The impact of using bungee cord exercises on the level of core strength and innovative thinking in the ability to design and perform the Enbu sequence for traditional karate beginners

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Introduction and Research Problem:

The global evolution and the use of artificial intelligence and technological advancements in various fields necessitate researchers in sports psychology to explore new methods to encourage players to seek creativity both within and outside the sports arena. Given that sports have a direct and indirect impact on individuals' lives, the creative and intellectual development of individuals to stimulate their creativity has become an immediate need for societies. The training process aims to discover the best ways to enhance the player's level of achievement.

Researchers have shown interest in innovative thinking in the sports field because it aims to demonstrate exceptional and unique diversity in motor responses to incentives. Innovative thinking can evolve in sports through efforts to develop specific preparations that enable athletes to reach creativity in performance. These preparations, in turn, can evolve through the availability of appropriate factors, new and ideal opportunities, perseverance in training and practice, movement, social encouragement, success in attempts, and continuous exercise.

This is particularly important when considering that the appropriate choice of style complements these factors. The right style allows athletes to perceive performance in a way that enables them to find motivation and authenticity to develop their creative abilities. Researchers are currently focusing on discovering talented students in sports, directing attention to those who have the predispositions and abilities for creative performance. This is done with the aim of presenting new ideas and innovative motor performance to elevate sports and athletes. (Akla Suleiman Al-Hourani, 2019)

Khair Allah Sayed (1981) believes that innovative thinking is an individual's ability to produce output characterized by the highest possible degree of fluency, flexibility, authenticity, and far-reaching implications. It also involves responding to a problem or an exciting situation (Khair Allah Sayed, 1981).

The capabilities of innovative thinking are:

1. **Fluency:** The ability to generate the greatest number of ideas within a specific time for a given problem or exciting situation.
2. **Flexibility:** The ability to 3produce standard responses to a problem or exciting situation. These responses are characterized by diversity, non-patterned behaviour, and an increase in new individual responses, thereby enhancing flexibility.
3. **Authenticity:** The ability to produce non-traditional responses with a statistically low recurrence within the

group to which the individual belongs. In other words, the less common the idea, the more authentic it is considered.
(Khair Allah Sayed, 1981)

Innovation is a continuous distribution from low levels of innovation to high innovative achievements. This means being innovative after making serious efforts, with more struggle. There are different degrees of innovativeness within the same individual's specific work performance.
(Majdi Abdel Karim Habib, 2001)

Undoubtedly, innovative capabilities play a prominent role in the field of innovative production. However, this does not mean overlooking the various other factors that go beyond the limits of these capabilities. These factors can also have an impact on innovative production.
(Majdi Abdel Karim Habib, 2001)

Anne Tjønndal (2016) mentions that sports innovation is a form of change, a new idea, or modernity in a sports context (Anne Tjønndal, 2016).

Before innovating challenging movements, it is necessary to formulate a comprehensive scientific idea in the brain, act on it, and understand the specific physical conditions of athletes, technical characteristics, and competition requirements (Xiao Jianwei, 2023).

Martial artists should first focus on developing performance-specific traits and tendencies. Second, athletes must possess these qualities, which include abilities and skill quality. Third, they should concentrate on the rules of self-defence arts competition. Fourth, they need to work on the proper use of the venue and equipment requirements in competition rules and use the equipment correctly if available (Xiao Jianwei, 2023).

The bungee cord (Bungee) is one of the tools used in functional training that aims to strengthen core muscles and limbs using an elastic cord. It utilizes the body's weight reaction according to the trainee's own capabilities and is ideal for training physical abilities and physical rehabilitation. It provides the opportunity for high-flying and low-impact landings. The bungee cord comes in various forms (suspended from the middle, the shoulder, and the ankles).(https://www.bungeetrainingaustria.com)

Claus Opper (1994) mentions that jumping with bungee cords stimulates the happiness hormone, making individuals feel a sense of accomplishment. The release of endorphins during bungee jumping increases euphoria and leads to a noticeable change in mood. Negative feelings, fear, and sadness decrease, resulting in behavioural changes. (Claus Opper, 1994)

The focus on strengthening core muscles has become a popular trend in physical fitness, extending beyond the field of sports medicine to fitness programs such as Tai Chi, Yoga, and Pilates. This is due to their numerous benefits in improving athletic performance, preventing injuries, and alleviating lower back pain. (Akuthota, Venu et al., 2008)

Lukaski (2006) points out that muscular strength in all its forms is

considered one of the essential elements of physical fitness. Core muscles dynamically transfer forces from the lower to the upper body and vice versa. The legs serve as the origin and pivot point from which the arm muscles derive pushing strength. The core muscles work to transfer movement at the same speed and force to the upper body through repetitive motions (Lukaski HC, 2006).

The term 'center of the body' is used to refer specifically to the trunk or, more precisely, the pelvic region of the body. This is because the stability of the pelvic region is crucial for providing the foundation for the movement of both the upper and lower limbs, supporting loads, protecting the spinal cord, and nerve roots (Jeffrey M. Willardson, 2007).

Hodges (2003) explains that the core is described as a muscular box, with the abdomen in the front, thigh muscles, and spinal stabilizing muscles in the back, and the diaphragm at the top. This box contains 29 pairs of muscles that work to stabilize the spine and pelvis and maintain the stability of the movement sequence during functional movements. Without efficient muscle function, the spine becomes unstable and incapable of supporting the upper body (Hodges, P.W., 2003).

In addition, the muscles of the core have been described as cylindrical in shape due to their anatomical characteristics and structural composition (Scott Riewald & Scott Rodeo, 2015).

Jeffrey M. (2014) believes that the muscles of the core consist of four basic muscle groups:

1. Global Core Stabilizers: Providing general stability to the core.
2. Local Core Stabilizers: Offering localized stability to the core.
3. Upper Extremity Core-Limb Transfer Muscles: Facilitating the transfer of stability to the upper limbs.
4. Lower Extremity Core-Limb Transfer Muscles: Facilitating the transfer of stability to the lower limbs.

(Jeffrey M. Willardson, 2014)

Additionally, the major muscles contributing to core stability include the pelvic floor, the multifidus, the transversus abdominis, and both the internal and external obliques. The rectus abdominis, the Erector spinae, especially the longissimus thoracis muscle, and the diaphragm also play a role. Furthermore, the latissimus dorsi, the quadratus lumborum, and the external and internal intercostals contribute to core stability (Wikipedia).

Mingming Guo (2013) emphasizes that core training is the key to increasing the capacity of small deep muscles, enhancing stability in the spine and pelvis, and improving attributes such as initiation, acceleration, directional changes, and ensuring proper positions in performance (Mingming Guo, 2013).

Bliss (2005), Dave Schmitz (2003), and Ron Jones (2003) all point out that strengthening exercises for the core have become the primary key for athletic training programs at all levels. These exercises act as a bridge connecting the upper and lower body

while preventing the leakage of force resulting from the core, known as the energy source for the limbs (Bliss, Lisa S. 2005, Ron Jones 2003, and Dave Schmitz, 2003).

Additionally, Prateek Srivastav and others (2016) have indicated that core stability helps improve athletic performance by generating force during movement, providing a stable base through which this force transitions from the proximal part to the distal part, acting on the principle of "Summation of Force." Therefore, the more there is strength and control in the core muscles, the more effective the transfer of these forces becomes (Prateek Srivastav et al., 2016). (https://www.youtube.com/watch?v=I0Etnldfcgg)

Traditional karate is a martial art that requires high physical fitness, incorporating defensive and offensive techniques along with foot movements. This sport relies on the utmost levels of strength, speed, continuous and rapid changes in various directions. Karate can be practiced as an art, a combat sport, or self-defence training. Traditional karate focuses on self-development (Bishop, 1999).

In the context of karate, "Enbu" refers to a prearranged fight between teams, with each team (man-man or manwoman) demonstrating attacks and defences on the field for a period of approximately one minute, plus or minus five seconds. The winners are determined based on the highest recorded evaluations (Traditional karate, 2007).

Experts, including Sensei Richard Jorgensen and the late Sensei Ibrahim Al Marhoubi, agreed during the International Master Course at the "Le Meridien Airport" hotel in Cairo (November 2014) that Enbu is an important competition in traditional karate. It is a creative competition where the player, in collaboration with the coach, forms a sequence according to specific difficulties and international karate law.

Through observing and following championships, the researcher noticed the repetition of some technical sequences in Enbu matches, indicating a lack of innovation in addition to a decline in the performance level of some technical skills. Despite being a creative competition where the player, assisted by the coach, designs a prearranged fight with a colleague, the element of innovation and creativity in Enbu competitions plays a significant role in performance according to agreed-upon difficulties based on international traditional karate law.

The researcher sees that traditional karate is one of the individual sports that requires a high level of muscular strength, capability, and endurance. Muscular strength is the quality upon which all other physical attributes are built. It serves as a starting point for mastering motor skills, helps execute the required motor tasks, and is the foundation for reaching advanced levels in practiced activities. The strength of the core has a significant impact on the performance of all motor skills, whether involving the upper or lower limbs. In traditional karate, the pressure on the ground, if not followed

by a transfer of movement to the extremities, is futile.

Similarly, stability, if not supported by strength from the core (hara), which transfers movement to the legs, will not result in powerful and effective motion. Core strength, along with breathing, facilitates the rapid transfer of movement in traditional karate.

This aligns with Akuthota & Nadler (2004), who assert that core muscles work to transfer force generated from the lower limbs through the trunk to the upper limbs and sometimes to the carried tool. Therefore, weakness in core muscles will not lead to the full transfer of kinetic energy from the lower to the upper body, resulting in poor athletic performance (Akuthota, V., and S.F. Nadler, 2004).

The statement aligns with what delecuse (1997) mentioned, stating that the effective core in the body's center allows for optimal acceleration, deceleration, and overall movement stability. It is a series during functional exercise where the core requires appropriate training to efficiently distribute weight, absorb force, and transfer ground reaction forces during functional movements. The core helps control the curvature of the vertebral column and assists in coordinating movement segments. (delecuse1997)

Heather Sumulong (2008) also points out that most strength training programs overlook core strength exercises, focusing solely on weight training in expensive gyms. There is a belief that the best training for core muscles is weight training. Due to this clear flaw in core strength training programs, it has led to postural issues, frequent injuries, especially lower back injuries, resulting in slow performance and increased fatigue and injuries. (Heather Sumulong 2008)

Therefore, the researcher believes that using bungee cords may help players change the training rhythm to develop physical and skilful abilities and enhance core strength, away from routine exercises that lack innovation. Consequently, this can lead to an improvement in skilful performance in the Enbu sequences. Through these exercises, flying in the air against gravity and performing skills in the correct movement path for the skill in the air using an unconventional tool, it helps young athletes develop the ability to break away from conventional patterns in designing innovative Enbu sequences, in accordance with international standards.

Research Objective:

- The research aims to investigate the impact of using bungee cord exercises on the core strength and innovative thinking concerning the ability to design and perform Enbu sequences for traditional karate youth.

Research Hypotheses:

1- There are statistically significant differences between pre-test and post-test measurements in the level of some physical and skill-related variables and the core muscle strength in favour of the post-test measurement.

2- There is a statistically significant correlation between the ability for innovative thinking and the design of Kinetic Sequences.

3- There are statistically significant differences between pre-test and post-

test measurements in the skill performance level of the Kinetic Sequences in favour of the post-test measurement.

4- There is a statistically significant correlation between the ability for innovative thinking and the skill performance of the Kinetic Sequences.

Research Methodology:

The researcher employed the experimental method, using a single experimental group with both pre-test and post-test measurements to suit the nature of the research.

Research Sample:

The research sample was randomly selected from traditional karate (Enbu) players at Etihad Basyoun sports club in El-Gharbia Government, who hold brown belts. The selected sample represents the age group under 14 years, totalling 10 players. In addition, 8 players were selected for the exploratory and standardization study outside the main research sample.

Before implementing the program, and to control the variables that may affect the accuracy of the research results, the researcher ensured the homogeneity of the research sample. The following table illustrates the homogeneity of the research sample in variables that may impact the application of the proposed Fight Do training exercises. These variables include height, weight, age, and training experience, and their data were collected through a player information form.

Table (1)

Mean, Standard Deviation, and Skewness Coefficient for the Variables of the Research Sample (n = 18)

No.	Variables	Measurement Unit	Mean	Median	Standard Deviation	Skewness Coefficient
1	Height	Cm	141.65	140.00	3.58	1.382
2	Weight	Kg	38.51	38.00	1.65	0.927
3	Age	Year	12.80	12.50	1.08	0.833
4	Training age for karate	Year	7.11	7.00	0.50	0.66

Table (1) shows that the skewness coefficient falls between (0.660 to 1.382), which is confined within the range of (± 3). This indicates that the research sample is homogeneous in these variables

Table (2)

Mean, Standard Deviation, Median, and Skewness Coefficient for Physical Abilities and Core Muscle Strength Levels under Study (n = 18)

No.	Variables		Measurement Unit	Mean	Standard Deviation	Median	Skewness Coefficient
	Test	Skill					
1	Muscular Power for Legs	Mawashi Geri + Mae Geri	15 Sec.	6.28	1.52	6.20	0.157
2	Muscular Endurance for Legs	Mawashi Geri + Mae Geri	30 Sec.	15.62	1.36	15.50	0.264

Follow Table (2)
Mean, Standard Deviation, Median, and Skewness Coefficient for Physical Abilities and Core Muscle Strength Levels under Study (n = 18)

No.	Variables		Measurement Unit	Mean	Standard Deviation	Median	Skewness Coefficient
	Test	Skill					
3	Agility Endurance	Kiai Jo Zuki + Mawashi Geri + Mae Geri	35 Sec.	4.36	0.98	4.30	0.183
4	Precision of Muscular Ability for Legs	Kizami Mawashi Geri	15 Sec.	10.52	1.12	10.50	0.0532
5	Muscular Power for Arms	Kizami Zuki + Gyaku Zuki	10 Sec.	12.62	0.25	12.50	1.44
6	Precision of Power for Arms	Kizami Zuki + Gyaku Zuki	15 Sec.	10.68	0.62	10.50	0.870
7	Endurance of Power for Arms	Kizami Zuki + Gyaku Zuki	30 Sec.	38.21	0.86	38.00	0.732
8	Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	10 Sec.	12.98	0.64	12.50	2.25
9	Endurance of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	30 Sec.	23.58	0.29	23.50	0.827
10	Precision of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	15 Sec.	13.25	0.87	13.00	0.862
11	Agility	Kiai Jo Zuki + Mawashi Geri + Mae Geri	10 Sec.	1.88	0.63	1.85	0.142
12	Test of Core Stability Strength		180 Sec.	118.65	2.29	118.00	0.851

From Table (2), it is evident that the skewness coefficient ranges between (0.157 to 2.25), which is confined within (± 3). This indicates that the research sample is homogeneous in these variables.

Table (3)
Mean, Standard Deviation, Median, and Skewness Coefficient for the Innovative Thinking Variable in Traditional Karate Beginners (n = 18)

Axes	No.	Innovative Thinking	Measurement Unit	Mean	Standard Deviation	Median	Skewness Coefficient
Axis 1	1	Sensitivity to Problems	Grade	1.52	1.65	1.50	0.0363
	2	Improvements	Grade	2.56	1.52	2.50	0.118
Axis 2	3	Applications	Grade	1.94	1.96	1.90	0.0789
Axis 3	4	Consequences	Grade	2.65	1.09	2.50	0.412
	5	Positions	Grade	2.98	0.97	2.50	1.484
Axis 4	6	Ramifications	Grade	1.96	1.11	1.95	0.0270
		Overall Total	Grade	13.61	2.65	12.85	0.860

From Table (3), it is evident that the skewness coefficient ranges between (0.118 to 1.484), which is confined within (±3). This indicates that the research sample is homogeneous in these variables.

Table (4)

Mean, Standard Deviation, Median, and Skewness Coefficient for the Variable of the Ability to Design and Perform Enbu Sequence for Traditional Karate Beginners (n = 18)

No.	Ability to design and perform the Enbu sequence	Measurement Unit	Mean	Standard Deviation	Median	Skewness Coefficient
1	Evaluation of the performance of the Enbu sequence	Grade	18.65	1.08	18.50	0.416
2	Evaluation of the design of the Enbu sequence	Number	4.92	1.62	4.50	0.777

From Table (4), it is evident that the skewness coefficient ranges between (0.416 to 0.777), which is confined within (±3). This indicates that the research sample is homogeneous in these variables.

Data Collection Tools:

1- Measurement Tools:

- Stadiometer for measuring height in centimetres
- Medical scale for measuring weight in kilograms, calibrated against other scales
- Measuring tape
- Stopwatch
- 2 rulers
- Video camera (Appendix 3)

2- Forms:

- Expert selection criteria and names (Appendix 1)
- Player data form (Appendix 2)
- Referee's scorecard for Enbu matches (Appendix 4)
- Form for designing Enbu matches (Appendix 5)
- Expert opinion survey on the proposed program (Appendix 6)
- Form to determine suitable tests for measuring physical and skill-related abilities under study (Appendix 7)
- Physical and skill-related ability tests under study (Appendix 8)
- Trunk stability test (Appendix 9)
- Innovative thinking scale for students at the talented sports school (Appendix 10)
- Timing distribution for program dimensions (Appendix 11)
- Training program (Appendix 12)
- Distribution of dimensions of the proposed program on training units (Appendix 13)

Innovative Thinking Scale:

The Innovative Thinking Scale was used among students at the talented sports school. The scale consists of (4) dimensions. The first and third dimensions are divided into two items, each containing two statements, while the second and fourth dimensions consist of one item, each containing two statements (See Appendix 10).

The scale was developed for sports-talented students in the age group

(12-18) years. The dimensions of the scale are:

1- **Problem Sensitivity:** The player's ability to perceive various sports-related problems, awareness of errors, and aspects of deficiencies associated with sports situations, attempting to find solutions to them.

2- **Cognitive Fluency:** The player's ability to generate a greater number of skilful ideas and correct motor responses within a specified time.

3- **Automatic Flexibility:** The player's ability to produce a greater number of diverse skilful and motor ideas and transition from one sports position to another through non-patterned responses.

4- **Originality:** The player's ability to produce new and uncommon sports ideas characterized by statistical and skilful rarity.

Survey Study:

The researcher conducted a survey study on a sample of players from within the research community and outside the primary sample, consisting of (8) players. **The objectives of the survey were:**

- To determine the scientific properties (validity and reliability) of the tests used in the research.
- To ensure the suitability of using the tools.
- To train assistants on the tests used.
- To ensure that there are no issues when applying different rhythms to the players.

The scientific properties of the tests are under Study:

Validity:

The researcher selected (8) players from the research community and outside the original sample to investigate the calculation of the validity of the bilateral comparison between the higher and lower spring.

Reliability:

The researcher selected (8) players from the research community and outside the original sample to investigate the calculation of the reliability of the bilateral comparison between the higher and lower spring.

Table (5)

Bilateral Comparison Validity in Physical and Skill-related Ability under Study (n1 = n2 = 2)

No.	Variables		Measurement Unit	Upper Quartile		Lower Quartile		Value (t)	Significance Level
	Test	Skill		Mean	Standard Deviation	Mean	Standard Deviation		
1	Muscular Power for Legs	Mawashi Geri + Mae Geri	15 Sec.	6.98	0.36	6.51	0.94	3.84	Stat. Func.
2	Muscular Endurance for Legs	Mawashi Geri + Mae Geri	30 Sec.	16.52	0.28	15.11	0.34	3.64	Stat. Func.

Follow Table (5)
Bilateral Comparison Validity in Physical and Skill-related Ability under Study
(n1 = n2 = 2)

No.	Variables		Measurement Unit	Upper Quartile		Lower Quartile		Value (t)	Significance Level
				Mean	Standard Deviation	Mean	Standard Deviation		
3	Agility Endurance	Kiai Jo Zuki + Mawashi Geri + Mae Geri	35 Sec.	4.91	0.52	4.31	0.15	3.29	Stat. Func.
4	Precision of Muscular Ability for Legs	Kizami Mawashi Geri	15 Sec.	10.97	0.35	10.48	0.55	3.51	Stat. Func.
5	Muscular Power for Arms	Kizami Zuki + Gyaku Zuki	10 Sec.	12.94	0.15	12.02	0.92	3.62	Stat. Func.
6	Precision of Power for Arms	Kizami Zuki + Gyaku Zuki	15 Sec.	11.62	0.82	10.31	0.34	3.15	Stat. Func.
7	Endurance of Power for Arms	Kizami Zuki + Gyaku Zuki	30 Sec.	39.28	0.35	37.32	0.15	3.41	Stat. Func.
8	Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	10 Sec.	13.21	0.11	12.11	0.59	3.29	Stat. Func.
9	Endurance of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	30 Sec.	24.65	0.19	21.25	0.34	3.91	Stat. Func.
10	Precision of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	15 Sec.	13.94	0.63	12.62	0.241	3.12	Stat. Func.
11	Agility	Kiai Jo Zuki + Mawashi Geri + Mae Geri	10 Sec.	1.97	0.34	1.75	0.910	3.33	Stat. Func.
12	Test of Core Stability Strength			121.32	0.15	117.32	0.36	3.67	Stat. Func.

The critical (t) value at a significance level of 0.05 is 1.182.

From Table (5), it is evident that there are statistically significant differences between the higher spring and the lower spring in the tests under study, in favour of the higher spring. This indicates the validity of these tests in distinguishing between different groups.

Table (6)

Bilateral Comparison Validity of Innovative Thinking Variables for Traditional Karate beginners (n1 = n2 = 2)

Axes	No.	Variables	Measurement Unit	Upper Quartile		Lower Quartile		Value (t)	Significance Level
				Mean	Standard Deviation	Mean	Standard Deviation		
Axis 1	1	Sensitivity to Problems	Grade	1.61	0.57	1.14	0.64	3.21	Stat. Func.
	2	Improvements	Grade	2.18	0.59	1.98	0.19	3.18	Stat. Func.
Axis 2	3	Applications	Grade	1.95	0.62	1.44	0.36	3.62	Stat. Func.
Axis 3	4	Consequences	Grade	2.41	0.74	2.16	0.52	3.28	Stat. Func.
	5	Positions	Grade	2.63	0.63	2.17	0.36	2.98	Stat. Func.
Axis 4	6	Ramifications	Grade	1.98	0.44	1.36	0.64	3.45	Stat. Func.
		Overall Total	Grade	12.76	0.67	10.25	0.19	3.91	Stat. Func.

The critical (t) value at a significance level of 0.05 is 1.182.

From Table (6), it is evident that there are statistically significant differences between the higher spring and the lower spring in the tests under study, in favour of the higher spring. This indicates the validity of these tests in distinguishing between different groups.

Table (7)

Bilateral Comparison Validity of Variables for the Ability to Design and Perform Enbu Sequences for Traditional Karate beginners (n1 = n2 = 2)

No.	Variables	Measurement Unit	Upper Quartile		Upper Quartile		Value (t)	Significance Level
			Mean	Standard Deviation	Mean	Standard Deviation		
1	Evaluation of the performance of the Enbu	Grade	21.25	0.94	16.32	0.1.11	3.98	Stat. Func.
2	Evaluation of the design of the Enbu	Number	6.21	0.94	3.94	0.94	3.64	Stat. Func.

The critical (t) value at a significance level of 0.05 is 1.182.

From Table (7), it is evident that there are statistically significant differences between the higher spring and the lower spring in the tests under study, in favour of the higher spring. This indicates the validity of these tests in distinguishing between different groups.

Reliability:

The researcher selected (8) players from the research community and outside the original sample to investigate the level of reliability between the first application and the re-application within the research sample.

Table (8)

Reliability Coefficient in Physical and Skill-related Ability, and Stability Level of the Core Part (n = 8)

No.	Variables		Measurement Unit	First Application		Second Application		Value (r)	Significance Level
	Test	Skill		Mean	Standard Deviation	Mean	Standard Deviation		
1	Muscular Power for Legs	Mawashi Geri + Mae Geri	15 Sec.	6.21	0.68	6.29	0.18	0.952	Stat. Func.
2	Muscular Endurance for Legs	Mawashi Geri + Mae Geri	30 Sec.	15.49	0.51	115.55	0.11	0.947	Stat. Func.
3	Agility Endurance	Kiai Jo Zuki + Mawashi Geri + Mae Geri	35 Sec.	4.48	0.19	4.55	0.32	0.964	Stat. Func.
4	Precision of Muscular Ability for Legs	Kizami Mawashi Geri	15 Sec.	10.61	0.36	10.98	0.18	0.914	Stat. Func.
5	Muscular Power for Arms	Kizami Zuki + Gyaku Zuki	10 Sec.	12.69	0.32	12.77	0.39	0.964	Stat. Func.
6	Precision of Power for Arms	Kizami Zuki + Gyaku Zuki	15 Sec.	10.60	0.18	10.78	0.21	0.952	Stat. Func.
7	Endurance of Power for Arms	Kizami Zuki + Gyaku Zuki	30 Sec.	38.69	0.52	38.98	0.15	0.915	Stat. Func.
8	Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	10 Sec.	12.32	0036	12.91	0.19	0.982	Stat. Func.
9	Endurance of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	30 Sec.	23.64	0.24	23.91	0.11	0.964	Stat. Func.

Follow Table (8)
Reliability Coefficient in Physical and Skill-related Ability, and Stability Level of the Core Part (n = 8)

No.	Variables		Measurement Unit	First Application		Second Application		Value (r)	Significance Level
	Test	Skill		Mean	Standard Deviation	Mean	Standard Deviation		
10	Precision of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	15 Sec.	13.81	0.31	13.91	0.32	0.948	Stat. Func.
11	Agility	Kiai Jo Zuki + Mawashi Geri + Mae Geri	10 Sec.	1.96	0.18	1.97	0.28	0.925	Stat. Func.
12	Test of Core Stability Strength			119.32	0.32	120.20	0.34	0.964	Stat. Func.

The critical (r) value at a significance level of 0.05 is 0.648.

From Table (8), it is evident that there are no statistically significant differences between the first application and the second application in the tests under study. This indicates the stability of these tests upon repeated applications.

Table (9)
Reliability Coefficient of Innovative Thinking Variables for Traditional Karate Beginners (n = 8)

Axes	No.	Variables	Measurement Unit	First Application		Second Application		Value (r)	Significance Level
				Mean	Standard Deviation	Mean	Standard Deviation		
Axis 1	1	Sensitivity to Problems	Grade	1.54	0.11	1.62	0.31	0.947	Stat. Func.
	2	Improvements	Grade	2.51	0.14	2.59	0.17	0.965	Stat. Func.
Axis 2	3	Applications	Grade	1.95	0.32	1.99	0.30	0.958	Stat. Func.
Axis 3	4	Consequences	Grade	2.51	0.19	2.64	0.19	0.947	Stat. Func.
	5	Positions	Grade	2.56	0.32	2.59	0.32	00962	Stat. Func.
Axis 4	6	Ramifications	Grade	2.10	0.27	2.15	0.85	0.984	Stat. Func.
		Overall Total	Grade	13.17	0.68	13.58	0.32	0.964	Stat. Func.

The critical (r) value at a significance level of 0.05 is 0.648.

From Table (9), it is evident that there are no statistically significant differences between the first application and the second application in the tests under study. This indicates the stability of these tests upon repeated applications.

Table (10)
Bilateral Comparison Validity of Variables for the Ability to Design and Perform Enbu Sequences for Traditional Karate Players (n = 8)

No.	Variables	Measurement Unit	First Application		Second Application		Value (r)	Significance Level
			Mean	Standard Deviation	Mean	Standard Deviation		
1	Evaluation of the performance of the Enbu	Grade	18.62	0.65	19.65	0.91	0.964	Stat. Func.
2	Evaluation of the design of the Enbu	Number	4.54	0.85	5.10	0.81	0.988	Stat. Func.

The critical (r) value at a significance level of 0.05 is 0.648.

From Table (10), it is evident that there are no statistically significant differences between the first application and the second application in the tests under study. This indicates the stability of these tests upon repeated applications.

Steps for Developing the Program Using Bungee Cords:

The proposed program aims to investigate the impact of using bungee cord exercises on the core strength and innovative thinking level in the ability to design and perform Enbu sequences for traditional karate beginners.

Steps for Program Development Using Bungee Cords:

1- Conduct a survey of relevant research and studies related to the research variables.

2- Interview experts and benefit from their diverse experiences in designing training programs for this age group.

The general principles for developing the training program, including:

- Enhancing physical and skill-related performance and innovative capabilities through exercises using bungee cords.
- Setting program goals and objectives for each phase of its implementation.
- Drawing on similar training programs that addressed the training of novices using different tools to develop physical and skill-related levels for karate players.
- Ensuring the program content aligns with its goals and the level of the target sample.
- Determining the training load structure (periodic, weekly, daily) suitable for the research sample.

- Gradual increase in the training load in line with the age group and the research sample's level.
- Considering individual differences among players.
- Using a 1:3 method in structuring the loads for weekly training units.
- Apply progressive overload to training units during the specialized (skill-based) preparation period, according to the training plan, which lasts for six weeks.
- Specify the number of training sessions (4) per week during the specialized (skill-based) preparation period.
- Total daily training unit time (75-100 minutes), including warm-up (10 minutes), specialized skill preparation using bungee cords (20-30 minutes), main part, with a significant portion using bungee cords (20-40 minutes, with 10-20 minutes using bungee cords), competition part (5-20 minutes), and cool-down (10 minutes).

Implementation Steps:

First: Preliminary Measurements:

Preliminary measurements were conducted for traditional karate players participating in the Enbu competitions at Etihad Basyoun Sports Club in the Gharbia Governorate in all variables as follows:

1- Physical measurements and the innovative thinking scale on Friday, February 5, 2021.

2- Measuring the effectiveness of the skill performance of the Enbu routine by organizing an internal championship. This championship was a semi-league among the players, and the matches were recorded on video with the presence of 4 referees. The researcher prepared a match analysis form (Appendix 4) and a design form for the Enbu routine (Appendix 5) on Friday, February 12, 2021.

Second: Application of Exercises Using the Proposed Bungee cords:

The proposed bungee cord exercises were applied starting from Saturday, February 13, 2021, until Friday, March 26, 2021, following the research procedures. The training units were performed at 7:00 PM on Saturdays, Mondays, Wednesdays, and Fridays each week, as detailed in (Appendix 12 and 13)

Components of the Training Program:

The training program was applied to a single experimental group consisting of 10 traditional karate players. The program lasted for 6 weeks and included 24 training units, with each unit lasting between 75 and 100 minutes. These units were applied at a rate of 4 training units per week, utilizing bungee cord exercises.

The following table illustrates the temporal distribution of the program:

Table (11)
Temporal Distribution of the Program Using Bungee Cords

No.	Program Components	Timing (Time and Numbers)
1	Program Duration	1 month and a half – 6 weeks
2	Unit Training Time	From 75 minutes to 100 minutes
3	Time of Program Units in Minutes	From 1800 minutes to 2400 minutes
5	Number of Training Units per Week	4 units
6	Distribution of Unit Time for Warm-up	10 minutes per unit (240 minutes for the entire program)
7	Distribution of Unit Time for Physical and Skilful Preparation Using Bungee Cords	20 to 30 minutes per unit (480-720 minutes for the program)
8	Distribution of Unit Time for the Main Part as a Whole	20 to 40 minutes per unit (480-960 minutes for the program)
9	Distribution of Unit Time for the Main Part Without Using Bungee Cords	10 to 20 minutes per unit (240-480 minutes for the entire program)
10	Distribution of Unit Time for the Main Part Using Bungee Cords	10 to 20 minutes per unit (240-480 minutes for the entire program)
11	Distribution of Unit Time for the Combat Part	5 to 20 minutes per unit (120-480 minutes for the entire program)
12	Distribution of Unit Time for Cooling Down	10 minutes per unit (240 minutes for the entire program)
13	Total Physical and Skilful Training Exercises in the Program	45 to 90 minutes per unit (1080-2160 minutes for the program)
14	Percentage of Physical and Skilful Training in the Program as a Whole	60-90%
15	Total Physical and Skilful Training Exercises Using Bungee Cords	30 to 50 minutes per unit (720-1200 minutes for the program)
16	Percentage of Physical and Skilful Training Using Bungee Cords	40-50%

Thirdly: Post-Measurements:

1- Physical measurements and the innovative thinking scale were conducted on Saturday, March 27, 2021.

2- The effectiveness of the skill performance for the Enbu sequence was measured by organizing an internal tournament. This tournament was a half-league among the players, and the matches were recorded on video with the presence of 4 referees. The analysis of the matches was carried out using a form prepared by the researcher, attached (4), and the design form for the Enbu sequence attached (5) on Monday, March 29, 2021.

The statistical methods used for data analysis include the following:

- Mean
- Standard Deviation
- Skewness Coefficient
- Paired Samples t-test
- Cronbach's Alpha coefficient for reliability assessment
- Improvement Percentage

Presentation and Discussion of Results:

Table (12)
Significance of Differences Between Pre and Post Measurements in Physical and Skill Abilities and the Level of Core Muscles under study (n=10)

No.	Variables		Measurement Unit	Pre-Measurement		Post-Measurement		Differences Between the Averages	Improvement Percentage	Value (t)	Significance Level
	Test	Skill		Mean	Standard Deviation	Mean	Standard Deviation				
1	Muscular Power for Legs	Mawashi Geri + Mae Geri	15 Sec.	6.28	1.52	9.51	0.52	3.23	33.96	7.65	Stat. Func.
2	Muscular Endurance for Legs	Mawashi Geri + Mae Geri	30 Sec.	15.62	1.36	19.65	0.15	4.03	20.50	5.15	Stat. Func.
3	Agility Endurance	Kiai Jo Zuki + Mawashi Geri + Mae Geri	35 Sec.	4.36	0.98	6.84	0.62	2.48	36.25	4.65	Stat. Func.
4	Precision of Muscular Ability for Legs	Kizami Mawashi Geri	15 Sec.	10.52	1.12	13.52	0.33	3.00	22.18	6.65	Stat. Func.
5	Muscular Power for Arms	Kizami Zuki + Gyaku Zuki	10 Sec.	12.62	0.25	15.65	0.52	3.03	19.36	7.15	Stat. Func.
6	Precision of Power for Arms	Kizami Zuki + Gyaku Zuki	15 Sec.	10.68	0.62	14.52	0.17	3.84	26.44	8.32	Stat. Func.
7	Endurance of Power for Arms	Kizami Zuki + Gyaku Zuki	30 Sec.	38.21	0.86	42.62	0.19	4.41	10.34	6.65	Stat. Func.
8	Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	10 Sec.	12.98	0.64	15.21	0.32	2.23	14.66	6.28	Stat. Func.
9	Endurance of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	30 Sec.	23.58	0.29	26.65	0.85	3.07	11.51	6.87	Stat. Func.
10	Precision of Muscular Power for Arms and Legs	Kizami Zuki + Kizami Mawashi	15 Sec.	13.25	0.87	16.58	0.32	3.33	20.08	6.32	Stat. Func.
11	Agility	Kiai Jo Zuki + Mawashi Geri + Mae Geri	10 Sec.	1.88	0.63	2.65	0.17	0.77	29.05	6.28	Stat. Func.
12	Test of Core Stability Strength			118.65	2.29	125.65	3.65	7.00	5.57	6.85	Stat. Func.

The critical (t) value at a significance level of (0.05) is 1.666.

It is evident from Table (12) that there are statistically significant differences between the means of pre and post measurements in physical and skill abilities, as well as the level of core muscle strength. This is indicated by the fact that the critical (t) value from the table is greater than the calculated (t) value.

Table (13)

Significance of Differences Between Pre and Post Measurements in the Level of Innovative Thinking for Traditional Karate Players (n=10)

Axes	Variables	Measurement Unit	Pre-Measurement		Post- Measurement		Differences Between the Averages	Improvement Percentage	Value (t)	Significance Level
			Mean	Standard Deviation	Mean	Standard Deviation				
Axis 1	Sensitivity to Problems	Grade	1.52	1.65	3.88	0.65	2.36	60.82%	3.98	Stat. Func.
	Improvements	Grade	2.56	1.52	4.21	0.18	1.65	39.19%	4.25	Stat. Func.
Axis 2	Applications	Grade	1.94	1.96	4.62	0.62	2.68	58.00%	3.64	Stat. Func.
Axis 3	Consequences	Grade	2.65	1.09	4.65	0.85	2.00	43.01%	5.28	Stat. Func.
	Positions	Grade	2.98	0.97	3.98	0.31	1.00	25.12%	3.64	Stat. Func.
Axis 4	Ramifications	Grade	1.96	1.11	4.98	0.19	3.02	60.64%	4.58	Stat. Func.
	Overall Total	Grade	13.61	2.65	26.32	1.65	12.71	48.29%	6.51	Stat. Func.

The critical (t) value at a significance level of (0.05) is 1.666.

It is evident from Table (13) that there are statistically significant differences between the means of pre and post measurements in the level of innovative thinking among young practitioners of traditional karate. This is indicated by the fact that the critical (t) value from the table is greater than the calculated (t) value at the significance level of (0.05).

Table (14)

Significance of Differences Between Pre and Post Measurements in the Ability to Design Combination Attacks for Traditional Karate Players (n=10)

Variables	Unit of Measurement	Pre-Measurement		Post-Measurement		Differences Between the Averages	Improvement Percentage	Value (t)	Significance Level
		Mean	Standard Deviation	Mean	Standard Deviation				
Evaluation of Enbu Performance	Grade	18.65	1.08	22.65	3.65	4.00	17.66%	9.65	Stat. Func.
Evaluation of Enbu Design	Number	4.92	1.62	7.21	2.64	2.29	31.76%	6.24	Stat. Func.

The critical (t) value at a significance level of (0.05) is 1.666.

It is evident from Table (14) that there are statistically significant differences between the means of pre and post measurements in the performance level of the combination attacks and in the ability to design combination attacks for traditional karate players. This is indicated by the fact that the critical (t) value from the table is greater than the calculated (t) value at the significance level of (0.05).

Table (15)

The Relationship Between Innovative Thinking and the Design of Combination Attacks for the Research Sample (n=10)

Innovation Thinking Axes	Statement	Designing of the Enbu Sequence
Sensitivity to Problems	A	0,661*
	B	0,708*
Improvements	A	0,633*
	B	0,714*
Applications	A	0,759*
	B	0,646*
Consequences	A	0,772*
	B	0,765*
Positions	A	0,699*
	B	0,681*
Ramifications	A	0,634*
	B	0,611*

The critical (r) value at a significance level of 0.05 is 0.602.

It is evident from Table (15) concerning the relationship between innovative thinking and the design of combination attacks that there is a positive correlation between the variables. This is indicated by the fact that the critical (r) value from the table is greater than the calculated (r) value at the significance level of 0.05.

Table (16)

The Relationship Between Innovative Thinking and Skill Performance in Combination Attacks for the Research Sample (n=10)

Innovation Thinking Axes	Statement	Skillful Performance of the Enbu Sequence
Sensitivity to Problems	A	0,283
	B	0,242
Improvements	A	0,300
	B	0,014
Applications	A	0,185
	B	0,039

Follow Table (16)
The Relationship Between Innovative Thinking and Skill Performance in Combination Attacks for the Research Sample (n=10)

Innovation Thinking Axes	Statement	Skillful Performance of the Enbu Sequence
Consequences	A	0,807*
	B	0,038
Positions	A	0,038
	B	0,164
Ramifications	A	0,366
	B	0,294

The critical (r) value at a significance level of 0.05 is 0.602.

It is evident from Table (16) regarding the relationship between innovative thinking and skill performance in combination attacks that there is no positive correlation between the variables except for statement A on the dependent variable axis.

It is evident from Table (12) that there are statistically significant differences between the means of pre and post measurements in physical and skill abilities, as well as the level of core muscle strength. This is indicated by the fact that the critical (t) value from the table is greater than the calculated (t) value.

The researcher attributes these significant differences between the averages of pre and post measurements (pre-training and post-training) to the impact of core muscle strength training using scientifically based exercises and regulating training loads in a scientific manner. This is achieved through training different muscle groups, especially the core muscles. Muscle strength is significant because it indirectly affects other muscles by converting the increased power from movement to be utilized effectively. This is accomplished using resistance bands, where these exercises helped stabilize the body's center during performance, maintaining balance and executing various skills in an unbalanced position.

The researcher believes that the body's center is crucial in human movement, as most functional movements within the body, ankle movements, and lower leg movements, originate from the center. Thus, the improvement rate for core muscle strength was 5.57%. There was also improvement in all physical and skill abilities ranging from 10.34% to 36.25%.

This aligns with the findings of Adams et al. in 1992, who stated that the activity of elastic bands allows for excellent energy transfer to the same distinctive movements of biomechanically similar mechanics that require high capacity from the trunk and legs, and the results become apparent during performance.

(Adams K., O'Shea JP, O'Shea KL, 1992)

Additionally, the rectus abdominis muscle plays a fundamental role in strengthening the core muscles. It forms what is known as the "hoop tension" or a belt around the waist that generates pressure around the spine. This pressure helps stabilize and protect the spine against various loads. The more the abdominal region is characterized by stability and strength, the better the mobility of the joints improves. The effectiveness of the joints depends on having a stable platform or a pivot point for movement, allowing the transfer of motion up and down the spine within the intended ranges at the required speeds.

(Heather Sumulong, 2008)

Pollock et al. (2009) state that the core muscles perform two main functions during performance: creating and transferring forces to and from the legs and arms using the lateral abdominal muscles.

According to Essam Abdelkhalek (2000), skill performance is closely associated with specific motor and physical abilities. Mastery of skill performance depends on the development of physical and motor capabilities, such as muscle strength, coordination, flexibility, agility, and balance. The assessment of skill performance often involves evaluating an individual's acquisition of these specific physical and motor qualities.

Ashraf Zein (1999) emphasizes that the development of physical qualities is crucial in training the core, as it directly influences its efficiency. Physical qualities are indispensable for performing functional tasks, allowing individuals to sustain effort and execute skills effectively.

These findings are consistent with the research of Aladdin Samarian (2012), highlighting the importance of functional training programs for improving overall fitness, particularly muscle strength. This is corroborated by the work of Mohamed Osman Mohamed (2012), Ashraf Yahya (2013), Wajih Ahmed (2014), and Ihab Abdel Aziz (2016). They emphasize that various training programs using functional training tools in studies have led to improvements in muscle strength, agility, endurance, precision, and other study variables. Although the nature of these programs may vary from one study to another, the consensus is that they contribute positively to enhancing physical performance.

Mohamed Osman Mohamed (2012), Ashraf Yahya (2013), Wajih Ahmed (2014), and Ihab Abdel Aziz (2016)

The results of this study are consistent with the study of Yasumura Maruki and others (2000), which contributes to training core strength and subsequently improving strength, agility, and various elements of physical fitness. The relationship between the fundamental skills of karate and different physical requirements (general and specific) is a close connection that should be considered when preparing players. There is no separation between skilful performance and physical fitness; on the contrary, the development of

physical compatibility elements with skill requirements is crucial. Success in the training process depends on improving the players' levels, and when a player possesses good physical qualities, they are significantly capable of performing all skills effectively.
(Yasumura ST, Hamamura A 2000)

The results of the study align with the findings of both Gehan Elsawy (2010) and Alauddin Shaikh, Samiran Mondal (2012), as well as Kelly et al. (2012), indicating that functional exercises contribute to improving physical abilities.
Gehan Elsawy (2010) ،Alauddin Shaikh, Samiran Mondal (2012) Kelly R. et al (2012)

The results of the study align with the findings of Osama Abdelrahman (2008), Amr Saber (2012), Reda Ibrahim (2009), Ahmed Mohamed (2014), and Kwang Jan (2013), indicating that functional exercises contribute to improving skill performance and efficiency in effort.

Osama Abdelrahman Ali (2008), Amr Saber Hamza (2012), Reda Mohamed Ibrahim (2009), and Ahmed Mohamed Nagib (2014)
This aligns with Marwan Ali's (2003) conclusion that skill training alone is insufficient for improving skills and achieving fruitful results, emphasizing the necessity of developing both skill and specific physical capabilities associated with that skill. Marwan Ali Abdallah (2003)

This perspective agrees with Deleciuse (1997), who suggests that effective center of gravity allows optimal performance in all peripheral joints of the body, including ankle rotation.
Deleciuse (1997)

In this context, Fabio Comana (2004) emphasizes that functional strength programs aim to direct generated force in movements that are multi-level, integrated, and rely on the spine to facilitate motion, without relying on external stabilizers.
Fabio Comana (2004)

This is in line with Dave S, (2003) emphasis on the crucial aspect of strength training, focusing on the core where strong core muscles connect the lower and upper extremities, incorporating skill-based strength exercises with multi-directional movements. Dave S, (2003)

Additionally, this aligns with Barbara J. HoogEnbuom et al.'s (2018) indication that the strength of the body's core is fundamental for transferring motion to distant extremities. Barbara J. HoogEnbuom et all (2018)

Furthermore, Fabio (2004) emphasizes that balance is the fundamental element in karate training, extending beyond the balance between strength and flexibility or muscle engagement and disengagement. It also involves consideration of the methods used, such as standing on one foot and maintaining mobility without falling, which is a crucial feature in interactive functional training. (Fabio C, 2004)

Hussein Abdel Salam (2011), and Mohamed Mahrous(2010) argue that core strength training leads to improvements in physical variables. Hussein Ali Abdel Salam (2011)

Additionally, both Hisham El-Gioshy and Mamdouh Bayoumi (2013) and Kwang Jankim (2015) agree that stability and core strength training enhance agility and muscular strength for all players. Hisham Mohamed El-Gioshy, Mamdouh Mohamed Bayoumi (2013), Kwang Jan Kim 2013

Matthew Weston, Angela E. Hibbs, Kevin G. Thompson, and Iain R. Spears (2015) affirm that trunk strength and stability exercises impact the digital level of young players. Angela E. Hibbs, Kevin G. Thompson, Iain R. Spears (2015)

Dave Schmitz (2003) indicates that strong core muscles connect the lower limb to the upper limb. Additionally, core strength training involves multi-directional movements, and exercises that focus on one side make them some of the best-used training methods. Dave Schmitz 2003

Ahmed Moussa Kamel Gomaa (2022) affirms that core strength training has a positive impact on physical variables (distinctive speed, maximum strength). Ahmed Moussa Kamel Gomaa 2022 Amal Khalil (2017) believes that core stability exercises lead to improvement in the digital level and performance level of players.
Amal Ali Khalil Hassan 2017

Dnyanesh Patil (2014) concurs with what was mentioned, stating that a lack of core stability leads to a weakness in timing. Dnyanesh Patil 2014

Aisha El Fatih (2011) agrees that core strength exercises impact the improvement of muscle strength, agility, flexibility, and balance to varying degrees, leading to an enhancement in skill performance. Aishe El Fateh 2011

Mingming Guo (2013) confirms that training the core area is key to increasing the capacity of deep small muscles, enhancing stability in the spine and pelvis, and improving characteristics such as initiation, acceleration, directional change, and ensuring proper posture in performance. Mingming Guo 2013

Hiba Radwan Labib's study (2012) supports the idea that core strength training leads to improvement in overall strength, muscle strength, and skill performance.
Hiba Radwan Labib (2012)

Allen, Skip (2002) affirms that the most significant benefits resulting from practicing core muscle exercises include increased physical and motor efficiency during sports and daily activities, enhanced body stability and stability, and the production of tremendous strength from the muscles of the central part of the body and its adjacent muscles. Allen, Skip (2002)

This aligns with the findings of studies conducted by Adel Al-Namoury, Abdullah Al-Amir (2008), Mamdouh Mohamed Bayoumi (2013), Kwang Jankim (2015), and Matthew Weston, Angela E. Hibbs, Kevin G. Thompson (2015). These studies indicate that core muscle strength training contributes to improving muscle strength and explosive power.

Adel Al-Namoury, Abdullah Al-Amir (2008), Kwang Jan Kim (2013)
Dave Schmitz (2003) emphasizes that a key feature of functional strength training is focusing on the core, where

strong core muscles connect the lower body to the upper body. Additionally, functional strength training involves multi-directional movements, and its exercises, with a focus on a single limb, make it one of the best methods for improving core muscle strength and balance. Dave Schmitz (2003)

In addition to descriptive studies exploring the relationship between the core and its impact on performance, such as the studies conducted by Sharrock (2011), Okada (2011), and Nesser (2009), which affirmed a direct correlation between core muscle strength and skill performance.

Sharrock, (2011), Okada, T., Huxel, K.C., & Nesser, T.W.(2011), Hodges , p.W (2003)

Mohammad Shehata (2006) also emphasizes the importance of paying attention to the core muscles during strength training for youth.
Mohammad Shehata (2006)

Here lies the importance of core strength exercises in developing skill performance in karate. The assessment of skill performance relies on the ability to transfer force generated from the lower limbs through the core to the upper limbs.

Thus, the first hypothesis is confirmed, stating that "There are statistically significant differences between pre-test and post-test measurements in the level of some physical and skill-related variables and the core muscle strength in favour of the post-test measurement."

From Table (13), statistically significant differences are evident between the means of pre-test and post-test measurements in the level of innovative thinking among traditional karate beginners. The calculated t-value exceeded the tabulated value at a significance level of 0.05, with an improvement ranging from 25.12% to 60.82%.

Similarly, Table (14) indicates statistically significant differences between the means of pre-test and post-test measurements in the level of the ability to design the kinetic sequence of Enbu among traditional karate beginners. The tabulated t-value was greater than the calculated value at a significance level of 0.05, with an improvement of 31.76%.

From Table (15) regarding the relationship between innovative thinking and the design of the kinetic sequence of Enbu, it is evident that there is a positive correlation between the two variables. The tabulated t-value was greater than the calculated value at a significance level of 0.05.

The researcher believes that this improvement in both innovative thinking and the subsequent improvement in designing the kinetic sequence of Enbu resulted from using an innovative tool and performing skills using the bungee cords. This unfamiliar form of exercise, combined with the fun atmosphere and the sensation of flying during skill performance and physical skills, helped participants think more freely in their suggestions for designing combinations of Enbu.

This aligns with the opinion of Fadel Qais (2010), who believes that in sports governed by specific rules, systems, and defined laws, the opportunities for creative movement

are limited. On the other hand, activities that require a high degree of creative movement, such as judo, karate, fencing, basketball, boxing, and others, enhance creativity. Fadel Qais (2010)

Moreover, Xiao Jianwei (2023) observes, for example, that in self-defence martial arts competitions, most athletes perform ordinary procedures, but only a few have unique techniques and rare movements that will attract the attention of the judges. Additionally, with a high level of performance, they will undoubtedly achieve success.

Researchers' interest in creative and innovative thinking in the sports field stems from its aim to demonstrate exceptional and unique diversity in kinetic responses to incentives. Creative thinking can evolve in the sports domain by working on developing specific preparations that enable athletes to achieve creativity in performance. This development, in turn, can be facilitated through the availability of appropriate factors, good and ideal opportunities, perseverance in training and practice, facilitation, social encouragement, success in competitions, and continuous exercise. It is particularly noteworthy that the appropriate choice of the approach is a complementary factor since the suitable approach allows athletes to see the performance and results of this performance Al-Houry, A., & Sleiman, A., 2012

In innovation, it is essential to consider the athlete's physical condition as the fundamental condition for completing the movement. Moreover, the designed movement must consider the complete characteristics of the athlete's movement style. If the movement cannot meet the physical conditions and the technical style of the athlete, it is not creative and does not serve the purpose of competing in martial arts. (Xiao Jianwei, 2023)

Xiao Jianwei (2023) also believes that researchers and creators should keep up with the times by relying on aesthetics and the style of the routine project. They should arrange movements based on the principle of movement aesthetics, thereby increasing the competitive ability of martial arts. (Xiao Jianwei, 2023)

According to Aklat Suleiman Al-Houri (2012), martial arts players exhibit a moderate level of creative thinking. Aklat Suleiman Al-Houri (2012)

Referring to Amabil, Magdy Abdel Karim (2001) indicates that there are three components for innovative performance: appropriate domain skills, appropriate innovative skills, and work motivation. Amabil has developed a model illustrating the relationship between these three innovative components and the stages of the innovative process, such as problem identification, preparation, response generation, verification of response accuracy, and output, in a dynamic manner (Magdy Abdel Karim, 2001)

For example, before inventing challenging movements, there must be a comprehensive scientific idea in the brain, considering the specific physical

conditions of athletes, technical characteristics, and competitive requirements, all in an innovative manner. (Xiao Jianwei 2023)

This aligns with Shalaby's perspective (2001), which states that innovation refers to an individual's ability to discover new relationships between existing or proposed elements. Innovation requires complex capabilities in individuals, allowing them to deal with a large amount of previously stored information in long-term memory or recall its location in scientific references. Innovation is creating new configurations from scattered old information. In addition, there is the motivational aspect, involving engaging in solving a problem for an extended period and looking at it from various perspectives (Shalaby 2001).

Thus, the second hypothesis is confirmed, which states that there is a statistically significant correlation between the ability for innovative thinking and the design of Kinetic Sequences.

As evident from Table (14), there are statistically significant differences between the means of pre-test and post-test measurements in the level of performing the kinetic sequence. The tabulated (t) value is greater than the calculated value at the significance level of 0.05, indicating an improvement of 17.66%.

The researcher attributes the improvement in the skill level of the sampled individuals to the training program using resistance bands (Bungee) which led to an increase in the physical aspects under investigation. Consequently, it impacted the skill-related aspects, as the training exercises closely resembled both the muscle work of the skills and the movement paths of the various skills. Additionally, the Kinetic Sequences consist of several basic skills in traditional karate, some of which are commonly used in competitive matches, while others are less common. These skills heavily depend on the availability of a set of physical fitness elements, with the Core being at the forefront. Training in the Core contributes to skill development, consequently improving performance levels and achieving success.

This is consistent with the findings of Saudia Rashdi Ahmed (2015), indicating that the use of suspended resistance bands induces clear changes in physical performance and improves skill performance (Saudia Rashdi Ahmed, 2015)

Similarly, these results align with those of Mervat Salem and others (2019), who observed improvements in muscular strength variables, including arms, legs, abdomen, and back, using bungee cords. This improvement is attributed to the stimulation of motor units, leading to enhanced performance (Mervat Mohamed Salem, Saida Abdel Aal, et al., 2019)

Omaima Kamal (2015) argues that improving the core muscles is not a luxury but crucial for enhancing and developing skill performance in karate and improving results. (Omaima Kamal, 2015)

Dina Ali (2011) affirmed that the stability of the core significantly

affects the performance level. (Dina Ali Mohamed Saeed, 2011)

In this regard, Abdel Aziz Al-Nemr and Nariman Al-Khatib (1996) added that performance improves more effectively when training is specific to the practiced activity, including the major muscles involved, and their development aligns with how they are used in competition. (Abdel Aziz Al-Nemr, Nariman Al-Khatib, 1996)

Kamal Darwish and Sobhi Hassanein (2002) emphasize this point, indicating that improvement in skill performance requires enhancement in physical elements influencing performance. (Kamal El-Din Abdel Rahman Darwish, Mohamed Sobhi Hassanein, 2002)

Functional strength training involves core muscles such as abdominal and back muscles, along with stabilizing muscles for the trunk and spine. The core and midsection muscles play a crucial role in most sports movements, particularly in karate. Functional strength training has become essential for overall fitness, as noted by the Training Network Life Fitness Academy (Christina Cunningham). This type of training is considered the ideal approach to enhance and develop motor skills, leading to athletic achievements in the field of specialization. http://forum.iraqacad.org/viewtopic.php?f=40&t=1968

Thus, the third hypothesis is confirmed, which states that there are statistically significant differences between pre-test and post-test measurements in the skill performance level of the Kinetic Sequences in favour of the post-test measurement.

As evident from Table 16 regarding the relationship between innovative thinking and skill performance for the Enbu sequence, it is revealed that there is no positive relationship between the variables, except for statement A in the dependent axis.

Creative thinking did not play a role in the performance level except in the dependent axis, and these results align with the following studies: Youssef Ben Hamida (2019), Aziz Suleiman Haridan (2008), and Ahmed Arabi Ouda (2009), all of which suggest a lack of a correlational relationship between creative thinking, skill performance, and athletic achievement.

This is also consistent with the findings of Zahra Jameel Saleh (2006), who concluded that there is no correlation between creative thinking and skill acquisition.
Zahra Jameel Saleh (2006)

Majdi Abdel Karim (2001), citing Ahmed Shaaban (1984), indicates that recurring theoretical signals point to a decline in innovative thinking in the age group under 15 years old. (Majdi Abdel Karim Habib 2001)

Fadl Qais's study (2010) also suggests that there is no positive correlation between skill performance and innovative abilities in most aspects of innovative capabilities. (Fadl Qais 2010)

This contrasts with what Al-Houry (2012) mentions, stating that there is an increase in the level of

creative thinking for Muay Thai players participating in the Advanced Iraq Championship, and there is a correlational relationship between creative thinking and their achievement levels. (Al-Houry 2012)

The focus for martial artists should first be on developing performance-oriented attitudes. Secondly, athletes should possess comprehensive development qualities, defining the quality of movements. Thirdly, they should concentrate on the specific competition rules of self-defence arts. Fourthly, they need to comply with and make reasonable use of the space and equipment requirements in the competition rules, using equipment correctly to aid in flow and creativity.

The fundamental principle of creativity in martial arts is uniqueness and rarity in movements and seriousness in the creation of movements. This is based on ideas, awareness, and challenges understood by martial arts players. (Xiao Jianwei 2023)

This is also consistent with the findings of Ashraf Mohamed Gaber and Mohamed Ibrahim Mahmoud (2002) that the higher the level of innovative thinking abilities, the greater the ability to act strategically in different situations. (Ashraf Mohamed Gaber, Mohamed Ibrahim Mahmoud 2002)

Thus, the partially fulfilled fourth hypothesis states that there is a statistically significant correlation between the ability for innovative thinking and the skill performance of the Kinetic Sequences.

Conclusions:

- There are statistically significant differences between the frontal and lateral measurements in the level of some physical and skill-related variables and the core muscle strength in favour of the lateral measurement.
- The improvement rate for core muscle strength (5.57%) and improvement in all physical and skill-related abilities ranged from (10.34 to 36.25%).
- There is a statistically significant correlation between the ability to think innovatively and the design of the Enbu sequence.
- The improvement percentage in the level of innovative thinking ranged from (25.12% to 60.82%) for traditional karate beginners.
- There are statistically significant differences between the frontal and lateral measurements in the ability to design the Enbu sequence with an improvement rate of 31.76%.
- There are statistically significant differences between the frontal and lateral measurements in the skill performance level of the Enbu sequence with an improvement rate of 17.66%.
- There are statistically significant differences between the frontal and lateral measurements in the skill performance level of the Enbu sequence in favour of the lateral measurement.
- There is no positive relationship between innovative thinking and skill performance for the Enbu sequence, except for statement A in the dependent variable axis.

Recommendations:

- Conduct further research on Enbu, addressing psychological and skill-related aspects and comparing them with other competitions in traditional karate.
- Conduct research that supports innovative thinking and innovation in traditional karate.
- Develop new and innovative training tools that captivate the interest of children and novices to create an innovative training environment.

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