-test (after 6 weeks), and post-test stages. Statistical analysis included mean, standard deviation, and paired sample T-tests.

Chapter 4 focused on analyzing data concerning the impact of a skill-based Taekwondo training program on executive functions in school-going adolescents in Bahrain. The results of this analysis are summarized below:

1. In Table 4.2.1, the calculated t-value is 6.93 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance at the 0.05 level. This demonstrates the effectiveness of the Taekwondo program compared to the Control Group on Executive Function.
2. In Table 4.1.2, the calculated t-value is 4.876 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance at the 0.05 level. This shows the program's effectiveness in improving the variable response inhibition compared to the Control Group.
3. In Table 4.2.3, the calculated t-value is 5.078 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance at the 0.05 level. This demonstrates that the program was effective in improving Working Memory compared to the Control Group.
4. In Table 4.2.4, the calculated t-value is 5.637 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance at the 0.05 level. This shows that the program was effective in improving Emotional Control compared to the Control Group.
5. In Table 4.2.5, the calculated t-value is 6.096 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), indicating statistical significance. This demonstrates that the Experimental Group's Task Initiation score was significantly higher than the Control Group's, highlighting the program's effectiveness.
6. In Table 4.2.6, the calculated t-value is 3.989 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This shows that the Experimental Group's Sustained Attention score was significantly higher than the Control Group's, demonstrating the effectiveness of the Taekwondo training program
7. In Table 4.2.7, the calculated t-value is 4.756 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This shows that the Experimental Group's mean Planning score was significantly higher than the Control Group's, highlighting the program's effectiveness.
8. In Table 4.2.8, the calculated t-value is 6.676 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This demonstrates that the

Experimental Group's Organization score was significantly higher than the Control Group's, reflecting the taekwondo training program's impact.

9. In Table 4.2.9, the calculated t-value is 4.344 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This shows that the Experimental Group's Time Management score was significantly higher than the Control Group's, demonstrating the effectiveness of the Taekwondo training program..
10. In Table 4.2.10, the calculated t-value is 4.814 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This demonstrates that the Experimental Group's Flexibility score was significantly higher than the Control Group's, highlighting the program's impact.
11. In Table 4.2.11, the calculated t-value is 3.689 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This reveals a significant difference in metacognition skills between the Experimental Group and the Control Group during the post-test, demonstrating the program's effectiveness.
12. In Table 4.2.12, the calculated t-value is 4.019 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This shows a significant difference in goal-directed persistence skills between the Experimental Group and the Control Group during the post-test, reflecting the impact of the Taekwondo training program.
13. In Table 4.2.13, the calculated t-value is 6.510 (greater than 1.66 at 0.05), and the p-value is 0.00 (less than 0.05), both indicating statistical significance. This reveals a significant difference in stress tolerance skills between the Experimental Group and the Control Group during the post-test, with the Experimental Group's Stress Tolerance score being higher, demonstrating the program's effectiveness

5.2 CONCLUSIONS

1) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage on executive function skill. This training may boost in skills can lead to better academic performance, improved focus, and greater self-regulation for students.

2) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable response inhibition skill. This advancement in response inhibition can lead to better self-control, improved decision-making, increased focus, and enhanced emotional regulation among students.

3) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable working memory skill. This enhancement in the training program boosts working memory, allowing students to recall information instantly when needed. This improvement leads to better academic performance, enhanced problem-solving skills, and more effective multitasking.

4) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable emotional control skill. This training appears to enhance individuals' ability to remain focused on tasks and maintain dedication, without letting personal emotions disrupt their commitments.

5) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable task initiation skill. This enhancement program may improve task initiation, enabling students to motivate themselves to start and complete tasks on time, embrace new challenges, and persist with determination until the task is finished.

6) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable sustain attention skill. This enhancement in the training program improves sustained attention, allowing individuals to remain focused and undistracted by their surroundings.

7) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable planning skill. This advancement helps adolescents develop effective planning abilities, including setting goals, defining strategies, and organizing tasks and schedules to achieve objectives. It also involves anticipating challenges and efficiently managing resources and actions.

8) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable organization skill. This development enhances adolescents' ability to complete tasks efficiently by keeping information and necessary materials well-organized and easily accessible.

9) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable time management skill. This development helps adolescents effectively prioritize tasks and manage their time, reducing procrastination and ensuring they stay focused on their responsibilities.

10) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable flexibility skill. This training effectively enhanced adolescent's ability to embrace change, adapt solutions, and improvise to manage different situations.

11) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable metacognition skill. This training seems to refine individuals' capacity for self-assessment and evaluation of their work's effectiveness, cultivating skills such as self-reflection and introspection that contribute to improved personal growth and productivity.

12) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable goal directive persistence skill. This training appears to strengthen individuals' willpower, enabling them to remain steadfast and focused on their goals, undeterred by distractions.

13) The selected training program of skill based taekwondo training program on school going adolescents of Bahrain, experimental group and control group have shown significant difference during post-test stage in executive function on the variable stress tolerance skill. This study suggests that the training may improve individuals' capacity to perform effectively under pressure.

5.3 SUGGESTIONS

1. It is suggested to conduct similar research specifically targeting male adolescents to determine whether Taekwondo training has differing effects on executive functions based on gender.
2. Present study was conducted on the papulation of Bahrain and future study can conduct on any other country.
3. Similar study on a larger scale in different states or countries to evaluate the effectiveness of Taekwondo training across various educational and cultural contexts.
4. In future research it is suggested to include students at primary, elementary, and college levels to explore how Taekwondo training impacts executive functions at different stages of academic and personal development.
5. Comparative study between Taekwondo and other martial arts to assess how different martial arts disciplines affect executive functions in adolescents.
6. It is suggested to investigate the potential benefits of Taekwondo training for children with Attention-Deficit/Hyperactivity Disorder (ADHD) to manage and improve executive function skills specific to this condition.
7. Another new treatment programs incorporating other individual sports, such as Judo or Karate, to compare their effects on executive function skills can be developed to provide a broader perspective on effective interventions.

8. Include competitive phases within the Taekwondo training program to identify and address potential skill gaps in executive functions that may arise under competitive conditions.
9. Conduct similar studies to evaluate how different educational training programs influence executive function skills, thereby providing a broader understanding of effective strategies for enhancing these skills.
10. Undertake exploratory research to identify strategies and interventions that can help reduce weaknesses in executive function skills, enhancing overall cognitive and behavioral outcomes.
11. Expand the scope of the treatment programs to include team sports, examining their impact on executive function skills and comparing these effects with those of individual sports.

5.4 RECOMMENDATION OF THE RESEARCH

1) It has been recommended to include this type of training program should be elemental primary, elementary, and college-level students to explore how Taekwondo training impacts executive functions across various stages of academic development.
2) It has been recommended to the findings of this research can be considered to discover the results of any training on any given group of individuals. It will enable us to put these abilities to use on a regular basis for learning, working, managing our lives, following instructions, and managing our emotions, among other things.
3) It has been recommended to the Psychiatrists, researcher, and professionals can use this study for screening and Identifying drawbacks, weaknesses, and the skills where one is doing well but needs to be nurtured.
4) This study can be very useful in preventing the youth at risk of Attention-deficit/hyperactivity disorder.
5) The study has highlighted the significance of ‘sports’ for improving their overall well-being and benefits in their life.
6) It has been recommended to reduce screen time and encourage active engagement. limiting passive screen time and increasing real-world interactive experiences can help strengthen working memory and attention span.
7) It has been recommended to teachers, coaches, and educators to find out talents and facilitate the behaviors required to plot and gain goals on this Executive functioning helps.

The essential competencies associated with feature encompass talent in adaptable thinking, planning, self-monitoring, self-control, operating memory, time management, and organization.

8) It has been recommended to that different treatment program comprising of selected essential abilities associated with characteristic consist of talent in adaptable thinking, planning, self-monitoring, self-control, running memory, time management, and organization.
9) It has been recommended to this study has highlighted the significance of 'sports to develop their executive functions skills. Therefore, it can be applied in prisons around the world for the management of Executive functions skills -Response inhibition, working memory, Emotional control, Flexibility, Planning, Sustained attention, Task initiation, Organization, Time management, Goal-directed Persistence, Metacognition and Stress Tolerance.
10) The study empowering the new generation with strong executive function skills will not only help them succeed academically but also equip them with the life tools needed to lead, adapt, and thrive in a fast-changing world.
11) Finally, it has been strongly recommended to the school's organizations some sort of training program should be held, so that students can develop their Executive function skill and personality towards their educational career and get motivation for academic achievement and side by side ignore the conflict regarding their roles.

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APPENDICES

"Executive Function Questionnaire for Adolescents" (2023)

Title of scale: - Executive Function Questionnaire for Adolescents

Name: Dipshikha Baruah
Registration No.42000221
Ph.D. Scholar (Physical Education)
University: Lovely Professional University, Phagwara, Punjab, India.

Supervisor Name: Dr. Neelam K Sharma
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University: Professor, Lovely Institute of Education, Lovely Professional University, Phagwara, Punjab, India.

Co-Supervisor : Dr. Aruna Rani
University: Assistant Professor, Govt. College, Hoshiarpur, Punjab.

Section I

Please provide the correct information for each of the following. All information will be used, strictly for research purposes. Please put a right (√) in the block for yes responses

1. **Name: ……**
2. **Gender:** Male ☐ Female ☐
3. **Age:** 12 to 16 years ☐
4. **Class: …….**
5. **School Name: …….**
6. **Contact**: ……...
7. **E-mail Id**: ……...
8. **Annual Income of Guardian: …….**
9. **Area:** Rural ☐ Urban ☐

Section II

Questionnaire Relating in Executive Skills for Adolescence

Everyone has challenges and obstacles in these skills but we also got solutions and strengths to overcome in these skills based on our situation. Once you've read each item, rate it according to how much you agree or disagree that it describes you. Using the rating system, ascertain the accurate score. Mark (✓) the number box if your response fits in there. More truthfulness from you will provide more precise outcomes.

Strongly disagree	Disagree	Tend to Disagree	Neutral	Tend to agree	Agree	Strongly agree
1	2	3	4	5	6	7

Please click (√) your preferences on the scale 1 to 7 SD = Strongly Disagree, D = Disagree, TD =Tend to Disagree, N = Neutral, TA = Tend to agree, A = Agree, SA = Strongly Agree (Strongly Disagree-1, Disagree-2, Tend to Disagree -3, Neutral-4, Tend to agree-5, Agree-6 and Strongly Agree-7)								
SL	**Statements**	**SCORE**						
1	**RESPONSE INHIBITION** **Response inhibition** is the ability of analyse circumstances before jumping to the conclusion							
		SD	**D**	**TD**	**N**	**TA**	**A**	**SA**
1.1	I analyze before I jump to the conclusions	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1.2	I am aware of my goal	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1.3	I always present myself with facts	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
2	**WORKING MEMORY** **Working memory** is the ability that helps a person to recall information instantly when ever required							
2.1	I can recall information quickly	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.2	Usually I do not forget facts, dates, and details	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.3	Doing everyday tasks and skills I never face any difficulty	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
3	**EMOTIONAL CONTROL** **Emotional control** is the ability that allows a person to concentrate on a task dedicatedly without letting their personal emotions intervene his commitments.							
3.1	I determined to perform better	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.2	Emotions never effect on my performance	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.3	During task time I never switch or shifts my mood	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Total score-							
4	**TASK INITIATION** **Task initiation** is an ability to motivate oneself to complete the task on time, accept and overcome new challenges, and to stay rigid with full determination to complete the task.							
4.1	I stay perseverant until the tasks are complete	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.2	I smartly handle any task	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.3	I stick on my work schedule	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
5	**SUSTAIN ATTENTION** Sustained attention can be described on a person who cannot be distracted by surrounding							
5.1	I am focused on my work	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5.2	I put my full dedication in my work	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5.3	If I take up a challenge, I make sure I finish it	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
6	**PLANNING /PRIORITIZING** **Planning and prioritization** are two different skills which is required to complete one task successfully on time.							
6.1	I always stick to my plan	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6.2	I focus on most important task and solve it on priority	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6.3	I keep time schedules for my work	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
7	**ORGANIZATION** **Organization** is a skill which is very essential in a task completion this skill helps to execute the task in a smooth way keeping all the information and required materials easily reachable							
7.1	I plan all my work	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7.2	I don't do any unorganized work	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7.3	I never did any work disordered	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
8	**TIME MANAGEMENT** **Time Management** is a skill which lead a person in such a way that procrastination will never have a place in their life. They always give priority to time							
8.1	I always complete my assignment on time.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8.2	I utilize my time effectively.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8.3	I never postpone my task till due date.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
9	**FLEXIBILITY** **Flexibility** is the ability to accept the changes, adapt the available solution and improvise according to circumstances to overcome the situation							
9.1	Under any circumstances I adjust with the situation.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9.2	I can adapt and always adapt the changes in my schedule as per requirement.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9.3	I can deal with any uncertainties.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
10	**METACOGNITION**							

	Metacognition is a skill to evaluate their won performance level and effectiveness of their work. it is like self-questioning and nurturing their abilities for better inputs							
10.1	I evaluate my performance & strategies on regularly and try to improve.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10.2	I evaluate situations and calculate risk factors before I jump into it.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10.3	Before using any skill, I always evaluate its effectiveness.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
11	**GOAL DIRECTIVE PRESISTANCE** **Goal-Directed Persistence** is the capacity of a person's will power to stay rigid on their path to achieve their goals without being distracted							
11.1	My goals are always set in a high-level way	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11.2	I always make sure to achieve the benchmark of my goal	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11.3	I keep on working to achieve my goals not being affected by difficult situation	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							
12	**STRESS TOLERANCE** **Stress Tolerance** is the ability to perform under pressure							
12.1	I can work in a compose manner whatever the situation is.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12.2	The frequency of stress is always control by my mind	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12.3	I can work promisingly controlling my anxiety	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Total score-							

Your executive skills strength
(Lowest score)

Your executive skills weaknesses
(Highest score)

A self-assessment that you can use to evaluate your leadership skills. The 36 items in this survey yield scores in 12 areas of leadership, which we refer to as competency areas. The scores below are the average score for each competency area and can range from 1 to 7. The lower the score, the stronger your skills in that area. A score of 3 or lower means that you have rated the items on this scale as "Strongly Disagree," " Disagree," and " Tend to Disagree," so any competency area with a score of 3 or less may be problematic for you.

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The Indian School
KINGDOM OF BAHRAIN
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المدرسة الهندية
مملكة البحرين
ISO ٩٠٠١:٢٠١٥ المؤسسة

Date: 25.05.2023

To Whomsoever It May Concern

This is to certify that Mrs. Dipshikha Baruah, a Trained Graduate Teacher (TGT) of The Indian School, Bahrain has conducted a 12 week skill based Taekwondo training program consists of 36 classes of one hour each on the adolescent students of our school from 3rd January 2023 to 20th April, 2023. We also understand that she is a PhD Research Scholar of Lovely Professional University, who is also a Taekwondo 3rd dan black belt holder.

Best regards

V R Palaniswamy
Principal