Athens Journal of Sports - Volume 11, Issue 3, September 2024 – Pages 165-178

Effectiveness of Stretching Routines in Enhancing Kicking Performance

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This study was undertaken primarily to determine the effectiveness of stretching routines in enhancing kicking performance in Karate. Quasi-experimental design was used, involving two (2) karate classes, involving a total of 62 participants. The combined stretching routine of Hamstring Stretch and Seat Straddle Lotus were used for Stretching Routine 1 and Side Split and Seat Side. Straddle Lotus were employed for Stretching Routine 2. Matching was observed, and Wilcoxon signed rank test was used to determine the difference between the pretest and post test scores of the students; and the Mann-Whitney U Test was used to determine the difference between the performance of the two groups. The study revealed that the majority of the participants' kicking performance showed the need for improvement during the pretest. After administering the stretching routines, with one group using the Hamstring Stretch and Seat Straddle Lotus, and another Side Split and Seated-Side Straddle, it was found that the two (2) groups' kicking performance improved to a 'good' level. A significant difference was found between the pretest and posttest, implying an improvement in their kicking performance and level of flexibility. The increment of the two groups' performance did not significantly differ; hence, both the stretching routines are equally effective in enhancing the kicking performance of the students.

Keywords: *flexibility, hamstring stretch, seat straddle lotus, side split, seat side straddle*

Introduction and Literature Review

Karate, as martial arts and system of self-defense, originated hundreds of years ago in Okinawa but was greatly influenced by an even older tradition from the state of China (Cowie & Dyson 2016). Karate-do is one of the most popular martial arts in the world which involves using the body as an ultimate weapon against various forms of attacks (Cynarski 2017). It consists of different techniques of blocking, punches, and kicks to deliver an effective means of defense and offense. Although arms are commonly used in Karate, since the legs are normally used to support the body, they are utilized more (Oyama 1998). The legs are also much stronger than the arm, and because of its superior length the legs are used to attacking from a greater distance, thus, to develop sufficient strength and flexibility of legs is to therefore acquire the strongest weapon in an unarmed man's arsenal (Gavagan & Sayers 2017). This is apparent in Karate competitions wherein most of the winning blows are delivered by the leg,

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https://doi.org/10.30958/ajspo.11-3-3 doi=10.30958/ajspo.11-3-3

particularly through the roundhouse kick *(mawashi-geri)* (Sterkowicz & Franchini 2009).

However, effective technique performance is not done overnight. Before progressing to formula of techniques, every Karate student must be prepared and conditioned physically to prevent injuries and strains in the execution of techniques; hence, as a Karate student, it is imperative to be physically fit and to be flexible with the aid of different routines (do Nascimento et al. 2023).

Among the many problems encountered by Karate Instructors is the flexibility of the kicking legs (do Nascimento et al. 2023). But flexibility is not limited to athletes alone- an awareness of proper stretching techniques may also benefit non-athletes or non-Karate practitioners (Law et al. 2009). As observed, only a few who exercise take the time to stretch, and only a few of those who stretch do it properly (Ayala et al. 2013). When joints are not regularly moved through their entire range of motion, muscles and ligaments shorten in time and flexibility decreases- without proper stretching, even if one does regular exercise such as running, cycling, or aerobics, there is a tendency that muscles and ligaments to tighten (Walker 2013). Most fitness participants underestimate and overlook the contribution of good muscular flexibility to overall fitness leading to muscular and skeletal problems and injuries (Slobounov 2008). In daily life, one often must make rapid or strenuous movements and abruptly forcing a tight muscle beyond its achievable range of motion may lead to injury (Hoeger & Hoeger 2014).

In developing flexibility, it is apt to remember that it is a complex skill which requires several skills subsets and is affected by several factors (Batista et al. 2019). Hoeger & Hoeger (2014) cite the benefits of good flexibility which include promoting healthy muscles and joints, improving elasticity of muscles and connective tissue around joints and enabling greater freedom of movements and the individual's ability to participate in many types of sports and recreational activities. Adequate flexibility also makes activities of daily living much easier to perform (Tidman & Skotzke 2020). Taking part in a regular stretching program increases circulation to the muscles being stretched, prevents low back and other spinal column problems, improves and maintains good postural alignments, promotes proper and graceful body movement, improves personal appearance and self-image, and helps in the development and maintenance of motor skills throughout life (Behm et al. 2016).

Regular stretching helps decrease the aches and pains caused by psychological stress and contributes to a decrease in anxiety, blood pressure and breathing rate (Kwok et al. 2019). Stretching also helps relieve muscle cramps encountered at rest or during participation in exercise (Maughan & Shirreffs 2019). Mild stretching exercises in conjunction with calisthenics are helpful in warm-up routines to prepare for more vigorous aerobics or strength-training exercises and in cool down routines following exercise to facilitate the return to a normal resting state (Draper 2016). Fatigued muscles tend to contract to a shorter than average resting length and stretching exercises help fatigued muscle re-establish their normal resting length (Colby et al. 2017).

Considering that flexibility is a component of health–related physical fitness, it is imperative for one to learn stretching as a primary technique. Regular stretching

exercises promote flexibility that permits freedom of movement, contributes to ease and economy of muscular effort, allows for successful performance in certain activities and provides less susceptibility to some types of injuries or musculoskeletal problems (Corbin et al. 2006). The critical role of stretching routine to man's physical fitness impels the researcher to conduct this study.

This study assumes that the stretching routines, specifically side-straddle lotus, hamstring stretch, side-split and seat-side straddle, are effective in developing flexibility as demonstrated by students' kicking performance. It also assumes that better flexibility is achieved through stretching routines as manifested through the performance of the roundhouse kick (*mawashi-geri*). Flexibility is very much needed when engaging in all types of activities, whether in sports or exercises (Law et al. 2009). However, many jobs that require sitting for long periods of time may result in muscles losing its elasticity, which diminishes joint flexibility resulting to shortened muscles and lack of mobility of the body (Nelson & Kokkonen, 2020). Good flexibility, which requires strong muscles, is an important means of injury prevention especially when engaging in activities such as Karate-do, swimming, track and field events, gymnastics and other martial arts, and even in everyday activities (Franchini & Herrera-Valenzuela 2021).

Most importantly, people with greater flexibility have greater reach (Knudson 2018). They can push off the rear leg and send their hips far forward without raising them. They can lift their knees and unload a kick as much as two feet greater stable range while stepping in. If caught, they are far less likely to lose their balance or be injured. If they overstep or slip and fall, they are more likely to recover without harm (Redmond 2008).

There are two types of flexibility. The first type is static flexibility which refers to the range of motions that can be achieved through a slow and controlled stretch. The second type is dynamic flexibility which refers to the range of motion achieved by quickly moving a limb to its limits (Burgess et al. 2009). The importance of flexibility can be best associated with almost all sporting events. Primarily, this is one of the many pre-requisites to become a good athlete in Karate-do as show through performance of the roundhouse kick (*mawashi-geri*).

Considering that basic kicking is emphasized for beginners, exercises like Front Kick (*Mae-geri*), Side Kick (*Yoko-geri*) and Roundhouse Kick (*Mawashi-geri*) are oftentimes repeatedly practiced. In particular, the study focuses on the Roundhouse Kick (*Mawashe-geri*) as this is the most difficult kick that most students find hard to execute (Abdel Fattah Alserssi 2014). Oyama (1998) mentions that the Roundhouse Kick (*Mawashi-geri*) starts by bending the knee and bringing it to the side position and the body is bent away from that side. Then, using a large circular motion, one extends the foot forward and strikes the jaw, face or side of the body of the opponent. If the timing is correct, this kick can express a tremendous amount of power. Roundhouse kicks are commonly used in sparring (*Kumite*) competitions because proper execution of the techniques earns a greater deal of points as compared to other attacks since the technique provides the participant a longer reach since the leg has obviously greater reach than the arms (Gavagan & Sayers 2017).

The succeeding paragraphs describe the stretching routines for implementation to help the body either warm up or cool-down for specific activities (Powers et al. 2009).

First is Hamstring stretches, specifically the Sitting Single Leg Hamstring Stretch. This stretch is done through sitting with one leg straight out in front and toes pointing upwards. The other foot is then moved towards the knee. The students will then let their head fall forward and reach towards their toes with both hands (Walker 2007). This stretch affects the semimembranosus, semitendinosus, and bicep femoris muscles. The first stretching exercise is the Hamstring stretches which one can do to prevent injuries. Hamstrings are often overlooked during strengthening because they are on the back of the body. Muscle imbalances often predispose people to injuries. Stretching hamstrings is also important to prevent back injuries. Tight hamstrings prevent the forward tilt of the pelvis causing more pain of the lower back. The lower back is not designed to withstand the forces exerted on it in a forward bending position when lifting. All three muscles act to flex the knee. This exercise is helpful for the roundhouse kick (*mawashi-geri*) as the semimembranosus and semitendinosus muscles are the ones which act to extend the hip (Eveleigh 2013).

Another exercise is the Seat-Side Straddle, also known as Reverse Side Hurdle Sitting or Siting Reach Forward Hamstring Stretch, which is a stretch executed by sitting on the floor and the legs are spread out in a half-split position, just like jumping over a hurdle, but seated (Walker 2007). The forearms (or elbows) are placed on the gap in the middle of the legs and the body is pushed downward, holding the final stretch for several seconds (Werner & Hoeger 2012). Seat-Side straddle targets the hamstrings, semimembranosus, semitendinosus, biceps femoris, extensor muscles and erector spinae (Walker 2007, Alaia 2010). This stretch is helpful for the roundhouse kick (*mawashi-geri*) as it is the initial position before kicking (Oyama 1998).

The first two stretches are done in combination as they both target the hamstring muscles, semimembranosus, semitendinosus, biceps femoris, extensor muscles and erector spinae. Stretching exercises which target the hamstrings are important in developing kicking as these muscles facilitate a better range of motion for hip flexors (Haddad 2014), for medial and lateral rotation of the hip (Park & Lim 2023), and for leg rotation during knee extension (Kimura 2023). Stretches targeted toward the hamstrings often indicate the viscoelastic and lengthening changes of the hamstrings, which means less tension and stress when the muscles are used (Meroni et al. 2010).

Next is the Seat Straddle Lotus, also called Groin Butterfly Stretch or Sitting Adductor Stretch, which refers to the stretch executed by sitting on the floor and the feet are brought close to the soles of the feet allowing them to touch each other. The forearms (or elbows) are placed on the inner part of the thigh and the legs are pushed downward, holding the final stretch for several seconds (Werner and Hoeger 2012). This stretch works on the inner thigh muscles in its basic version, specifically, the adductor muscles - adductor longus, brevis and magnus, and some muscles on the back of the thighs as well. The Seat Straddle Lotus is great because most people forget that they should think of their torso occasionally, but it can be

injured like any other body part (Knox, 2015). This stretch is important in the execution of the roundhouse kick (*mawashi-geri*) as adduction strength is important for kicking and acceleration (Jensen et al. 2014).

Lastly, there's the Side Split which refers to the stretch executed by sitting with the legs spread apart as far as possible to either side. This is a variation of the Sitting Wide Leg Adductor Stretch in which the hand touches both toes and leans forward until the chest almost touches the floor, with the leg kept flat on the floor (Walker 2007). This stretch targets transversus abdominis to compress abdomen and stabilize lumbo-pelvic region, it also targets the adductor longus, brevis and magnus (Walker 2007). It also employs deep pelvic floor to aid in firing transversus and obliques and erector spinae to stabilize torso. Target areas also include abdominals and hip extensors to stabilize pelvis and hip abductors concentrically to press carriage out, eccentrically on return (Merrithew 2009). The Side Split stretch develops the flexibility of the lower limbs, which is useful in a difficult kick like the roundhouse kick (*mawashi-geri*) (Penov & Chalukov 2019).

The second stretching combination both target adductor muscles- adductor longus, brevis and magnus, which provide a useful source of flexor and extensor torque at the hip (Sheng et al. 2016) and provide high levels of stability protection for the hip and knee of the pivot leg during a kicking motion (Chang et al. 2021). Each individual adductor muscle aids in femoral flexion and rotation (Nicholas & Tyler 2002). It is therefore important to properly stretch them as decrease in the strength of the adductor musculature can be the cause of an increased risk of injury in many sports and activities wherein changes of direction or accelerations are characteristic (Whittaker et al. 2015).

A decline in flexibility can cause poor posture and subsequent aches and pains that lead to limited and painful joint movement. Inordinate tightness is uncomfortable and debilitating (Hoeger & Hoeger 2014). This is supported by Corbin et al. (2006) who claimed that maintenance of flexibility is a life-long process. The reduced activity fosters loss of flexibility and the cycle continues. Thus, to give further emphasis to the importance of flexibility not just among athletes, but especially among non-athletes, this study attempted to determine the levels of flexibility of the Physical Education male Karate students using the stretching routines Hamstring Stretch and Seat-Side Straddle, as well as the Seat-Straddle Lotus and Side-Split to Roundhouse Kick (*Mawashi-geri*) performance and comparing the effectiveness of the stretching routine combinations between each routine and between groups.

Materials and Methods

The study utilized the quasi-experimental design as defined by Campbell (2002) as the process of conducting an initial observation (pre-test) to the group of participants, and then to administer a treatment and finally, to conduct the second observation (post-test). In this study, two different stretching routines were introduced to two different groups.

The population was made up of two separate Karate classes in a physical education setting. The respondents were all males in second year college, aged around 17-19 years old. Each class consisted of 31 male students in each group. The Karate class took place three times a week for 2 hours per class for six months, or one semester. The participants undertook both pre-test and post-test to determine the kicking performance increment after exposure to the two different interventions. The participants of this study were taken from six sections enrolled in Physical Education. The participants were divided into two groups- where one group performed the Hamstring Stretch and Seat Straddle Lotus, while the other group used the Side Split and Seat Side Straddle as the stretching routines program. The groups' stretching techniques were limited to the ones assigned to them. Both classes were Karate classes which included a lecture-demonstration of different Karate techniques. For this class, the focus was on kicking, particularly on the roundhouse kick (*mawashi-geri*).

The intervention was the Stretching Routines- which included the Hamstring stretch and Seat-Straddle Lotus, and the Side Split and Seat Side Straddle combination stretching routines. The dependent variable was the students' kicking performance. Rubrics were then used to determine the participants' performance levels for the roundhouse kick. Criteria included patterns in movement, and proper delivery of the kick to its target. This rubric was validated by an expert on Karate - Shihan Masayuki Iwabuchi and an expert on physical education – Dr. Edna delos Santos. The rubric is as follows:

	Needs Improvement 1	**Acceptable 2**	**Good 3**	**Outstanding 4**
Skill on kicking focus Round house kick (Mawashi-geri)	Round house kick hitting below hip level is weak and needs improvement; unsure of proper techniques but sometimes successful in executing them; knows and tries to follow movement patterns required in executing corrected performance in round house kick	Round house kick hitting hip level is adequate; tries to use proper techniques and is often successful in executing them; knows and tries to follow most movement patterns required in executing corrected performance in round house kick	Round house kick hitting the body or rib level is generally good. Mostly, uses proper techniques and are successful in executing them. Attempt to apply the necessary skill in round house kick movement pattern in karate tournament and self-defense technique	Round house kick hitting face level is superior; uses proper techniques and is successful in executing them; knows and always follows movement pattern; helps others to develop their own skill in round house kicking learned to karate tournament and self-defense techniques

A letter requesting for students' data on participant's height, weight and blood pressure information via health records was also done. Instructions were disseminated to all participants to avoid additional strenuous physical activity over the duration of the study. Such measures were taken to ensure that no other factor may influence their performance. The participants were required to wear proper PE uniform during the conduct of the study.

Each testing session started with the standard 15-minute warm-up and stretching procedure, followed by the two different stretching routines. The two stretching routines were administered on the same schedule or time of the day in the afternoon. Using Kicking Pad as an instrument to determine target and the kicking performance, the participants were asked to use the dominant leg to perform the Round House. The two experimental groups of Physical Education male Karate students were assigned to the two different combined stretching routines which are the Hamstring Stretch with Seat Straddle Lotus (groin butterfly stretch) and the Side Split with Seat Side Straddle (reverse side hurdle sitting).

Descriptive statistics such as the frequency, percentage, mean and standard deviation were used to organize the data in Problem 1. Considering that the data were not normally distributed as shown by the Kolmogorov- Smirnov (.367, p=. 00) and Shapiro-Wilks (.693, p=.000) test, nonparametric statistics were used. To determine the difference between the pre-test and post test scores of the participants' kicking performance, Wilcoxon signed rank test (the non-parametric equivalent of t test for paired samples) was used; and to determine the difference in the students' performance between groups, Mann-Whitney was used (the non-parametric equivalent of the t test for independent samples). Descriptive statistics such as frequency, percentages and mean were used to describe the variables of the study.

Results

This section features the findings, analysis and interpretation of the data. The gathered data are presented and sequenced according to outlined objectives.

Problem 1. What are the participants' kicking performance before and after the stretching routines?

Table 1 shows the frequency, percentage and mean distribution of participants' kicking performance before and after exposure to the two sets of Stretching Routines namely Hamstring Stretch and Seat Straddle Lotus and Side- Split and Seat Side Straddle.

Table 1. *Frequency, Percentage and Mean Distribution of Students' Kicking Performance*

Scale	Range	Decription	Stretching Routine 1 Hamstring and Seat Straddle Lotus				Stretching Routine 2 Side-Split and Seat Side Straddle			
			Pretest		Post Test		Pretest		Post test	
			f	%	*f*	%	*f*	%	*f*	%
4	3.51-5.0	Outstanding	0	0	1	3.23	0	0	0	0
3	2.51-3.50	Good	1	3.2	15	48.4	1	3.2	5	16.13
2	1.51-2.50	Acceptable	12	38.7	13	41.9	12	38.7	17	54.84
1	1.0-1.50	Needs Improvement	18	58.1	2	6.45	18	58.1	9	29.03
		Total	31	100.0	31	100.0	31	100.0	31	100.0
		Mean	1.45							
		SD	.568		.716		.568		.626	
		Description	Needs Improvement		Good		Needs Improvement		Good	

It can be gleaned from the table that both groups improved in their kicking performance from "needs improvement" classification to "good" category. Generally, a higher mean was detected among Stretching Routine one (2.79) often the intervention as compared with the Stretching Routine two with the over-all mean of 2.68 in the post test.

Furthermore, it is interesting to note the significant decrease of the number of participants who are assessed as "needs improvement" in their kicking performance. After experiencing the Hamstring and Seat Saddle Lotus, from 18 the number was reduced to only two participants needing improvement. This phenomenon was not seen with the Stretching Routine two. Out of the 18 participants assessed as needing improvement, there were still nine among them who remained in the "needs improvement" classification.

The figures also reveal that most of the participants in the Stretching Routine one was in the "good" category (48.4) after the intervention. This was followed by 41.9 percent of them with acceptable assessment in their kicking performance.

Meanwhile, the majority (54.84%) of students who performed the Stretching Routine two were on the "acceptable" level after the stretching intervention. This was followed by 29.03 percent who were still in the "needs improvement" classification even after the intervention.

Worthwhile mentioning is the lone participant who got "outstanding" assessment in his kicking performance having been exposed to Hamstring and Seat Saddle Lotus. However, none among the participants of Stretching Routine two got an outstanding assessment.

Nevertheless, both stretching routine groups showed increases in their kicking performance after their stretching routines exposures. The data shows that both stretching routines do improve kicking performance after exposure.

Problem 2. How do the participants' kicking performance compare before and after the stretching routines?

Ho1: The participants of each group do not significantly differ in their kicking performance before and after the stretching routines.

Considering that the data do not meet the requirements for a t test, the non-parametric equivalent Wilcoxon Signed Rank test was used. Table 2 presents the differences in the students' kicking performance before and after the stretching routines. Data show that in both groups, none of the participants got scores that are lesser than the pretest (negative scores); 31 participants had higher post test scores than their pretest (positive scores) and one participant got the same pretest and posttest results.

Table 2. *Wilcoxon Signed Ranks and Z Values Showing Differences in the Students' Kicking Performance Before and After the Stretching Routines*

Signed Ranks	Stretching Routine 1 Hamstring and Seat Straddle Lotus				Stretching Routine 2 Side-Split and Seat Straddle				
	N	Mean Rank	Z	P	Signed Ranks	N	Mean Rank	Z	p
Negative Ranks	0	.00	4.82**	.000	Negative Ranks	0	.00	4.85**	.000
Positive Ranks	30	15.50			Positive Ranks	30	15.50		
Ties	1				Ties	1			
Total	31				Total	31			

Legend:
Negative Ranks: Post test < Pretest
Positive Ranks: Post test > Pretest
Ties: Post test = Pretest
** significant at 0.01 level

The result shows an increase in the mean rank (.00 versus 15.50) among all the participants. In this test, it is assumed that data are paired and come from the same population; each pair was chosen randomly and independently, and the data were measured at least on an ordinal (and not nominal) scale. The Wilcoxon Signed Rank test shows that the observed difference between both tests is significant in group one (Z=4.82, p= .000) and group two (Z=4.85, p=.000). Thus, the null hypothesis which states that participants' kicking performance do not significantly differ is rejected.

Sufficient data show that the students had marked improvement in their kicking performance. Significant differences were detected in their performance after they were exposed to both stretching routines. This shows that both routines prove to be effective in improving the students' kicking performance.

Problem 3. Which of the two stretching routines significantly improved the participants' kicking performance?

Ho2: None of the stretching routines work more effectively in enhancing the participant's kicking performance.

The non-parametric equivalent of the T test for independent samples, namely the Mann- Whitney test was performed, and the data are presented in Table 3 below.

Table 3. *Mann-Whitney (Z) Values Showing Significant Differences of the Two Groups of Students' Kicking Performance*

Kicking Performance	Stretching Routine 1 Hamstrung and Seat Straddle Lotus Mean Rank	Stretching Routine 2 Side-Split and Seat Side Straddle Mean Rank	*Z*	*P*
Pretest	31.50	31.50	.000	1.00
Post Test	33.18	29.82	.750	.453
Increment	32.73	30.27	.556	.578

The results of the Mann-Whitney (Z) values show an increment of 32.73 for stretching routine group one. Meanwhile, an increment of 30.27 was detected among the stretching routine group two.

Findings show that there is no significant difference between the participants' kicking performance considering the two stretching routines as shown in the participants' post-test (Z=.750, p=.453) and in the increment (Z=.556, p=.578). The two stretching routines, Hamstring Stretch and Seat Straddle Lotus and Side-Split and Seat Side Straddle do not show any significant differences. This can be because both stretching routines target similar muscles which are the lower extremities, and both stretching routines have the same number of repetitions of sets. Therefore, the null hypothesis which states that none of the stretching routines work more effectively in enhancing the participants' kicking performance cannot be rejected. Data revealed that both routines have equally enhanced the participants' kicking performance.

Discussion

Based on the data gathered, the following are the salient findings revealed in this study: after the stretching routines intervention, students in both groups improved in their kicking performance from "Needs Improvement" to "Good" description; sufficient data show that the students had marked improvement in their kicking performance and that significant differences were found in their performance after their exposures to both interventions; and even though Stretching Routine one had higher increment compared to Stretching Routine two, both stretching routines one and two show that the participants had comparatively enhanced kicking performance and level of flexibility.

The participants in both stretching routines groups showed improvement in their kicking performance and level of flexibility. Therefore, both the prescribed stretching routines one (Hamstring Stretch and Seat Straddle Lotus) and stretching routines two (Side Split and Seat Side Straddle) enhanced the kicking performance of student participants. According to Corbin et al. (2006), regular stretching exercises promote flexibility - a component of fitness- that permits freedom of movement, contributes to ease and economy of muscular effort, allows for successful performance in certain activities, and provides less susceptibility to some types of injuries or musculoskeletal problems.

The foregoing phenomenon could be in line with the participants' experience as espoused by Robbins (2009) who claimed that there are factors that affect their performance such as joint structure, soft tissues, inactivity, muscle temperature, age, genetics, gender, obesity, injury, and neutral factors. However, he further postulated that through regular stretching, the range of motion can be increased, and the person's level of tolerance is also enhanced (Hoeger & Hoeger 2014). Regular stretching can help people maintain good flexibility throughout life (Welk 2006).

These findings imply that the stretching routines one, the combination of Hamstring Stretch and Seat Straddle Lotus and stretching routines two, the Side-Split and Seat Side Straddle both equally facilitated the improvement of the flexibility of the kicking performance of the participant. As supported by Redmond (2008), people with greater flexibility have greater reach and it is one of the holy grails of Karate ability that will improve performance and increase resistance to injuries such as muscle and ligament tears. Thus, if participants continue to use these stretching routines, it implies greater improvement in their kicking performance whereas non-athletes may also use these routines to make every day activity involving flexibility easier to do. The continued examination of their skills must be accurate and dependable and must be given emphasis to identify little but significant changes brought on by exercise training (Chuang et al. 2021).

Conclusions

Based on the Findings, the following conclusions can be asserted. The researcher's assumption that the stretching routines such as Side Straddle Lotus, Hamstring Stretch, Seat Side Straddle and Side Split are effective in enhancing kicking performance is confirmed in the study. Both stretching routines have facilitated the improvement of the participants' kicking performance. Thus, if participants continue to use the stretching routines, there is a greater likelihood that they improve their kicking performance and that they can make every activity involving flexibility easier to do.

Corbin et al.'s (2006) postulation that regular stretching exercises promote flexibility – a component of fitness that permits freedom of movement and allows successful performance in certain activities is thus confirmed in this research undertaking.

Based on the findings and conclusions, the following recommendations are endorsed by the researcher. For the Physical Education Department, first, to ensure continuous and appropriate implementation and administration of the Physical Education Fitness program and Sports, particularly Karate-do and to determine the students' profile and their fitness level in order to give proper exercise programs which are fitted for their needs. Second, to provide more training to achieve maximum performance in sports and incorporate proper stretching combinations that will enhance the level of students' flexibility that can be used in class or at home or before and after exercises, sports and recreation. Finally, to emphasize proper stretching combinations that will enhance the level of flexibility of the students to prevent injuries before and after games and class tournament.

School Administrators are recommended to provide the students with appropriate venues for the development of their flexibility skills. Sport Coaches and trainers are also recommended to apply correct Strength and Conditioning programs to prepare the athletes/varsity players in their future games and tournaments. Finally, future researchers are urged to use findings of this study as baseline data to explore further experimental research that aims to measure other skill and health related components such as balance, agility, speed, power, coordination, reaction time, cardiovascular endurance, body composition, abdominal strength and endurance, arms strength and endurance.

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