2024, Retos, 61, 367-374

Building mental health and social skills: The positive impact of jigsaw model in taekwondo course
Desarrollo de habilidades sociales y de salud mental: El impacto positivo del modelo jigsaw en el curso del taekwondo

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Abstract. 21st-century education emphasizes technology adaptation and high-level thinking skills, including the development of high-level thinking that puts high pressure on students' mental health and social skills. This study used a one-group pre-post design to test the effect of the jigsaw learning model on students' mental health and social skills in taekwondo lectures. The participants were 136 students (male = 109; female = 27) using a simple random sampling technique. Mental health data were collected using 35 items of the Mental Health Instrument with a 5-point Likert scale, and social skills data were collected using 45 items of the Social Skills Improvement System-Rating Scale with a 4-point Likert scale. Data were analyzed using descriptive statistics and paired sample tests with the help of the IBM SPSS version 29 program. The study's results proved that the mental health indicator that experienced the highest increase was "Harmony in mind," and the lowest was "Learning activities." In the social skills indicator, the highest increase was "Self-control," and the lowest was "Empathy". The jigsaw learning model has been proven to significantly improve students' mental health and social skills in taekwondo lectures. Thus, the jigsaw model can be used as an effective model to address students' mental health and social skills problems and support students' psycho-social development when facing various challenges and high academic demands at university.
Keywords: Mental health, social skills, jigsaw model, cooperative learning

Resumen. La educación del siglo XXI enfatiza la adaptación a la tecnología y las habilidades de pensamiento de alto nivel, incluido el desarrollo de un pensamiento de alto nivel que ejerce una gran presión sobre la salud mental y las habilidades sociales de los estudiantes. Este estudio utilizó un diseño pre-post de un grupo para probar el efecto del modelo de aprendizaje jigsaw en la salud mental y las habilidades sociales de los estudiantes en clases de taekwondo. Los participantes fueron 136 estudiantes (hombres = 109; mujeres = 27) utilizando una técnica de muestreo aleatorio simple. Los datos de salud mental se recopilaron utilizando 35 ítems del Instrumento de Salud Mental con una escala Likert de 5 puntos, y los datos de habilidades sociales se recopilaron utilizando 45 ítems de la Escala de Calificación del Sistema de Mejora de Habilidades Sociales con una escala Likert de 4 puntos. Los datos fueron analizados mediante estadística descriptiva y pruebas de muestras pareadas con ayuda del programa IBM SPSS versión 29. Los resultados del estudio demostraron que el indicador de salud mental que experimentó mayor aumento fue "Armonía mental" y el más bajo fue "Actividades de aprendizaje". En el indicador de habilidades sociales, el mayor incremento fue “Autocontrol” y el menor fue “Empatía”. Se ha demostrado que el modelo de aprendizaje jigsaw mejora significativamente la salud mental y las habilidades sociales de los estudiantes en las clases de taekwondo. Por lo tanto, el modelo jigsaw se puede utilizar como un modelo eficaz para abordar los problemas de salud mental y habilidades sociales de los estudiantes y apoyar el desarrollo psicosocial de los estudiantes cuando enfrentan diversos desafíos y altas demandas académicas en la universidad.
Palabras clave: Salud mental, habilidades sociales, modelo jigsaw, aprendizaje cooperativo

Fecha recepción: 09-07-24. Fecha de aceptación: 06-09-24
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Introduction

21st-century education emphasizes the adaptation of technology and higher-order thinking skills, including the development of analytical thinking (Blegur et al., 2023), critical thinking, collaboration, and creativity (Festiawan et al., 2024). This condition contributes to the formation of an academic environment that puts high pressure on students; at the same time, they are faced with the challenges of various academic tasks, social demands, and emotional struggles that they experience almost every day (Eganov & Romanova, 2021; Pedrelli et al., 2015). Learning at university requires students to collaborate in various learning activities, thus the ability to work in teams, communicate well, and resolve conflicts constructively are social skills that students really need (Akgun & Araz, 2014). It will impact students' emotions and psychological well-being (mental health) and will also have a sustainable impact on students' academic success. Mental health allows individuals to contribute effectively to academic projects and prepares them to work in professional environments, the world of work, and even in the future (Le et al., 2018).

Mental health is a state of dynamic internal balance that allows individuals to use their abilities in harmony with the universal values of society. Basic cognitive and social skills: the ability to recognize, express, and modulate one's emotions and empathize with others; flexibility and the ability to cope with adverse events in life and function in social roles (Galderisi et al., 2015). Students’ mental health and social skills are important aspects in forming individuals' holistically and harmonious personalities. Mental health involves the individual's ability to feel comfortable and respond when facing stress and tension. This ability can be seen through how a person thinks, expresses feelings, and behaviors that are shown according to age development, norms, and culture so that individuals can actualize their potential correctly (Hidayati et al., 2021). Mental health is not only free from mental disorders and mental illness, but

there is psychological, physical, social, and spiritual well-being embedded in a person's self-concept (Gillam, 2018).

College students often face academic pressure, personal challenges, significant life changes (Tian & Lu, 2017), and heavy pressure in pursuing grades and achievements through exams (Jumahat et al., 2013). A recent study by Emmerton et al. (2024) also reconfirmed that the majority of college students reported severe and very severe levels of depression, anxiety, and stress, and this has increased substantially compared to previous years. Some predictors of college students' mental health problems include pressure to succeed, self-esteem, body image, relationships with friends and family, academic performance, and sleep quality. Ratanasiripong et al. (2018) also reported four factors that significantly predicted college students' depression, namely self-esteem, family economic status, resilience, and years of schooling). Two factors that significantly predicted anxiety were self-esteem and family economic status, and three factors that significantly predicted stress were self-esteem, family economic status, and years of schooling. These mental health problems have a negative impact on students' academic performance and learning outcomes (Deng et al., 2022).

Several previous studies, such as Booysen and Grosser (2008), Casey and Rio (2019), Grenier and Yeaton (2019), Santos et al. (2017), Sharan (2015), Syakur and Sabat (2020) and Yuliawati (2018) have attempted to develop and promote affective aspects that are important for students to have to support individual mental health. Not only that, Pedrelli et al. (2015) have even illustrated crucial issues that need to be considered when dealing with students who have mental health problems at university. Learning at university seeks to prepare students to become competent individuals in the world of work. However, in various phenomena and high educational demands, universities and lecturers also need to prepare students with skills to live under various pressures and supportive and productive social environments, one of which is by promoting learning based on mental health and social skills. Efforts to build student character include designing meaningful learning and cooperative learning models focusing on social interaction and collaboration between individuals in achieving learning goals, including the jigsaw learning model.

The jigsaw learning model can promote students' mental health and social skills through its learning syntax. For example, students form work groups, discuss work units with expert groups, expert groups research their subject of expertise before returning to the home group, students share what they have learned with their peers, and individual evaluation and assessment (Şahin, 2010). Through these experiences, students will be faced with various problems and attempts to solve them so that they must have good mental health. They also develop an optimistic attitude to achieve goals with their abilities. After discussing with experts and peers, they are trained to cooperate with colleagues with low academic abilities. They are also trained to be responsible for gaining the trust of peers to discuss with experts and attempt to transfer and transform to their peers in the group and class

The jigsaw learning model has been widely applied to various educational fields and has had a positive impact. For example, the jigsaw model provides an effective way to introduce students to the environment (Buhr et al., 2014), improve problem-solving skills and listening/communication skills, and encourage cooperative learning (Wilson et al., 2017), encourage active learning (Anisa & Hidayah, 2024), and improve learning outcomes (Usman et al., 2022). However, the study by O'Leary et al. (2019) needs to make essential notes because they recommend that there are still shortcomings in the ability to teach the jigsaw learning model, and students' problematic social relationships have an impact on the use of the jigsaw learning model which is less effective. They suggest that further research considers and prepares holistic learning and development in developing students' social skills. Thus, this study will fill the gap in previous research by focusing on applying the jigsaw learning model to improve students' mental health and social skills.

Several studies have examined the implementation of cooperative learning models, but their relationship to mental health has received little attention. Thus, this study aims to determine how implementing the jigsaw learning model in taekwondo lectures affects students' mental health and social skills. This study is expected to contribute to developing holistic learning strategies that emphasize affective learning, focusing on mental health and social skills through learning based on collaboration and social interaction.

Methods

Study Design and Procedure

The study used a one-group pretest-posttest design (Fraenkel et al., 2011). This design facilitates assessing the impact of the jigsaw cooperative learning model intervention by comparing changes observed over time and provides valuable insights into its effectiveness in building students' social skills and mental health.

Table 1.
One-group pre-test-post-test design (Fraenkel et al., 2011)

O	X	O
Pre-test 1. Students completed the 35-item Mental Health Instrument 2. Students completed the 45-item Social Skills Improvement System-Rating Scale Dependent variable	Treatment 14 meetings (1 meeting/week) application of the jigsaw type cooperative learning model	Post-test 1. Students completed the 35-item Mental Health Instrument 2. Students completed the 45-item Social Skills Improvement System-Rating Scale Dependent variable

The researcher conducted a pre-test at the beginning of the meeting before the jigsaw learning model treatment was applied. Students completed the 35 Mental Health Questionnaires developed by Hidayati et al. (2021) and the Social Skills Improvement System developed by Gresham and Elliott (2008) and adapted by Mulyana et al. (2024) to the Indonesian context.

After collecting mental health and social skills data, students were given treatment for 14 weeks using the jigsaw cooperative learning model by considering the five model syntaxes compiled by Holliday (in Şahin, 2010), namely (1) formation of home groups and pre-work, (2) giving the groups of experts the unit of work, (3) expert groups research their expertise subjects before they return to their home groups, (4) students in expert groups return to their home groups to share what they have learned with their friends (5) individual evaluation and grading. Students in cooperative learning groups complete learning activities in small heterogeneous groups. One group member is responsible for mastering their portion of the material, while the experts are responsible for teaching their material to the other group members. After that, each member's score is accumulated from the test results into a group score (Gull & Shehzad, 2015).

After 14 weeks of treatment, the researcher again distributed the two research instruments used in the pre-test so that students could complete the test. The post-test scores were then compared with the pre-test scores to determine the effect of the jigsaw cooperative learning model in taekwondo lectures on students' mental health and social skills.

Participant

The population in this study were students of the Department of Physical Education, Faculty of Teacher Training and Education, Universitas Siliwangi, the academic year 2023, who contracted taekwondo courses totaling 275 people distributed in seven study classes. The research sample amounted to 136 students, each male numbered 109 and female numbered 27, which were determined using simple random sampling.

Instruments

The measurement of students' mental health used the Mental Health Instrument (MHI) developed by Hidayati et al. (2021). The MHI consists of 35 items constructed using 20 negative items and 15 positive items with construct reliability (CR) value >0.70 (9 items were deleted because they did not meet the CR parameters). The MHI uses three dimensions, namely harmony of mental functions with three indicators, namely (1) harmony on feeling 4 items, including *"I am not a person who panics easily over unfinished tasks*," (2) harmony in mind 4 items, including *"Many problems in life make me tired to think,"* and (3) harmony in behavior 3 items, including "*I prefer to be alone than to meet and hang out with friends."* The adaptability dimension uses three indicators, namely (1) adjustment to themselves 6 items, including "*With my abilities, I believe I can achieve my goals,"* (2) adjustment to others 3 items, including "*The shortcomings that exist in other people prevent me from being able to cooperate,*" and (3) adjustment to the environment 3 items including "*Obey the rules or norms that exist in society*." The last dimension, namely the ability to actualize self-potential, uses 3 indicators, namely (1) learning activities 4 items including *"I enjoy observing what is and is happening in the environment,"* (2) development of interest 4 items, including *"The extracurricular activities I chose didn't fit my interests,"* and (3) exercise 4 items, including *"I regularly exercise."* Respondents responded to the MHI using a 5-point Likert scale of four points (strongly disagree-strongly agree).

The measurement of students' social skills used the Social Skills Improvement System-Rating Scale instrument developed by Gresham and Elliott (2008) and has passed a cross-cultural adaptation study by Mulyana et al. (2024) to the context of Indonesian physical education students with a reliability value of 0.893 on 45 items (1 item was removed because it did not meet the validity value, namely 0.172 <0.176). The SSIS-RS is designed to facilitate students who experience social behavioral difficulties, focusing primarily on skills that facilitate academic success and help plan interventions to improve students' social behavior (Gresham & Elliott, 2008). There are seven indicators in the SSIS-RS construction, namely (1) communication with 7 items, including "*Respond well when others start a conversation or activity,"* (2) cooperation with 6 items, including *"Ignore classmates when they are distracting,"* (3) assertion with 6 items, including *"Say nice things about herself/himself without bragging*," (4) responsibility with 6 items, including *"Takes responsibility for her/his own actions,"* (5) empathy with 6 items, including *"Is nice to others when they are feeling bad,"* (6) engagement with 7 items, including *"Participate in games or group activities,"* and (7) self-control with 7 items, including *"Takes criticism without getting upset."* Participants responded to the SSIS-RS using a 4-point Likert scale (never-always).

Data Analysis

This study uses IBM SPSS version 29 data analysis tools. The data obtained were analyzed descriptively and inferentially. For descriptive analysis, the mean and standard deviation were found. After that, the analysis requirements test (classical assumption test) was carried out by testing the normality of the data using Kolmogorov-Smirnov. Then, hypothesis testing was continued using paired sample test analysis.

Results

Indicator/Variable Description

The data description in Table 1 shows that the mental health indicator that experienced the highest increase after the jigsaw learning model was implemented was *"Harmony in mind,"* with an average gain score of 0.77. In contrast, the indicator that experienced the lowest increase was *"Learning activities,"* which was -0.05. Based on the paired samples test

results, only two indicators had significant differences after treatment, namely the *"Harmony in mind"* indicator with a Sig. value <0.05 (0.002) and the *"Harmony in behavior"* indicator with a Sig. value <0.05 (0.030), while the other seven indicators did not have significant differences because they had Sig. values >0.05.

Table 2.
Description of mental health variable indicators

No	Mental health variable indicators	M±SD		Paired samples test	
		Pre-test	Post-test	t	Sig.
1	Harmony on feeling	9.7±1.9	10.1±1.7	-1.599	0.112
2	Harmony in mind	10.0±2.3	10.8±2.2	-3.204	0.002
3	Harmony in behavior	8.1±1.9	8.5±1.7	-2.188	0.030
4	Adjustment to themselves	17.8±2.8	18.4±2.9	-1.944	0.054
5	Adjustment to others	9.3±1.9	9.6±1.8	-1.854	0.066
6	Adjustment to the environment	9.9±1.6	10.2±1.8	-1.453	0.149
7	Learning activities	11.6±1.6	11.6±1.4	-0.306	0.760
8	Development of interest	10.3±1.9	10.6±1.9	-1.283	0.202
9	Exercise	12.9±2.6	13.1±2.6	-0.801	0.425

Data description analysis on the social skills variable shows that the indicator that experienced the highest increase after the jigsaw learning model was applied was *"Self-control,"* with a mean gain score of 1.46, while the indicator that experienced the lowest increase was *"Empathy,"* which was 0.50. Based on the paired samples test results, six indicators had significant differences after receiving treatment with a Sig. value <0.05, while one other indicator, namely *"Empathy,"* did not have a significant difference because it had a Sig. value >0.05 (0.072) (see Table 2).

Table 3.
Description of social skills variable indicators

No	Social skills variable indicators	M±SD		Paired samples test	
		Pre-test	Post-test	t	Sig.
1	Communication	14.2±2.8	15.4±2.6	-4.729	0.001
2	Cooperation	11.2±2.4	12.3±2.5	-4.346	0.001
3	Assertion	9.7±2.5	10.5±2.7	-3.071	0.003
4	Responsibility	13.8±2.3	14.4±2.4	-2.572	0.011
5	Empathy	11.5±2.7	12.0±2.9	-1.811	0.072
6	Engagement	13.2±3.5	14.3±3.4	-3.589	0.001
7	Self-control	12.5±3.0	13.9±3.4	-4.409	0.001

Paired Samples Test

The results of the data normality test in Table 3 show that the Sig. pre-test and post-test values on the mental health variable are >0.05, which is 0.200. The Sig. pre-test and post-test values on the social skills variable are >0.05, which is the same value as 0.200. Considering the Sig. values on the four data groups, it can be concluded that the data on the four groups of dependent variable data (mental health and social skills) are normally distributed.

Table 4.
Normality test (Kolmogorov-Smirnov)

		Statistic	df	Sig.
Mental health	Pre-test	0.056	136	0.200
	Post-test	0.040	136	0.200
Social skills	Pre-test	0.055	136	0.200
	Post-test	0.049	136	0.200

Based on the results of the classical assumption test that has been met in this study, the research data is normally distributed, so the data calculation uses parametric statistics by continuing to the paired sample test. Table 4 shows that the average mental health score in the pre-test was 99.68 (SD = 10.66), and the post-test was 102.90 (SD = 11.28), so there was a difference of 3.22. In the social skills variable, the average pre-test score was 86.04 (SD = 12.61), and the post-test score was 92.68 (SD = 15.01), so there was a difference of 6.63.

Table 5.
Paired samples statistics

		Mean	N	Std. deviation	Std. error mean
Pair 1	Pre-test-mental health	99.68	136	10.66	0.91
	Post-test-mental health	102.20	136	11.28	0.97
Pair 2	Pre-test-social skills	86.04	136	12.61	1.08
	Post-test-social skills	92.68	136	15.01	1.29

A paired samples test was conducted to see the effect of the jigsaw-type cooperative learning model intervention in taekwondo lectures on students' mental health and social skills. The result, the Sig. value (2-tailed) in testing the mental health variable, which is 0.007 (<0.05), and in the social skills variable, the Sig. value is 0.001 (<0.05) (see Table 5), so it is concluded that there is a significant difference between the application of the jigsaw-type cooperative learning model on students' mental health and social skills.

Table 6.
Paired samples test

		Paired differences		t	df	Sig. (2-tailed)
		Mean	Std. deviation			
Pair 1	Pre-test-mental health-Post-test-mental health	-3.22	13.79	-2.724	135	0.007
Pair 2	Pre-test-social skills-Post test-social skills	-6.63	15.23	-5.078	135	0.001

Discussion

The results of our study indicate that implementing the jigsaw cooperative learning model has a positive effect on students' mental health and social skills in taekwondo lectures. The jigsaw cooperative learning model, which emphasizes social interaction, can not only improve students' social skills but also positively impact mental health. It aligns with the research questions we asked, as evidenced by the differences and increases in the average pre-test and post-test scores on the mental health variable.

Most cooperative learning studies are more related to social skills so that students have the skills demanded in the 21st century. Like previous studies, many have discussed the positive impact of the cooperative model on social skills (Kamaruddin & Yusoff, 2019; Montoya et al., 2020; Mulyana et al., 2023; Raharja, 2017; Syahbuddin et al., 2022). Casey and Rio (2019) emphasized that the cooperative learning model focuses on physical education's social domain and promotes social learning in various ways. Other studies provide new information and experiences that the cooperative learning model can improve students' hard skills and soft skills, as well as improve the

psychomotor domain in various fields of study (Dupri, 2019; Firdaus, 2017; Gambari & Yusuf, 2015; Hidayat et al., 2017; Jatmiko, 2017; Khairunnisa & Aziz, 2019; Nair & Sanai, 2018; Sapitri & Hartono, 2015; Siong et al., 2020).

It is also important to understand that social skills are not just about the ability to cooperate, work in teams, or develop good social relationships; social learning is also about showing care, concern, empathy, and respect for each other and encouraging each other to learn (Casey & Goodyear, 2015). The attachment and emotions built through interactions during cooperative learning provide self-satisfaction and fulfillment of basic human needs (the need for safety, love, affection, belonging, appreciation, and self-actualization) (Maslow, 1954, 2017). In addition, the cooperative learning model also has a positive influence on students' affective domains, such as motivation, attitude, and increased self-esteem of students (Cook & Friend, 2020; Damayanti et al., 2023; Koc, 2008; Montoya et al., 2020; Waritsman et al., 2018).

Our interest in this study is whether the social domain owned by students and the jigsaw cooperative learning model can be predictors in the development of student's mental health. taekwondo lectures contain many meanings and values contained in them, such as social responsibility, self-control, and self-confidence, which can be learned through physical education learning content, especially in taekwondo lectures (Bae & Roh, 2021; Kazemi et al., 2009; Kim et al., 2021). Lecturers should be able to integrate these values effectively by creating student learning experiences that promote positive social behavior. In addition to establishing positive social interactions, this is one of the crucial foundations in building students' mental health through taekwondo lectures by implementing the jigsaw cooperative learning model.

Discipline and focus can be trained in taekwondo lectures, helping someone to manage their emotions better and improve their ability to deal with challenging situations (Bae & Roh, 2021), providing a sense of community and providing social support that is important for mental health (Kim et al., 2021). It means that taekwondo lectures not only improve physical skills but also provide significant psychological benefits (Kim et al., 2021) so that with the mediation of the jigsaw learning model, students are more explorative in integrating their physical experiences through the experience of sharing knowledge and skills with their peers. Thus, students' physical activity contributes to a person's psychological dimension, which can ultimately result in an active and healthy lifestyle, improving a better quality of life (Ramírez-Gomez et al., 2024). Physical activity-based learning, such as taekwondo, should be balanced between opportunity and enjoyment, and a lecturer should rationalize the significance of the activities carried out in the real world (Miller & Kocurek, 2017).

Taekwondo lectures teach participants to control their emotions and channel their energy positively. It can help reduce aggression and increase self-control (Bae & Roh, 2021). The evidence in the field during the study was that students showed self-control and emotional control when practicing sparring or kyorugi. They realized that to get good grades on the final semester exam, they needed effort, courage, and self-confidence to perform well and win the match. However, arrogance and emotion are not the only ways to achieve these goals. The effect of taekwondo lectures by implementing the jigsaw cooperative model is that students have an understanding that having self-control and respecting others is the most valuable thing compared to a final semester exam score so that they are more communicative, cooperative, assertive, responsible, empathetic, and also self-controlled in responding to various competition values during their sports activities.

Other values of taekwondo lectures are building respect and self-discipline. In fact, when students want to leave the lesson, they always ask permission from the lecturer, even for the most minor matters; this point illustrates that several indicators of social skills (Gresham, 2016), namely cooperation, communication, and empathy, are already possessed by students. Furthermore, Trulson (in Petrovic, 2017) reported that six months of taekwondo training can improve psychosocial health (respect, humility, responsibility, perseverance, and honor) compared to other martial arts. Relevant evidence that Taekwondo can increase responsibility and perseverance is that when students work on unstructured tasks (online), most students show their efforts in completing and collecting their performance through videos. This condition shows their responsibility for the tasks given by describing positive self-control from each student.

Lastly, participation in taekwondo martial arts with the mediation of the jigsaw learning model can provide adolescents with various physical and psychosocial benefits. It can be helpful in student stress management, providing psychological experience to students so they can overcome mental health problems and social skills. In addition, taekwondo martial arts effectively improve health holistically by encouraging positive changes in the body, mind, and soul. Therefore, students have the opportunity to learn and practice at a manageable pace that has been proven to be conducive to developing positive behaviors and perspectives on stress to improve their mental health and overall well-being (Petrovic, 2017).

Conclusion

Based on the results of our study, it can be concluded that the jigsaw learning model has a positive effect on students' mental health and social skills in learning. Taekwondo lectures given during the study were conducted in heterogeneous groups; the research we conducted actualized the syntax in the jigsaw-type cooperative learning model. The effect of the activities carried out during the study was that valuable social interactions were established between students. Participants learned to work together, communicate, and build positive relationships with others,

which can reduce feelings of loneliness and isolation. The actual evidence in the field during the treatment was that each jigsaw group had established good communication and bonds; this was reflected in solving the movement tasks given by the lecturer; they completed them with their own learning style and group abilities according to the concepts and passions for learning they have.

Implementing the jigsaw learning model in the context of a taekwondo course has been proven to facilitate students so that they can not only improve their physical skills but also develop their ability to communicate, work together, manage conflicts positively, manage emotions well and correctly so that they can support the development of students' mental health. Students with high social skills can control their feelings, thoughts, behavior, self-adjustment, adjustment to others, adjustment to the environment, learning activities, and the development of their interests so that they can develop according to their potential without having to cause prolonged psychological and social conflicts.

Acknowledgments

We would like to thank the participants who participated in this research. We also thank the Indonesia Endowment Funds for Education (LPDP) Center for Higher Education Funding (BPPT) for sponsoring the publication of research.

Conflict of Interest

There is no conflict of interest.

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