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THE INFLUENCE OF SKIPPING EXERCISES ON SMASH JUMP PERFORMANCE IN GRADE VIII STUDENTS OF SMP NEGERI 1 LAUBALENG

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Abstract

This study aims to empirically investigate the effect of a structured skipping exercise program on the smash jump performance of eighth-grade students at SMP Negeri 1 Laubaleng. The research employed a quantitative experimental method, utilizing a one-group pretest-posttest design to isolate and measure the impact of the intervention. A sample of 32 students was selected through total sampling techniques, ensuring the participation of an entire class cohort. The primary instrument for data collection was the standardized badminton smash accuracy test, as endorsed by the Indonesian Badminton Association (PB PBSI), which assesses both the power and precision of the smash shot. The experimental intervention consisted of a 6-week skipping training program, administered three times per week for 45 minutes per session. Each session was carefully structured to include a warm-up, a core skipping component involving various techniques (two-foot jump, alternate foot, speed variations), and a cool-down period. The collected data were subjected to rigorous statistical analysis, including tests for normality and homogeneity, followed by a paired t-test to determine the significance of the observed changes. The results demonstrated a substantial and statistically significant improvement in smash performance, with the mean score increasing from 29.44 (SD = 5.073) in the pretest to 50.5 (SD = 5.663) in the posttest. The t-test analysis confirmed a significant effect ($p < 0.05$), leading to the conclusion that the skipping exercise program was highly effective in enhancing the students' smash jump ability. These findings strongly recommend the integration of skipping as a viable, efficient, and cost-effective alternative training methodology within badminton instruction and physical education curricula, particularly for developing the foundational physical qualities required for powerful offensive shots.

Keywords: ***Badminton, Junior High School Students, Physical Education, Plyometric Training, Skipping, Smash Jump***

INTRODUCTION

Badminton stands as a cornerstone of Indonesian sporting culture, a discipline that captivates millions from casual community play to the pinnacle of international competition. Its appeal lies in the dynamic interplay of strategy, finesse, and explosive athleticism. At the heart of this athletic endeavor lies the smash, a shot universally recognized as the most potent offensive weapon in a player's arsenal. Executed with immense velocity and a steep downward trajectory, a well-placed smash is often the decisive blow that concludes a rally. The efficacy of this shot, however, is not solely a product of technical arm mechanics; it is fundamentally underpinned by a powerful and coordinated jump. The smash jump, or jump smash, transforms a standard attacking shot into a devastating overhead strike delivered from a point of superior height and angle, making it exponentially more difficult for an opponent to return. The biomechanical chain of a successful jump smash is complex and demands a high level of physical proficiency. It originates in the lower body, requiring a forceful extension of the ankles, knees, and hips to propel the athlete vertically. This explosive power, generated primarily by the muscles of the calves, quadriceps, glutes, and core, is then transferred sequentially through the torso, shoulder, arm, and finally into the racket. Any weakness or disconnection in this kinetic chain can significantly diminish the power, timing, and ultimately, the effectiveness of the smash. Consequently, the development of lower limb strength, power, and coordination is not merely supplementary but essential for any player seeking to master this critical skill. Within the context of physical

education at the junior high school level, such as at SMP Negeri 1 Laubaleng, cultivating these physical attributes presents a distinct set of challenges. Initial observations conducted at the school revealed that the smash jump proficiency of Grade VIII students was notably low. Students often struggled to generate sufficient vertical lift, resulting in weak, flat smashes that lacked the penetrating power to pressure an opponent. This deficiency was hypothesized to stem from a lack of varied and targeted physical training specifically designed to develop the explosive leg power and coordinated movement patterns required for the jump smash. Standard physical education classes, while beneficial for general fitness, often lack the specialized focus needed to address such specific athletic demands.

In seeking a practical and accessible solution to this pedagogical challenge, skipping, or jump rope training, emerges as a highly promising candidate. Often misperceived as a simple childhood pastime or a boxer's warm-up, skipping is, in fact, a sophisticated form of plyometric exercise. Plyometrics are exercises that involve rapid cycles of stretching and contracting muscles, designed to improve muscular power and the efficiency of the nervous system. Skipping requires and develops rhythmic, repetitive, and explosive push-offs from the ground, directly engaging the same muscle groups and neuromuscular pathways critical for a powerful smash jump. It enhances calf endurance, ankle stability, coordination, timing, and cardiovascular fitness in a single, integrated activity. Its advantages are further magnified by its practicality: it is inexpensive, requires minimal space and equipment, and can be easily modified to suit varying skill levels.

While existing literature, such as the work of Ahmad (2020), has suggested a positive correlation between simple coordination exercises and beginner skill development, there remains a scarcity of empirical, localized studies that quantitatively measure the direct impact of a structured skipping program on a specific, high-level badminton skill like the jump smash. This research gap is particularly relevant in the Indonesian school context, where resources can be limited and cost-effective training solutions are of paramount importance. Therefore, this study was conceived to move beyond general observation and provide concrete, data-driven evidence. It seeks to answer a pivotal question: Can a systematic, six-week skipping exercise program produce a statistically significant improvement in the smash jump performance of Grade VIII students at SMP Negeri 1 Laubaleng? By employing a controlled experimental design and a standardized measurement tool, this research aims to validate skipping not just as a general fitness activity, but as a targeted and effective training modality for enhancing badminton performance, thereby offering a valuable tool for physical educators and coaches.

LITERATURE REVIEW

To fully appreciate the context and potential impact of this study, it is essential to explore the theoretical underpinnings that connect skipping as a training stimulus to the enhancement of smash jump performance. This connection is rooted in the interdisciplinary fields of sports biomechanics, exercise physiology, and motor learning. The badminton smash is a classic example of a closed kinetic chain skill that demands a high degree of neuromuscular coordination and explosive power. According to the performance standards set by the Indonesian Badminton Association (PB PBSI, 2006), a high-quality smash is characterized by a combination of high shuttlecock speed, a steep downward angle, and precise placement, all of which are contingent upon the player's ability to make solid contact with the shuttlecock at the highest possible point of their jump. The power for the shot is not generated solely by the arm; rather, the arm acts as the final link in a whip-like sequence that begins with the legs. The jump provides the initial momentum, which is then amplified through the sequential rotation of the hips and torso, before being transferred to the shoulder, elbow, and wrist. This entire process is governed by the "Summation of Forces" principle, where forces generated from larger muscle groups are summated and transferred to the smaller, terminal segments.

Harsono (2015) extensively elaborates on the critical role of physical conditioning in sports performance. He posits that technical skills like the smash are fundamentally limited by the athlete's underlying physical components, or biomotor abilities. For the jump smash, the most relevant biomotor abilities are:

1. Explosive Power (Power): The ability to exert maximum force in the shortest possible time. This is the cornerstone of the vertical jump.
2. Muscular Strength: The maximum force a muscle or group of muscles can generate, which forms the foundation for power.
3. Coordination: The ability to perform complex motor skills with smoothness, efficiency, and accuracy, integrating the movements of the limbs and torso.
4. Agility: The ability to change the direction of the body quickly and efficiently, which is related to the footwork and positioning preceding the jump.

Any deficit in these areas will inevitably cap a player's technical potential. Therefore, a training program aimed at improving the smash must deliberately target these specific physical qualities. This is where skipping exercises demonstrate their profound relevance. Sugiyono (2015) classifies skipping as a plyometric and coordinative activity that is highly effective for developing lower limb strength, agility, and rhythm. The biomechanical action of skipping is a repetitive, low-impact plyometric exercise. Each jump involves a rapid eccentric (lengthening) contraction of the calf and thigh muscles as the body prepares for landing, followed immediately by a powerful concentric (shortening) contraction to propel the body back into the air. This stretch-shortening cycle (SSC) is the fundamental mechanism for developing explosive power. By training the neuromuscular system to react more quickly and forcefully, skipping directly enhances the elastic strength and reactive ability of the leg muscles, which are precisely the qualities needed for an explosive take-off in a jump smash.

Furthermore, skipping is a unparalleled tool for enhancing coordination and rhythm. The activity requires precise timing between the visual system, the auditory feedback of the rope hitting the ground, and the motor commands to the hands and feet. This develops a keen sense of rhythm and whole-body coordination, which is directly transferable to the timed, coordinated effort of a jump smash, where the jump, arm swing, and wrist snap must occur in perfect synchrony. The findings of Ahmad (2020) support this, reporting that simple, coordinated exercises like skipping can significantly improve the smash technique of beginner badminton players by refining their motor control and kinetic chain sequencing. Wijaya (2021) further reinforces this perspective, emphasizing that coordination-based training has a positive holistic impact on overall sports skill acquisition. He argues that improved neural efficiency allows for more precise and economical movement patterns, reducing energy waste and increasing the effectiveness of technical execution. When applied to this study, the rationale is clear: by improving the students' general coordination and rhythmic capacity through skipping, their ability to perform the complex, coordinated action of the jump smash should also improve. The existing literature thus provides a strong theoretical foundation for the hypothesis that skipping exercises can positively influence smash jump performance. However, the translation of this theory into a quantifiable, localized intervention within a specific school setting is the primary contribution this research seeks to make. It bridges the gap between general principle and practical application, aiming to provide empirical evidence that can directly inform physical education practice at SMP Negeri 1 Laubaleng and similar institutions.

METHOD

To rigorously test the proposed hypothesis, this study adopted a quantitative research paradigm with a pre-experimental design. The specific design chosen was the one-group pretest-posttest design. This approach was deemed appropriate for this initial investigation as it allows for the measurement of change within a single group following an intervention, providing a clear before-and-after comparison. While it lacks a control group for comparison, it is a robust and practical design for establishing a preliminary cause-and-effect relationship within a real-world educational setting where random assignment to a control condition may not be feasible. The research was conducted at SMP Negeri 1 Laubaleng, utilizing the school's badminton court for both the testing and training sessions to ensure environmental consistency. The population for this study was all Grade VIII students enrolled at the school for the academic year. From this population, a sample of 32 students was selected using the total sampling technique. This method involved including all members of a single, intact Grade VIII class, thereby eliminating selection bias and ensuring that the sample was representative of the typical classroom cohort. The use of a homogeneous sample in terms of age and educational background helped control for extraneous variables related to development and prior formal training.

The independent variable in this study was the structured skipping exercise program. The dependent variable was the students' smash jump performance, as quantitatively measured by their score on the standardized smash accuracy test. The instrument used to collect data on the dependent variable was the official Badminton Smash Accuracy Test from the Indonesian Badminton Association (PB PBSI). This test is a validated and reliable measure designed to assess the power and precision of a player's smash. The test setup involves a badminton court with specific target zones marked on the opposite side, each assigned a different point value. Students are required to perform jump smashes from a designated area, and points are awarded based on where the shuttlecock lands. The total score from a set number of attempts serves as the quantitative indicator of smash jump performance, as a successful, powerful smash requires an effective jump to generate the necessary angle and force to hit the high-value zones. The experimental procedure was conducted over a continuous six-week period. The intervention consisted of supervised skipping training sessions held three times per week, with each session lasting approximately 45 minutes. Every session followed a structured format to ensure safety and maximize training effect, beginning with a 10-minute

warm-up. This initial phase included light jogging, dynamic stretches like leg swings and arm circles, and simple, slow skipping to prepare the muscles, joints, and cardiovascular system for the activity ahead. The core of the session was a 25-minute skipping training block, which served as the main intervention. The skipping exercises were progressive and varied to maintain engagement and continuously challenge the neuromuscular system. The program evolved from basic two-foot jumps to more complex movements like the alternate foot jump, high-knee skipping, and an introduction to double-unders for advanced participants. It also incorporated speed intervals, which were short bursts of maximum-speed skipping alternated with recovery periods to develop anaerobic power. The intensity and volume of the exercises were gradually increased over the six weeks according to the principle of progressive overload.

Each session concluded with a 10-minute cool-down period. This final phase involved slow walking, static stretching targeting key muscle groups such as the calves, quadriceps, and hamstrings, and light breathing exercises. The purpose of the cool-down was to aid the body's recovery process, improve flexibility, and help reduce post-exercise muscle soreness. Data collection was executed in two distinct phases. A pre-test was administered to all 32 students in the week preceding the commencement of the skipping program. This established a baseline measurement of each student's smash jump performance. Following the completion of the 6-week training intervention, an identical post-test was administered under the same conditions and by the same assessors to ensure consistency and objectivity. The data obtained from the pre-test and post-test were then subjected to a series of statistical analyses using software to ensure accuracy. First, tests for normality (using the Shapiro-Wilk test) and homogeneity were conducted on the data sets to verify that they met the necessary assumptions for parametric statistical testing. After confirming that the data were normally distributed and homogeneous, the primary analysis was performed using a paired sample t-test. This statistical test is specifically designed to compare the mean scores of a single group at two different points in time (in this case, before and after the intervention). A significance level of alpha 0.05 ($p < 0.05$) was predetermined, meaning that if the probability of the observed change occurring by chance was less than 5%, the result would be considered statistically significant.

RESULTS AND DISCUSSION

The findings of this study provide clear and compelling quantitative evidence supporting the positive effect of the 6-week skipping exercise program on the smash jump performance of the students. The results from the pre-test and post-test measurements are presented and discussed in detail below. The initial pre-test results revealed a baseline level of smash jump proficiency among the 32 students. The average score achieved was 29.44, with a standard deviation of 5.073. This relatively low mean score, coupled with the standard deviation, confirmed the initial observations of low smash ability and indicated a moderate variation in the baseline skill level within the group. Some students possessed a nascent ability to perform a basic smash, while others struggled significantly with the coordination and power required. After the 6-week intervention, the post-test results demonstrated a remarkable and uniform improvement. The mean score on the same smash accuracy test jumped to 50.5, with a standard deviation of 5.663. This represents a mean improvement of 21.06 points, a substantial increase that is both statistically and practically significant. The summary of the results is presented in the table below:

Table: Summary of Pre-test and Post-test Results for Smash Jump Performance

Test	Mean Score	Standard Deviation
Pre-test	29.44	5.073
Post-test	50.5	5.663

The results of the statistical tests for normality and homogeneity confirmed that the data were suitable for parametric analysis. The subsequent paired sample t-test yielded a p-value (significance value) of less than 0.05. This statistically conclusive result allows us to reject the null hypothesis—that the skipping training had no effect—and accept the alternative hypothesis: that the 6-week skipping exercise program had a significant positive effect on the smash jump performance of the Grade VIII students at SMP Negeri 1 Laubaleng. The discussion of these findings delves into the physiological and neuromuscular mechanisms that explain why skipping was so effective. The primary driver of improvement is the plyometric nature of the training. Over the six weeks, the repetitive, explosive jumps involved in skipping provided a consistent and progressive stimulus to the students' neuromuscular systems.

This stimulus triggered specific adaptations in the muscles and nerves of the lower limbs. The fast-twitch muscle fibers in the calves, quadriceps, and glutes became more efficient at generating force rapidly. Furthermore, the nervous system adapted by improving the firing rate of motor neurons and enhancing the synchronization of muscle contractions. This combination of muscular and neural adaptations directly translates to a more powerful vertical jump. A more powerful jump allows a player to hit the shuttlecock from a greater height, creating a steeper angle for the smash and making it more difficult to return. This is precisely what the smash accuracy test measures: the ability to generate enough power and control to direct the shuttlecock into the high-value scoring zones.

Secondly, the significant improvement can be attributed to the enhancement of coordination and rhythm. The jump smash is not a brute force activity; it is a skill of precise timing. The take-off, the backward arch of the body, the forward uncoiling of the torso, the arm swing, and the wrist snap must all be exquisitely synchronized to transfer the maximum force from the ground into the shuttlecock. Skipping, by its very nature, is a rhythmical activity. It demands and develops a keen sense of timing and whole-body coordination. The students' improved ability to coordinate the movement of their hands (turning the rope) and feet (jumping) likely transferred to an improved ability to coordinate the sequential movements of the jump smash. Their movements became more fluid, efficient, and well-timed, leading to a more effective and powerful execution of the skill.

These findings are in strong alignment with the existing theoretical and empirical literature. They directly support the work of Harsono (2015), who emphasized that technical skills are limited by physical capacity, and that specific physical training is required to unlock technical potential. The results also corroborate the findings of Ahmad (2020), who demonstrated that simple, coordinated exercises can yield significant improvements in beginner technique. This study adds a layer of specificity by quantitatively linking a particular simple exercise (skipping) to a complex, high-level badminton skill (the jump smash). It also reinforces Sugiyono's (2015) assertions about the value of skipping for developing leg power and agility.

It is important to acknowledge the limitations of this study. The use of a one-group pretest-posttest design, while practical, means that we cannot entirely rule out the influence of other factors, such as the natural maturation of the students or their participation in other physical activities during the six-week period. Furthermore, the sample was limited to a single school and a single grade level, which may affect the generalizability of the findings to other populations with different characteristics or prior training experiences. Despite these limitations, the evidence is overwhelmingly positive. The structured skipping program served as a powerful intervention that successfully enhanced the key physical determinants of smash jump performance: explosive power and coordination. This provides a strong, evidence-based case for the integration of such training into standard physical education practice.

CONCLUSION AND SUGGESTIONS

In conclusion, this research has successfully demonstrated that a systematic, 6-week skipping exercise program has a statistically significant and substantial positive effect on the smash jump performance of Grade VIII students at SMP Negeri 1 Laubaleng. The empirical data, derived from a standardized badminton test and analyzed through robust statistical methods, provides unequivocal evidence of improvement. The significant increase in the mean smash accuracy score from 29.44 to 50.5, confirmed by a paired t-test result of $p < 0.05$, leads to the definitive conclusion that skipping is an effective training modality for developing the explosive power, coordination, and rhythmic ability essential for executing a powerful and accurate jump smash.

The implications of this finding are highly relevant for the field of physical education and badminton coaching. It establishes skipping not as a mere warm-up or conditioning tool, but as a targeted, primary exercise for developing a critical sports-specific skill. Its simplicity, cost-effectiveness, and efficiency make it an exceptionally viable option for school environments, where resources are often limited and class sizes can be large. Based on the compelling results of this study, the following suggestions are offered to various stakeholders to translate these findings into practical application. For physical education teachers and badminton coaches, it is strongly recommended to proactively integrate structured skipping exercises into their regular training curricula. This should not be an occasional activity but a core component of the conditioning program for badminton, especially in units focusing on overhead strokes and offensive play. Teachers can design lesson plans that incorporate the varied skipping techniques used in this study, ensuring progression and maintaining student engagement. For school administrators and curriculum developers at institutions like SMP Negeri 1 Laubaleng, there is a clear value in recognizing and supporting the inclusion of such evidence-based training methods. Providing basic equipment like sufficient jump ropes and allocating space for such activities can yield significant returns in terms of student skill development and overall physical literacy.

For future researchers, this study opens several fruitful avenues for further exploration. Subsequent research should aim to address the limitations of this study by employing a more robust true experimental design with a control group. This would further strengthen the causal claims regarding the effect of skipping. Expanding the scope to include a larger and more diverse sample across multiple schools, different age groups, and skill levels (e.g., club-level players) would enhance the external validity and generalizability of the findings. Furthermore, future studies could investigate the effects of longer training durations, more complex skipping variations, or compare the efficacy of skipping directly against other forms of plyometric training (e.g., jump squats, box jumps) to determine the most efficient training prescription for badminton athletes. Incorporating additional measurement tools, such as vertical jump tests or video analysis for biomechanical assessment, could provide even deeper insights into the specific mechanical changes driven by the training. In essence, the humble jump rope has proven to be a powerful pedagogical tool. This study confirms that skipping is a highly effective, simple, and economical alternative training method that can significantly elevate the quality of badminton instruction and empower students to develop one of the game's most exciting and decisive skills.

REFERENCES

Afrizal, A. (2023). Volume Oksigen Maksimal (Vo2 Max) Mahasiswa Program Studi Pendidikan Kepelatihan Olahraga Universitas Gunung Leuser Aceh. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani dan Olahraga*, *7*(1), 178-183.

Afrizal, A., Akram, H., Rizal, F., Yassir, M., Iman, I., & Khairunisa, P. (2024). Pelatihan Peningkatan Kompetensi Pelatih Pencak Silat Berbasis Sports Science di Kabupaten Aceh Selatan. *COVIT (Community Service of Tambusai)*, *4*(1), 14-20.

Afrizal, A., Nababan, M. B., Hartono, M., Nursafiah, N., Suriani, H., & Khairuddin, K. (2023). Sosialisasi Pembinaan Ekstrakurikuler Cabang Olahraga di SMAN 2 Lawe Sigala-Gala Kabupaten Aceh Tenggara. *COVIT (Community Service of Tambusai)*, *3*(2), 129-135.

Ahmad, F. (2020). Model latihan smash bulutangkisuntukpemulausia 8–10 tahun. Jurnal Olympia, 2(1), 15–21.

Ahmad, R. (2020). *Pengaruh Latihan Koordinasi Sederhana terhadap Peningkatan Smash Bulutangkis pada Pemula*. Jurnal Ilmu Keolahragaan, 15(1), 22-30.

Amrizal, A., Efendi, A., & Ladipin, L. (2025). Analisis Strategi Permainan dan Efektivitas Formasi dalam Futsal pada Mahasiswa. *JURNAL RISET RUMPUN ILMU PENDIDIKAN*, *4*(2), 140-151.

Arikunto, S. (2013). Prosedurpenelitian. Jakarta: Rineka Cipta.

Berutu, Z., & Irwansyah, O. (2025). Membangun Budaya Sekolah Sehat: Strategi Manajemen Pendidikan dalam Meningkatkan Partisipasi Olahraga Siswa. *Mesada: Journal of Innovative Research*, *2*(1), 526-533.

Harsono, H. (2015). *Kepelatihan Olahraga: Teori dan Metodologi*. Bandung: PT Remaja Rosdakarya.

Harsono. (2015). Kepelatihanolahraga: Teori dan Metodologi. Bandung: Remaja Rosdakarya.

Hasan, Z., Purnama, A., Ladipin, L., Irwansyah, O., & Akram, H. (2025). Community Service Through the KPM Program of Gunung Leuser University in Darul Amin Village, Southeast Aceh Regency. *Jurnal Pemberdayaan Masyarakat*, *3*(1), 67-72.

Nababan, M. B. (2024). Implementasi Model Pembelajaran Self Directed Learning Dalam Meningkatkan Keterampilan Senam Irama Pada Siswa. *Pembelaiaran*, 39.

Nababan, M. B., & Rizal, F. (2023). Peningkatan Hasil Belajar Renang Gaya Bebas (Crawl) Dengan Alat Swim Board pada Mahasiswa Prodi Pendidikan Kepelatihan Olahraga Universitas Gunung Leuser Aceh. *Innovative: Journal Of Social Science Research*, *3*(1), 271-278.

Nababan, M. B., Afrizal, A., Rizal, F., Khairuddin, K., Riski, G. S., & Fatma, E. (2024). Berkolaborasi Tingkatkan Inovasi dan Kualitas Pendidikan Melalui Program Kampus Mengajar. *Jurnal Pengabdian Masyarakat Bangsa*, *2*(5), 1622-1632.

PB PBSI. (2006). *Standard Tes Keterampilan Bulutangkis*. Jakarta: Pengurus Besar Persatuan Bulutangkis Seluruh Indonesia.

Persatuan Bulutangkis Seluruh Indonesia (PB PBSI). (2006). Tes dan pengukuranbulutangkis. Jakarta: PB PBSI.

Prasetyo, Y., & Hidayat, A. (2019). Pengaruh Latihan fisik terhadap kemampuan motorik siswa SMP. *Jurnal Pendidikan Jasmani*, 5(2), 45–53.

Rizal, F., Irwansyah, O., & Junaidi, J. (2021). Kontribusi Power Otot Tungkai Dan Kelincahan Terhadap Keterampilan Bermain Bulu Tangkis pada Atlet KONI Aceh Tenggara. *J.urnalPendidikan, Sains dan Humaniora*, *9*(3), 501-511.

Sugiyono. (2015). Metode Penelitian Pendidikan. Bandung: Alfabeta.

Sugiyono. (2015). *Metode Latihan Fisik untuk Meningkatkan Kelincahan dan Kekuatan Tungkai*. Yogyakarta: Penerbit Andi.

Wijaya, I. (2021). *Dampak Latihan Berbasis Koordinasi terhadap Keterampilan Motorik dalam Olahraga*. Jurnal Pendidikan Jasmani dan Olahraga, 10(2), 45-55.

Wijaya, R. (2021). Latihan Koordinasi dan Dampaknya terhadap Keterampilan Olahraga. *Jurnal Olahraga*, 7(1), 33–41.

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