

## Effects of the intelligence innovative smart ladder drill training program on developing agility of female youth volleyball players at Sriracha School

PHANINTRA JUNPALEE<sup>1</sup>, JUTHAMAS SINGCHAINARA<sup>2</sup>, SMICH BUTCHAROEN<sup>3</sup>

<sup>1</sup>Sriracha School, Jermjomphon Rd., Sriracha District, Chonburi, THAILAND

<sup>2</sup>Department of Physical Education, Faculty of Education, Kasetsart University, Bangkok, THAILAND

<sup>3</sup>Wireless Business Unit, National Public Company Limited, Bangkok, THAILAND

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### Abstract:

Developing the agility of female youth volleyball players at Sriracha School using the Intelligent Innovative Smart Ladder Drill Training Program was affected. The samples aged between 13 to 17 years old are studying at the grades 7<sup>th</sup> to 12<sup>th</sup> level in the academic year 2022. The IISLDT Program is portable and easy to use on five modes: automatic timing, automatic step count, stopwatch with automatic step count, self-timer with automatic step count, and step count in 30 seconds. Training five steps, including hopscotch backward; jumps following the pattern of the lateral jaws; step forward to the side; alternate feet on the sides, front, and back; and hopscotch kicks back in place with the 15 experimental group players who were trained. The 15 players in the control group were prepared with the traditional volleyball sporting training (TVST) program. The Nelson's Semo Agility Test (NSAT) was adapted to assess the players' agilities with the IISLDT and TVST Programs three times: before and after the 4<sup>th</sup> and 8<sup>th</sup>-week training. The physical general age, weight, and height averages were calculated. Significant differences ( $p < 0.05$ ) were found among the five positional categories of the physical characteristics of the sample size participating in the research. The players' responses to their agility with the NSAT before training indicate that of insignificant. After the 4<sup>th</sup> and the 8<sup>th</sup>, training with the IISLDT Program and the TRTP Program are differences, significantly. The two groups' activities are different and significant. Generally, the mean agility score is 11.957 seconds for females greater than 12.2 seconds. These results suggest that training athletes with this IISLDT program also affected agility when using the NSAT tested. The result reveals a significantly lower mean time than the standard time.

**Key Words:** agility effects, intelligent innovation, smart ladder, training program, agility development, volleyball players, Semo Agility Test (SAT).

### Introduction

Volleyball, a game played by two teams, usually of six players on a side, in which the players use their hands to bat a ball back and forth over a high net, trying to make the ball touch the court within the opponents' playing area before it can be returned. To prevent this a player on the opposing team bats the ball up and toward a teammate, before it touches the court surface that teammate may then volley it back across the net or bat it to a third teammate who volleys it across the net. A team is allowed only three touches of the ball before it must be returned over the net.

#### *Historical Background*

Volleyball was invented in 1895 by William G. Morgan, physical director of the Young Men's Christian Association (YMCA) in Holyoke, Massachusetts. It was designed as an indoor sport for businessmen who found the new basketball game too vigorous. Morgan called the sport "mignonette," (a name derived from the game of badminton (New England Historical Society, 2016) as a pastime to be played (preferably) indoors and by any number of players. The game took some of its characteristics from other sports such as baseball, tennis, and handball until a professor from Springfield College in Massachusetts noted the volleying nature of play and proposed the name "volleyball." The original rules were written by Morgan and printed in the first edition of the Official Handbook of the Athletic League of the Young Men's Christian Associations of North America (1897) (Morgan, 1985). The game soon proved to have wide appeal for both sexes in schools, playgrounds, the armed forces, and other organizations in the United States. It was subsequently introduced to other countries (The Editors of Encyclopedia Britannica, 2022).

Volleyball is a team sport in which a net separates two teams of six players. Each team tries to score points by grounding a ball on the other team's court under organized rules (The International Olympic Committee, 2007). It has been a part of the official program of the Summer Olympic Games since Tokyo 1964. Beach volleyball was introduced to the program at the Atlanta 1996. The adapted version of volleyball at the Summer Paralympics Games is sitting volleyball. The complete set of rules is extensive (The Fédération Internationale de Volleyball (FIVB), 2016), but play essentially proceeds as follows: a player on one of the

teams begins a 'rally' by serving the ball (tossing or releasing it and then hitting it with a hand or arm), from behind the back boundary line of the court, over the net, and into the receiving team's court. The receiving team must not let the ball be grounded within their court. The team may touch the ball up to three times to return the ball to the other side of the court, but individual players may not touch the ball twice consecutively (Joel., 2003). The ball is usually played with the hands or arms, but players can legally strike or push (short contact) the ball with any body part. Several consistent techniques have evolved in volleyball, including spiking and blocking (because these plays are made above the top of the net, the vertical jump is an athletic skill emphasized in the sport) as well as passing, setting, and specialized player positions and offensive and defensive structures (Northern California Volleyball Association, 2021).

#### *The Rules of Volleyball*

Knowing and understanding the rules of volleyball is essential for all players, coaches, and officials to be successful in the game. High school volleyball is played similarly to collegiate volleyball in that the scoring is based on a rally system allowing the opposing team to gain a point if your team fails to follow a rule. Rules range from fundamentals to player substitutions. Rules continually change, so it is vital to keep up to date (Steele, 2018). Three-set matches are two sets to 25 points and the third set to 15 points. Each group must be won by two points. The first team to win two sets is the winner of the match. Five-set matches are four sets to 25 points and the fifth set to 15 points. The team must win by two points unless tournament rules dictate otherwise. The first team to win three sets is the winner. Only six players on the floor at any given time: 3 in the front row and 3 in the back row. Points are made on every serve for the winning team of the rally (rally-point scoring). A ball hitting a boundary line is in. Contacting the ball with any part of a player's body is legal. It is illegal to catch, hold or throw the ball (The Art of Coaching, 2021).

#### 1.3 Volleyball Bloom in Thailand and an Inspiration for all Thais

Volleyball had spread into Thailand before the 1900s. In the past, volleyball was popular among the Chinese and Vietnamese. Until there was the competition between the clubs and community associations, sometimes contracted to compete in the Northern region, Northeastern region, and The Gold Cup volleyball tournament in the Southern Region. Since 1934 the Ministry of Education has published rules for volleyball. After that, the Department of Physical Education provided an annual girls' volleyball tournament. For the first time, the Department of Physical Education had set courses in the central physical education school for girls' students to studied Volleyball. the Department of Physical Education, University Sports Committee, Bangkok Municipality, Military Sports Council, as well as the Thailand National Games volleyball tournament in women's and men's volleyball under the "Amateur Volleyball Association of Thailand." (The Fédération Internationale de Volleyball (FIVB), 2019).

The excellence of the Thai Women's National Volleyball Team speaks for itself, as they have gone from perennial underdog to one of the best teams in the world. Ranked 14th globally by the Federation International Volleyball (2019), they have won 2 Asian Championships, 1 AVC Cup, and managed to finish 4th and 5th at the World Grand Prix and World Grand Champions cup, respectively. The charms of female volleyball are that the uniform makes the athletes more appealing, more elegant, and in good shape. One point can last from 7 to 14 seconds. We have researched that this duration can build excitement just right (Duankhloi, 2022).

#### *Inspiration for Thai Youth to Appreciate and Love Volleyball Athlete*

Coming from a country with a rich volleyball history in Southeast Asia, six women came together to chase their dreams and become the country's sporting heroes. What they lacked in height, they more than made up for creativity, technique, speed, teamwork, heart, and passion. Their two-decade-long careers were filled with some highs and lows, but the pinnacle of it all would be the values of friendship, determination, courage, inspiration, and respect that powered Thailand to success. The stories about their humble beginnings, remarkable experiences, and ascent to glory deserve recognition. Their dedication is a testament to their success, and the volleyball community is pleased and grateful to have witnessed these fabulous Thai women. It's because of their fighting spirit and refusal to give which has made both the Thai people and everyone in the world of volleyball fall in love with this team over the past ten years (The Fédération Internationale de Volleyball (FIVB), 2021).

#### *Volleyball in Secondary Schools of Thailand*

Volleyball is another prevalent sport. There was a national competition that was widely played until it was integrated into the curriculum for secondary education in schools. Volleyball is a team sport that helps players builds good relationships with their team players and opponents. The players in the team will have the same goal, which is to be considerate. And accept differences between people, helping players to know how to work as a team, responsible for their own duties sportsmanship, resulting in good social skills that benefit many aspects (Ministry of Education and Ministry of Tourism and Sports, 2016). The volleyball athlete has physical benefits, consisting of systematic exercise with rules and regulations, strengthening the body to grow, making the body system work normally, training the body to have agility, and enhancing the experience of the player's life. Social benefits include making players more friends or getting to know other people when there is unity in the team. Psychological benefits include helping to relax the mood, cause enjoyment and fun, reduce stress, helps promote the players' personality, trains them to be disciplined and rational, know how to lead a follower. and are responsible for their duties, train the mind to concentrate, build stability, be mentally strong, have

sportsmanship, and learn how to lose, win, and forgive (Office of the Basic Education Commission, Ministry of Education, 2019).

Sriracha Secondary Educational School, Chonburi Province, is a co-educational school under the Office of Secondary Education Service Area 18; it is a large extra-large secondary school in Sriracha District. Sriracha School is administered to the instructional learning management in the 7<sup>th</sup> to 12<sup>th</sup> grades. The total number of students in the school is 2,913 students. Chonburi province used to have a training project, "Mass sports to local Chonburi Province," for the fiscal year 2019 of the Sports Association of Chonburi Province to provide knowledge in football, volleyball, and sepak takraw skills for students at Sriracha School (Sriracha School, 2022). The three biological aspects of performance critical to introducing volleyball at any age: are jumping, hand-eye coordination, and agility footwork. Agility exercises will improve the athletes' ability to move quickly while maintaining balance and coordination. The sequence includes moving in all directions and jumping and landing (Junior Volleyball Association, 2019).

#### *Agility Training Exercises*

Agility training exercises are groups of workouts that improve speed, coordination, explosive power, and other sport-related skills. These training programs suit all athletes, including high school sports enthusiasts. To maximize the benefit of this training, you need to include the workouts as part of your training schedule. Agility is the ability to move quickly on players' feet. Agility ladder workouts target the lower body, specifically fast-twitch muscles. Players will develop strength and endurance in their hamstrings and hip flexors and improve joint flexibility. Players will need an agility ladder, perform each move for 60 seconds and rest for 20 seconds between moves. Once they finish all ten exercises, rest for 2–3 minutes, and then repeat the circuit twice for three sets. Ten agility moves make working out more fun, including lateral jump, two jumps forward, one jump back, squat out/hop in, single-leg forward hop, lateral lunge, side-step toe touch, and skater with a toe tap and plank jack (Olson, 2021). Good agility can make the difference between a good athlete and an average one and provide an advantage in avoiding injury. This definition of agility respects the cognitive components, visual scanning, and decision-making that contribute to your agility performance in a sport (Pierre, 2012).

#### *Agility Training Exercises on Volleyball Athletes*

A successful volleyball training advantage is vital in staying with and excelling in the competition. Agility plays a significant role in many different types of sports and, of course, the sport of volleyball is no exception. That means that volleyball players need to focus on improving their agility. All of this means that agility exercises need to be a part of the volleyball training program. Agility exercises can be done in many different ways. It is necessary to build physical performance in strength, speed, endurance, flexibility, neurological abilities, and significantly. Volleyball athletes need to be exceptionally agile, such as receiving the ball, swinging the ball from the net, blocking the ball in front of the net to get the ball hit in different directions, etc (Myosource Kinetic Bands, 2022). Agility training for volleyball athletes is essential to help athletes develop neuromuscular connections. This allows athletes to quickly change direction in short movements and respond well to the motor nervous system. Agility training is practiced in various ways, such as backward, zigzag running, etc. Another agility improvement tool that can be used is the smart ladder drill. The intelligent innovative smart ladder drill is a device used to improve the physical performance of agility that can accurately time and count the number of footsteps. This will make training more effective and used as a training tool (Butcharoen, 2019).

For the reasons mentioned above, agility training can enhance maneuverability in various directions and is suitable for practicing sports requiring extra agility. But no research has been found to train with the intelligent, innovative smart ladder drill to improve skills in volleyball players. Therefore, the researcher is interested in studying a program of agility training using the clever, innovative smart ladder drill smart to the sample of Sriracha School volleyball players who want to improve their agility. The results of this training will be a guideline for developing training methods to result in more capable players and achieve the desired goals.

#### **Material & methods**

Research on the Research & Development approach includes companies' activities to innovate and introduce new products and services. It is often the first stage in the development process. The goal is typically to take new trainers, training, and services to sports and add to the female volleyball youth in secondary school teams. Creative the *Intelligent Innovative Smart Ladder Drill Training* (IISLDT) Program, this drill is the perfect guide to optimizing the cross-linkage between volleyball players' eyes, their brains, and the movements they have to be able to execute to become a prolific, quick-thinking volleyball athlete. Set up the IISLDT Program for their first try and move through the IISLDT Program with some easy steps. Later they can and should get more complex. As they trained and practiced through the IISLDT Program, they wanted an even more challenging drill and could add other movement tasks and be affected and compared between ordering pairs.

*The Intelligent Innovative Smart Ladder Drill Training* (IISLDT) Program, Kasetsart University Research and Development Institute.

The Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program is a training or testing device that provides time and step information with the ability to count steps, and time accurately which is essential feedback. In addition, the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program has various

operating modes to be consistent with the objectives of the training. In which the trainer can choose from a variety of training modes as well as be able to control and report results through the Application on smartphones as well, which significantly facilitates the trainers and can be used with different groups of people as well.

The Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program is portable and easy to use. Rechargeable batteries power all devices to operate in manual or automatic mode with wireless data transmission/receiving between the main control box and the sensor plate. There are five operating modes: automatic timing mode, automatic step count mode, stopwatch mode with automatic step count, self-timer mode with automatic step count, and step count mode in 30 seconds. As for the application on the smartphone, the android operating system is easier to control and reduces the limitation of the display screen of the control box that cannot display the number of steps and time at the same time; this application is connected to the control box with a Bluetooth signal (Junpalee & Singchainara, 2023) (In Press).

1) Monitor Mode: This mode only monitors test results. Controls are performed at the control box. So, in this mode two controllers can be used to work together, one of whom may be the controller. The other person is the one who looks at the results and records the results of the experiment.

2) Control Mode: This mode is intended to control everything like a control box but can simultaneously display time and step count and use only one supervisor to perform such duties.

#### *Research Objectives*

To develop the agility of female youth volleyball players Sriracha School using the *Intelligent Innovative Smart Ladder Drill Training* (IISLDT) Program.

To compare the effect of agility training of the experimental group according to the agility training program using the *Intelligent Innovative Smart Ladder Drill Training* (IISLDT) Program and the control group according to the *Traditional Regular Training Program* (TRTP) of female youth volleyball players at Sriracha School during pre-training, after the 4<sup>th</sup> week of training, and after the 8<sup>th</sup> week of training.

#### *Sample Size*

The samples were female youth volleyball players at Sriracha School, aged between 13-17 years old who are studying at the grades 7<sup>th</sup> to grade 12<sup>th</sup> level in the academic year 2022 that consisted of 30 players by purposive random sampling. The sample was divided into a control group and an experimental group using Johnson and Nelson's Semo Agility Test (1986). The scores were arranged in descending order and randomly drawn (matching groups) into the control and experimental groups of 15 players. The agility ability is similar to the control group. The 15 control group players were trained with the *Traditional Regular Training Program* (TRTP), and the 15 experimental group players were introduced to the *Intelligent Innovative Smart Ladder Drill Training* (IISLDT) Program in eight weeks.

#### *Research Procedures*

What is a Semo agility test? Image result for Semo Agility Test, the Semo Agility Test is a measure of running agility suitable for testing field sport athletes (Kirby, 1971; Johnson & Nelson, 1986). This test is different from many other agility tests in that it also incorporates backward and sideways movements. This test differs from other agility tests, including backward and lateral directions.

*Purpose:* test the ability to maneuver the body forward, backward, and sideward.

*Equipment required:* marker cones, measuring tape, non-slip surface, and stopwatch.

*Pre-Test:* Explain the test procedures to the subject. Perform screening of health risks and obtain informed consent. Prepare forms and record basic information such as age, height, body weight, gender, and test conditions. Measure and mark out the course. Ensure that the participants are adequately warmed-up. See more details of pre-test procedures.

*Test Layout:* Set up the cones as illustrated in the diagram. Four cones are required, making a rectangle 12 x 19 feet (the dimensions of a standard basketball court free throw area). For the original test description, the measurement was in feet, which converts to 3.7 x 5.8 meters, though for some reason, 3.6m x 5.7m is sometimes used.

*Procedure:* Start with one foot behind the start line. No rocking movement is allowed. Hand timing starts from the first movement from the set position. Starting at cone 1, move to cone 2 using side-stepping motions, then turn around the cone and run backpedal to cone 3. Once you are around cone 3, sprint forwards to cone 1, go around the cone and backward running again to cone 4. Once around cone 4, sprint forwards to cone 2, and then sidestep back to the starting cone 1. Remain facing forwards towards the baseline throughout the test. Two trials are allowed.

*Scoring:* The stopwatch is started with the starting command "go" and stopped when the subject returns to the start/finish line. The fastest time of two trials to the nearest decimal place is recorded. A good score for males would be more excellent than 10.5 seconds and for females greater than 12.2 seconds.

*Comments:* some practice doing this test is helpful, particularly for the backward running component. Also, ensure that.

#### *Research Instruments*

*Johnson and Nelson's Semo Agility Test (JNSAT)*

The Semo tests the participant's agility in maneuvering forwards, backward, and sideways. Sports this test is suited to Female Youth Volleyball Players at Sriracha School, Thailand.

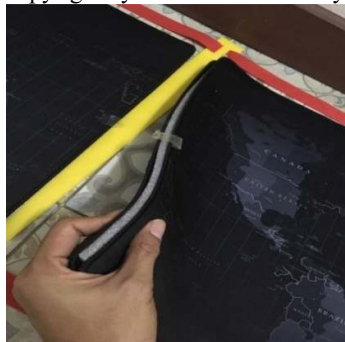
*Equipment:* A stopwatch, four cones (2 different sets of colors), and a tape measure.

*Method:* Set the course up as seen in figure 1. The horizontal lines measure 3.6m, and the vertical line measures 5.7 m; the participant begins the period at cone 1 with their back facing the square. Allow the participant at least one practice run-through and two system trials. The participant always faces the same direction, therefore requiring sideways and backward, and recording the participant's best time taken to complete the course.

*Score:* A good score for males would be more excellent than 10.5 seconds and for females greater than 12.2 seconds.

*Experimental Group Players were trained with the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program.*

Developing agility female youth volleyball players at Sriracha School was trained and practiced program using the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program created by the researcher through the quality check of the instrument through a face validity method by seven professional experts, and copyright by Kasetsart University Research and Development Institute (Figures 1).



a) The wireless sensor pad was designed for the first time.



b) The second revised sensor plate



c) The IISLDT was designed with a jigsaw sensor plate edge.



d) A prototype of an intelligent smart ladder drills' invention for physical competency fitness on the maneuverability of body agility testing



e) Master Control: Press the enter button to begin testing with new mode. Go to the first screen as in the picture

**Figure 1:** Designing the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program was trained within the experimental female youth volleyball player group in eight weeks

Source: Junpalee & Singchainara (2023, In Press)

Figure 1 reports the on/off switch located under the base to enable the power from the battery to feed the electrical circuit. The battery charger connector is used to connect the electric current to the battery for recharging in case the battery runs out. The display screen shows various control menu items and reports results. The menu selection key (Scroll) moves to the desired option or submenu, and enter button confirms the selected menu. There is a button to select the nodes to which the signal will act. Send the password to the desired wireless response time measurement nodes. A rechargeable battery powers the IISLDT invention; it reduces the number of toxic residues from disposable batteries that support environmental and friendliness. The IISLDT is designed using wireless technology. Reduce the accident of tripping the wires while in use, including installing anti-slip pads on both the bottom and top surfaces of the wireless sensor pads to prevent accidents from slipping safely in use.

#### *Training Procedures*

##### *Step I: Hopscotch backward*

The practitioner stands with his back to the starting point, jumps with his feet apart, one-legged jumps with one foot on the plate and the other folded backward. Continue alternating until the last plate.

##### *Step II: Jumps follow the pattern of the lateral jaws*

The practitioner stands at the starting point, alternating feet to the side by starting with one foot first. If the left foot begins to jump out to the left, starting right, jump out to the right. Switch feet to the side with the right foot inside the left outside of the first plate. Jumping on the second step: switch feet to the side, left foot on the first plate, and using the right foot takes on the outside of the second plate. Jumping on the third step: Switch feet to the side with your right foot inside the left foot on the outside of the third plate. Repeat continuously until the last plate.

*Step III: Step forward to the side*

Athletes stand at the starting point, starting with any foot. If starting with the left foot, step out to the left. If it starts to go right, step out to the right. When stepping out the inside of the first sheet, cross your feet sideways in the second sheet. Repeat until the last plate. This exercise should twist the body to help move the body.

*Step IV: Alternate feet on the sides, front and back*

Athletes stand at the starting point, running sideways with any foot; if starting with the left foot, step out to the left. Suppose beginning to the right, step out to the right. Strokes 1 and 2: Step left foot, lead right foot in the first sheet; Strokes 3 and 4: Step forward to the top of the second sheet by stepping left foot, leading right foot along; Strokes 5 and 6: Step back with the left foot, bring the right foot into the second plate; Strokes 7 and 8c Step back left foot, getting the right foot to the bottom of the second plate. Repeat the rhythm continuously until the last sheet.

*Step V: Hopscotch kicks back in place*

The athlete stands at the starting point, starts by jumping with feet apart in front, and then jumps on one leg. By placing one foot on the sheet, another foot is folded backward. Continue alternating for 30 seconds.

*Data Analysis*

Take the agility test data. Let's find the mean ( $\bar{x}$ ), and standard deviation (S.D.). The mean differences in the Semo Agility Test results were tested within the experimental and control groups before and after the 4th week of training. After the 8th week of exercise using a one-way, repeatable ANOVA (One - way ANOVA repeated measures), if the variance is found in the mean difference test, Bonferroni's pair-wise comparison method was used. The difference in the mean agility using the SEMO Agility Test was tested between the experimental and control groups before training, after the 4th week, and after the 8th week of training. The difference between groups (independent sample t-test) was analyzed.

**Results**

This study determined the effect of the Intelligent Innovative Smart Ladder Drill Training Program for developing agility in female youth volleyball players at Sriracha School, Chonburi Province, Thailand. The research method used in this study is quasi-experimental. The sample was divided into a control group and an experimental group using Johnson and Nelson's Semo Agility Test (1986). The scores were arranged in descending order and randomly drawn (matching groups) into the control and experimental groups of 15 players. The agility ability is similar to the control group. The 15 control group players were trained with the Traditional Regular Training Program (TRTP). The 15 experimental group players were introduced to the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program in eight weeks. The research design used in this study and the pretest-posttest design were compared.

**Physical Characteristics of the Sample Size Participating in the Research**

Height, body mass, muscular strength (4 repetitions maximum bench press and four repetitions maximum parallel squat tests), and muscular power (overhead medicine ball throw, countermovement jump) were assessed. Significant differences ( $p < 0.05$ ) were found among the five positional categories of the physical characteristics of the sample size participating in the research. Table 1 reported the means of age, weight, and height of the female youth volleyball players at Sriracha School.

**Table 1:** Means and Standard Deviation in terms of Age, Weight and Height for the Female Youth Volleyball Players Sriracha School between Groups

Group	Age (year)		Weight (kg)		High (cm.)	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Control Group	15.601	1.762	51.801	7.071	160.262	5.130
Experimental Group	15.862	1.122	54.798	12.212	161.133	8.201

Table 1 shows data on the physical characteristics of the subjects participating in the research which consists of means average and standard deviation of age, weight, and height for the control and experimental groups of the female youth volleyball players at Sriracha School, insignificantly.

Testing using the Semo Agility Test - The t-test is a common field test of agility that is normally performed on the athlete's regular playing surface. This test is especially useful for the female youth volleyball players at Sriracha School in the two groups that require athletes to sprint forward, move laterally, and backpedal. The shuttle run is a standard agility training exercise used by athletes who play stop-and-go volleyball sports. Shuttle run drills are an easy way to inject some high-intensity training into a basic conditioning program while players build speed, agility, and endurance, the results as reported in Table 2.

**Table 2:** Means and Standard Deviation of the Tests Using the Semo Agility Test of the Control Group and the Experimental Group at before the Training, after Training on 4 weeks, and 8 weeks, respectively

Timing Schedule Training	Control Group		Experimental Group		t-test	p-value
	$\bar{x}$ (second)	S.D.	$\bar{x}$ (second)	S.D.		
Before Training	15.061	0.822	14.838	0.654	0.574	.515
After the 4 <sup>th</sup> Week Training	14.858	0.957	13.565	0.537	3.973**	.001
After the 8 <sup>th</sup> Week Training	14.727	0.601	11.957	0.315	13.928***	.000

$N_C = 15, N_E = 15, *p < .05, **p < .01, ***p < .001$

Comparing the means of two groups in the data was analyzed with t-test analysis. Mean values obtained from different groups with different conditions are frequently compared in the Intelligent Innovative Smart Ladder Drill Training Program for developing agility female youth volleyball players Sriracha School study between the timing schedule training are differences. The t-test is a standard method for comparing the mean of one group to a value or the mean of one group to another.

Table 2 shows the timing schedule training between means of the tests using the Semo Agility Test for the Control and the Experimental groups at before the movement indicates that insignificant t-test and p-value, differently. After the female youth volleyball players are trained after the 4th training, it has been found that the difference between the two groups' pieces of training is different and significant at the level of .01 ( $p < .003$ ). Training takes more time (after the 8th Training), and the difference in agility between the two groups of Female Youth Volleyball Players at Sriracha School was even more influential. The results show that the t-test was analyzed with means indicating significantly ( $p < .001$ ) differently.

3. One-Way ANOVA Analysis of Variance with Repeated Measurement

Create the analysis with ANOVA result with  $\eta^2$  ( $\eta^2$ ) that measures the proportion of the total variance in a dependent variable associated with the membership of different groups defined by an independent variable. Partial eta squared is a similar measure in which the effects of other independent variables and interactions are partially out. Eta-squared is commonly used in ANOVA and t-test designs as an index of the proportion of variance attributed to one or more effects. The statistic is useful in describing how variables are behaving within the researcher's sample. It is a standardized estimate of an effect size comparable across outcome variables measured using different units.  $\eta^2 = 0.01$  indicates a small effect;  $\eta^2 = 0.06$  indicates a medium effect;  $\eta^2 = 0.14$  indicates a large effect.

**Table 3:** One-Way ANOVA Analysis of Variance and ANOVA Results ( $\eta^2$ ) with Repeated Measurement each of Agility within the Control and Group before Training, after 4 weeks of Training, and after 8 weeks of Training

Analysis of Variance (Between Control and Experimental Groups)	Sum of Squares (SS)	df	Mean Squares (MS)	ANOVA Results ( $\eta^2$ )	t-test	p-value
Before Training	12.154	14	0.935	0.814	0.574	.515
After four weeks of Training	7.484	14	0.761	0.871	3.973**	.001
After 8 weeks of Training	6.745	14	0.576	0.942	13.928***	.000

$N_C = 15, N_E = 15, *p < .05, **p < .01, ***p < .001$

Table 3, reports a statistic One-way ANOVA analysis of variance with repeated measurements of agility within the control group before training, after 4 weeks of training, and after 8 weeks of training using the Semo Agility Test of female volleyball players in the control group three times: before training, after 4 weeks of training, and after 8 weeks of training. The result has found that the testing time is different significantly after four and eight weeks of training significantly.

Effect size is an interpretable number that quantifies. The results in Table 3 are important because effect sizes allow us to compare effects. The effect size of the sampling data indicates that of the *Large Effect Sizes* on all before training, after four and eight weeks of training with the *Intelligent Innovative Smart Ladder Drill Training (IISLDT)* Program on five steps in eight weeks using that the results tell us which sample sizes we need to obtain a given level of determination was tested by the *Semo Agility Test*, significantly.

Another analysis using A One-Way repeated measure ANOVA is used to determine whether three or more group means are different where the participants are the same in each group. For this reason, the groups are sometimes called "related" groups, and one of the factors was repeated to compare two treatment groups and measure each agility within the control group before training, after 4 weeks of training, and after 8 weeks of training as reported in Table 4.

**Table 4:** One-Way ANOVA Analysis of Variance with Repeated Measurement each of Agility within the Experimental Group before Training, after 4 weeks of Training, and after 8 weeks of Training

Analysis of Variance	ss	df	MS	F-test	p-value
Duration	18.714	2	9.357	11.493***	.000
Discrepancy Data (error)	22.590	28	0.807		

$N_E = 15, *p < .05, **p < .01, ***p < .001$

Table 4, reports statistic a One-way ANOVA analysis of variance with repeated measurements of agility within the Experimental group before training, after 4 weeks of training, and after 8 weeks of training using the Semo Agility Test of female volleyball players in the control group three times: before training, after 4 weeks of training, and after 8 weeks of training. The result has found that the testing time was different, and significantly ( $p < .001$ ) by which the differences can be divided into individual pairs.

4. A Post Hoc Multiple Comparison Test of Agility

Post hoc (sometimes written statistic Post-Hoc is a Latin phrase, meaning "after this" or "after the event". Post Hoc may refer to Post hoc analysis or post hoc test, statistical analyses that were not specified before the

data were seen. Post hoc theorizing generates hypotheses based on data already observed. This research study was created using Post-Hoc analyses are questions that we try to answer with our data after the study had finished and was not the intent of that particular study. In a Post-Hoc analysis of a clinical trial, researchers will often further divide data to see if the agility exercise had benefits for certain groups.

**Table 5:** A Multiple comparison (Post-hoc) of agility within the Experimental Group before Training, after 4 weeks of Training, and after 8 weeks of Training using the Semo Agility Test

Semo Agility Test	Means	Before Training	After 4 weeks of Training	After 8 weeks of Training
Before Training	14.861			
After 4 weeks of Training	13.833		-1.086*	-1.550*
After 8 weeks of Training	13.313			-0.514*

$N_E = 15$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Table 5 shows the post hoc test is used only after agility training of the experimental group female youth players who are trained with the *Intelligent Innovative Smart Ladder Drill Training Program* and are tested with the *Semo Agility Test*. The results have found that a statistically significant result and need to determine where our differences truly came from many different post hoc tests that have been developed, and most of them would give differently on the training at Before training, after 4 weeks of training, and after 8 weeks of training, there was a statistically significant at the .05 levels, decreasingly.

### Discussion

Volleyball has come a long way from the dusty-old YMCA gymnasium of Holyoke, Massachusetts, USA, where the visionary William G. Morgan invented the sport back in 1895. It has seen the start of two centuries and the dawn of a new millennium. Volleyball is now one of the big five international sports, and the FIVB, with its 220 affiliated national federations, is the largest international sporting federation in the world. The Fédération Internationale de Volleyball (FIVB) is the governing body responsible for all forms of Volleyball on a global level. Working closely with national federations and private enterprises the FIVB aims to develop Volleyball as a major world media and entertainment sport through world-class planning and organization of competitions, marketing and development activities. The FIVB is part of the Olympic Movement, contributing to the success of the Olympic Games. Volleyball thus became more and more a competitive sport with high physical and technical performance. However, national championships were played in many countries (The Fédération Internationale de Volleyball (FIVB), 2022).

Why has volleyball change the world? As far as the physical benefits for the players are concerned, you will see volleyball has plenty of them. For the players, it's an interesting choice of sport, and for spectators, it offers excitement and friendly competition. Volleyball has also gained similar traction in the last few years (Bird, 2018). It allows people to collaborate and share their skills and have fun without getting too exhausted, through a sport that is not too vigorous. Volleyball has changed throughout the years, as it spread from coast to coast, becoming one of the most popular sports in the world (Jindani, 2017). Boosts mood and increases drive to succeed: Your involvement in volleyball can improve your mood, reduce stress and encourage pride in your accomplishments as a team member. The activity can also improve your self-confidence, self-esteem, your body image and make you feel happier about life in general to the important of your life (Mental Health Coordinator, 2016).

The Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program was developed as the prototype design system regardless of fitness of body agility testing level on the maneuverability. Female Youth Volleyball Players Sriracha School and others can experience the performance benefits of adding agility training to their fitness. They may be already considering adding agility training by the Automatic Timing Mode. This mode can time accurately, while the first sensor plate (plate 1) is started and the timer stops when the last sensor plate is stepped (plate 8), without counting the number of steps. Most of the five main pattern training tests, automatic step counting the modes for practicing process training model, adding self-timer mode, and counting the number of steps automatically with the sensor pad and the master control training system. The program training of automatic mode for the IISLDT invention by a rechargeable battery was reduced. As well as a discussion on the frequency with which an athlete should partake in agility training along with the IISLDT that they can try with an agility ladder for each. Agility ladders are a popular way to agility train. They are also an efficient and straightforward way to integrate agility training into everybody who has already established fitness on the maneuverability of body agility testing.

The samples were female youth volleyball players Sriracha School, aged between 13-17 years old who are studying at the grades 7<sup>th</sup> to grade 12<sup>th</sup> level in the academic year 2022 that consisted of 30 players by purposive random sampling. The average weight and height means of the sample as 52-55 kg and 160-161 for the control and experimental female volleyball youth players' groups, respectively. It is an indicator of the problem of height of volleyball players in international youth competitions. Because volleyball is obviously a sport where height matters taller players have a higher reach, can get above the net more easily and more quickly, and have more options for hitting (Samaras, 2007). In volleyball, tall players are usually desirable, because it would be easier for them to attack or block the ball. However, shorter players usually have faster



reaction time during defense and can pass the ball better. The majority of the best volleyball players in the world right now are 6'4" or very near. Speed is something that a smaller player can bring to help offset any disadvantage there might be. That is what I try to do offensively to hit as fast a ball as possible to maximize my chances of success (Brown, 2020).

In this research study, the sample was divided into two groups: it consisted of a control group was trained by the volleyball players with the traditional training volleyball sport and an experimental group was trained by the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program on five steps on eight weeks in three times per week. Before, after four and eight weeks were tested by the Johnson and Nelson's Semo Agility Test. A good score for males would be more excellent than 10.5 seconds and for females greater than 12.2 seconds. The training results were compared with average means (second) and the experimental group's training after the 8 weeks indicate that of 11.957 second, and 14.727 second for the control group's players. Normally, a compare groups examines independent samples and makes inferences about the differences between them. Independent samples occur when observations are made on different sets of items or subjects. If the values in one sample do not tell you anything about the values in the other sample, then the samples are independent. A common way to approach that question is by performing a statistical analysis. The two most widely used statistical techniques for comparing two groups, where the measurements of the groups are normally distributed, are the Independent Group t-test and the Paired t-test (JMP Statistical Discovery LLC., 2022).

Adapted version for testing the female youth volleyball players with *Johnson and Nelson's Semo Agility Test* (JNSAT) was tested of their agility. In volleyball players, agility is a key component in being a great athlete. This sport requires explosive jumps and changes in direction. Jumping is important in this sport not only for blocking the ball, but also for spiking. The player must jump vertically to block and jump up to shoot the ball down over the net. Here are a few strength, power, and agility exercises that they think will benefit all volleyball players (Glutes, 2018). The SEMO Agility Test is a measure of running agility suitable for testing field sport athletes to test the ability to maneuver the body in a forward, backward and sideward direction. Prepare forms and record basic information such as age, height, body weight, gender, test conditions. Measure and mark out the course. Ensure that the participants are adequately warmed-up. A good score for males would be greater than 10.5 seconds, for females greater than 12.2 seconds. This test is suitable for team sport athletes that require movement in multiple directions, such as tennis, volleyball, badminton (Sport Plan, 2022).

## Conclusions

Quantitative research method on the development of the agility female youth volleyball players Sriracha School using the *Intelligent Innovative Smart Ladder Drill Training Program* was affected. The IISLDT Program is designed to be portable and easy to use. There are five operating modes: automatic timing mode, automatic step count mode, stopwatch mode with automatic step count, self-timer mode with automatic step count, and step count mode in 30 seconds. Training five steps including: hopscotch backward; jumps follow the pattern of the lateral jaws; step forward to the side; alternate feet on the sides, front and back; and hopscotch kicks back in place with the 15 experimental group players were trained in eight weeks. Designing another control group that obtained 15 volleyball players were trained with the traditional volleyball sporting training too. The samples were female youth volleyball players Sriracha School, aged between 13-17 years old who are studying at the grades 7<sup>th</sup> to grade 12<sup>th</sup> level in the academic year 2022.

Adapted version of the Nelson's Semo Agility Test to the assessment of the effects of the intelligent innovative smart ladder drill training program for developing agility female youth volleyball players Sriracha School in two groups with average means on three times: before training, after the 4<sup>th</sup> week training, and after the 8<sup>th</sup> week training were compared. The physical general of the age, weight, and height averages were calculated. Using the One-way ANOVA,  $eta^2$ , t-test, and the repeatable ANOVA (One - way ANOVA repeated measures) statistics were analyzed. Height, body mass, muscular strength (4 repetition maximum bench press and 4 repetition maximum parallel squat tests), and muscular power (overhead medicine ball throw, counter movement jump) were assessed. The effect size of the sampling data indicates that of the *Large Effect Sizes* on all before training, after four and eight weeks of training with the *Intelligent Innovative Smart Ladder Drill Training (IISLDT)* Program on five steps in eight weeks. Significant differences ( $p < 0.05$ ) were found among the 5 positional categories of the physical characteristics of the sample size participating in the research. Table 1 reported the means of age, weight and height of the female youth volleyball players Sriracha School.

The players' responses of their agility with the Nelson's Semo Agility Test for the Control and the Experimental groups at before the training indicate that of insignificant of t-test and p-value. After the 4<sup>th</sup> and the 8<sup>th</sup> training with the IISLDT Program and the TRTP Program, it has found that the different between the two groups trainings are differences and significantly. Especially, the result has found that the testing time was difference, and significantly by which the differences can be divided into individual pairs. . Generally, a good score for males would be more excellent than 10.5 seconds and for females greater than 12.2 seconds. However, the agility of the 15 female volleyball youth players Sriracha School who were an experimental group players were trained with the Intelligent Innovative Smart Ladder Drill Training (IISLDT) Program in eight weeks were tested with the Nelson's Semo Agility Test indicated that of the agility average means is 11.957 second that this results determine of training athletes with this *Intelligent Innovative Smart Ladder Drill Training*

(IISLDT) program also had the effect of agility when using the Nelson's Semo Agility Test was tested. The result reveals in a statistically significantly lower mean time than the set standard time.

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