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Motivation to play pump it up: A comparative study of adolescents and adults

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ABSTRACT

Background. Game-based physical activity (exergaming) has emerged as an innovative approach to promoting physical activity through the integration of digital technology, music, and interactive movement. Objectives. This study examined the motivation of Pump It Up (PIU) players across adolescent and adult age groups, identified dominant motivational factors, and evaluated the potential of PIU as a technology-based exercise alternative. **Method.** A quantitative comparative descriptive design was employed. Data were collected using an online Likert-scale questionnaire distributed to PIU communities across Indonesia through purposive sampling. Sixty respondents participated, including 14 adolescents (11–20 years) and 46 adults (21–35 years). Data were analyzed using an Independent Samples t-test. **Results.** Overall motivation was high to very high, with enjoyment emerging as the strongest motivational factor (M = 4.31) in both groups. No significant difference was found in total motivation between adolescents and adults (t = 1.362, p = 0.182). However, adolescents demonstrated significantly higher self-development motivation than adults (t = 2.142, p = 0.040). **Conclusion.** PIU demonstrates broad motivational appeal across age groups and represents a promising technology-based exercise alternative for promoting physical activity and active lifestyles in Indonesia.

Key words: Exergaming; exercise motivation; Pump It Up; physical activity; technology-based exercise.

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INTRODUCTION

Motivation plays a central role in determining an individual's engagement in physical activity, particularly in newer forms such as exergaming. Motivation reflects the internal and external drives that influence a person to initiate, sustain, and intensify participation in physical activity (Ryan & Deci, 2000). In Indonesia, the need to understand such motivation is especially urgent, as the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia/SKI) reported that 58% of adolescents aged 10–14 years are classified as physically inactive, making this age group the most sedentary in the country (Kementerian Kesehatan Republik Indonesia, 2023). Overall, 37.4% of the Indonesian population aged 10 years and above are considered insufficiently physically active, with the primary reasons reported being lack of time (48.7%) and lack of motivation (32.6%) (Kementerian Kesehatan Republik Indonesia, 2023). This situation presents an urgent public health challenge, given that physical activity plays a vital role in maintaining both physical fitness and mental health (Hanifah

et al., 2023; Indrawati & Aswara, 2024). The advancement of digital technology has subsequently given rise to new forms of physical activity that integrate gaming elements with bodily movement, commonly known as exergaming or exergames.

Adolescents and adults represent two distinct groups in the context of physical activity participation. Adolescents are generally classified as individuals aged 11–20 years, a developmental stage marked by identity formation and a strong orientation toward social belonging (Cachón-Zagalaz et al., 2023). Adults, in this study categorized as individuals aged 21–35 years, are typically more established in their daily routines, with physical activity choices shaped by practical considerations such as health maintenance and time constraints (Molanorouzi et al., 2015). Adolescents tend to be motivated by factors such as peer interaction, competition, and enjoyment, whereas adults are more often driven by health benefits, time efficiency, and stress management. These differing motivational orientations indicate that the same physical activity, such as PIU, may hold different meanings and value depending on the age group involved.

Motivational characteristics in physical activity may also vary across age groups. Research in Indonesia has found that the motivation levels of junior high school students in physical education are generally in the moderate category, with only 9% reaching the very high category (Nur et al., 2019). Adolescents tend to demonstrate stronger motivation toward activities that are social, competitive, and enjoyable in nature (Cachón-Zagalaz et al., 2023), while adults place greater consideration on health benefits, time efficiency, and stress management (Molanorouzi et al., 2015). These differing characteristics influence the dominant type of motivation in physical activity, including in the context of Pump It Up.

One game that has emerged within the exergaming category is Pump It Up (PIU), a rhythm-based game in which players step on five diagonally arranged panels in sync with music. PIU holds particular promise as a solution to low physical activity levels, as it combines elements of play and sport into a single engaging activity that motivates continued participation. Beyond its entertainment value, PIU exhibits characteristics of physical activity akin to aerobic exercise, offering potential fitness benefits such as improved coordination, balance, endurance, and cardiovascular health. Several studies have shown that exergames positively influence physical activity, exercise motivation, and physical benefits such as improvements in balance, motor coordination, motor ability, and cognitive function (Hernandez-Martinez et al., 2024; Li et al., 2025; Moller et al., 2023; Chan et al., 2019). In the context of dance and rhythm-based games specifically, prior research has demonstrated that such exergames enhance physical activity participation while offering a

more engaging experience than conventional exercise (Lin, 2015; Tan et al., 2025; Staiano et al., 2017).

Two theoretical frameworks help explain player engagement in PIU. Self-Determination Theory (SDT) posits that motivation is shaped by the fulfillment of three psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000; Rahman et al., 2017). Flow Theory Csikszentmihalyi (1990) complements this by describing how full absorption in an activity, achieved when challenge and skill are balanced, produces intrinsic satisfaction that sustains continued participation. Together, these frameworks suggest that PIU's design is well-positioned to generate strong and lasting player motivation.

Pump It Up has also evolved into a recognized esports discipline with a structured competitive ecosystem spanning local to international levels. Official competitions such as the World Pump Festival (WPF), organized by Andamiro, and B1G ONE (recognized as the world's largest Pump It Up tournament), have attracted participants from dozens of countries. In Indonesia, the PIU Asia Pacific 2026 Indonesia National Finals, held in Jakarta, engaged more than 400 players from 40 locations across the country (Andamiro, 2026). This structured competitive ecosystem creates a robust system of extrinsic motivation, in which leaderboards, grading systems, and ranking achievements encourage players to continuously develop their skills and sustain active participation (Moller et al., 2023; Obine, 2024). This finding also reflects the broader role of social support and facility accessibility in shaping exercise behavior among Indonesian youth (Iwanta et al., 2023). Accordingly, PIU holds a unique position as a game that simultaneously functions as both an exergame and an esport, two dimensions that mutually reinforce motivation to play.

Despite the growing body of research on exergames, studies specifically examining motivation to play PIU among adolescent and adult groups remain scarce, while exercise motivation research in Indonesia has largely concentrated on formal physical education settings (Nur et al., 2019). To the author’s knowledge, no previous research has specifically compared the motivational characteristics of adolescent and adult Pump It Up players in Indonesia, which strengthens the novelty of this study. Therefore, this study aims to: (1) analyze motivation levels to play PIU among adolescents and adults, (2) identify the dominant motivational factors within each age group, and (3) examine the potential of PIU as a technology-based exercise alternative. It is hoped that this study will serve as a scientific reference for the development of digital sports, particularly within educational and community settings.

METHOD

Participant

The study population consisted of active Pump It Up players across various regions in Indonesia. Sampling was conducted using purposive sampling, in which the questionnaire was distributed online to PIU player communities throughout Indonesia (Sugiyono, 2019). Target communities were deliberately selected based on their alignment with the study population's characteristics and research objectives. Inclusion criteria required respondents to be actively playing PIU at least 3–4 times per week and willing to complete the questionnaire in full, while exclusion criteria applied to individuals who played fewer than 3–4 times per week or did not complete the questionnaire entirely. The questionnaire was distributed online via community groups and social media platforms of Pump It Up players across Indonesia. A total of 60 respondents who met the inclusion criteria and returned fully completed questionnaires were included in the study, comprising 14 adolescents aged 11–20 years and 46 adults aged 21–35 years. The unequal distribution between age groups was not predetermined, but reflects the actual demographic composition of the active PIU player population accessible through online community channels during the data collection period, in which adult players were considerably more represented than adolescents within these communities.

Research Design

28 This study employed a quantitative approach with a comparative descriptive design. The quantitative approach was selected because the study aimed to objectively measure and analyze motivation levels to play Pump It Up among adolescents and adults through numerical data. The comparative descriptive design was used to provide a systematic account of respondents' motivational characteristics while simultaneously comparing motivation levels across age groups (Nur et al., 2019). The research variable was exercise motivation, measured across five dimensions: (1) Enjoyment, encompassing satisfaction and pleasure derived from playing; (2) Self-Development, covering skill improvement and personal growth; (3) Physical Fitness, addressing health benefits and body conditioning; (4) Social, pertaining to social relationships and recognition from others; and (5) Exploration, reflecting the pursuit of new experiences and productive use of time. These five dimensions represent a 25 combination of intrinsic and extrinsic motivation as described within Self-Determination Theory (Ryan & Deci, 2000).

17 The research instrument was a five-point Likert scale questionnaire (1 = strongly disagree to 5 = strongly agree) consisting of 20 items, adapted from Yunita (2015) with modifications to suit the context of Pump It Up as a technology-based physical activity. Each item was designed to measure one of the five motivational dimensions, distributed as follows: Enjoyment (5 items),

Self-Development (6 items), Physical Fitness (3 items), Social (3 items), and Exploration (3 items). The same 60 respondents who participated in the main study were also used for the instrument validity and reliability testing, as the relatively limited and accessible population of active PIU players made it necessary to use the full sample for both purposes. Validity testing confirmed that all 20 items were valid, with each item's r-value exceeding the critical r-table value. Reliability testing yielded a Cronbach's Alpha of 0.904, classified as very high, indicating that the instrument was consistent and dependable for measuring exercise motivation.

Data Analysis

Data were collected through online distribution of the questionnaire via Pump It Up community groups and social media platforms. Data analysis was conducted using quantitative descriptive techniques, calculating the mean, percentage, and standard deviation for each motivational dimension to determine motivation levels within each respondent group. Prior to conducting the Independent Samples t-test, the assumptions of normality and homogeneity of variance were examined. The Independent Samples t-test was then used to examine differences in motivation levels between the adolescent and adult groups. A Pearson correlation analysis was also conducted to examine the relationship between playing experience and total motivation scores. All data analysis was carried out using Microsoft Excel with the Analysis ToolPak.

FINDINGS AND DISCUSSIONS

Findings

Respondent characteristics

This study involved 60 active Pump It Up players distributed across various regions in Indonesia, with the majority residing in Bandung (38.33%) and Jakarta (18.33%). The distribution of respondents' age and playing experience is presented in Table 1 and Table 2.

Table 1. Age distribution of respondents

Age	Frequency	Percentage (%)
11–15 years	3	5.00
16–20 years	11	18.33
21–25 years	19	31.67
26–30 years	23	38.33
31-35 years	4	6.67
Total	60	100

The 26–30 age group was the most dominant (38.33%), followed by the 21–25 age group (31.67%). The majority of respondents belonged to the young

adult group, with residential distribution spread across multiple regions rather than concentrated in a single area.

Table 2. Distribution of respondents by playing experience

Playing Experience	Frequency	Percentage (%)
1–5 years	16	26.67
6–10 years	15	25.00
>10 years	29	48.33
Total	**60**	**100**

The majority of respondents had more than 10 years of playing experience (48.33%), indicating that the sample was dominated by experienced players.

Motivation to play pump it up

The mean scoring criteria are presented in Table 3.

Table 3. Mean score categories

Mean Range	Category
1.00 – 1.80	Very Low
1.81 – 2.60	Low
2.61 – 3.40	Moderate
3.41 – 4.20	High
4.21 – 5.00	Very High

Descriptive analysis revealed that overall motivation to play PIU fell within the high to very high category (Table 4). A total of 83.4% of respondents were classified in the high (51.7%) and very high (31.7%) categories, with no respondents in the very low category.

Table 4. Mean scores and rankings of motivation dimensions

Dimension	Mean	SD	Category
Enjoyment	4.31	3.23	Very High
Physical Fitness	4.05	1.96	High
Self-Development	4.01	3.56	High
Exploration	3.92	2.27	High
Social	3.54	3.15	High

Comparison of motivation between adolescents and adults

The results of the Independent Samples T-test are presented in Table 5.

Table 5. Independent samples T-test results: adolescents vs. adults

Dimension	M Adolescents (SD)	M Adults (SD)	t	df	p	Sig.
Total Motivation	83.29 (8.30)	79.35 (12.58)	1.362	33	0.182	Not Significant
Enjoyment	21.64 (3.05)	20.74 (3.51)	0.936	24	0.359	Not Significant
Self-Development	24.86 (2.93)	22.72 (4.20)	2.142	31	0.040	Significant
Physical Fitness	12.36 (2.34)	12.83 (1.97)	-0.680	19	0.505	Not Significant
Exploration	12.79 (1.72)	12.22 (2.13)	1.022	26	0.316	Not Significant

No significant difference was found in total motivation between the adolescent and adult groups (t = 1.362; p = 0.182). The only dimension showing a significant difference was self-development (t = 2.142; p = 0.040), with adolescents scoring higher (M = 24.86) than adults (M = 22.72).

Table 6. Comparison of mean scores per motivation dimension: adolescents vs. Adults

Dimension	Adolescents (n = 14)	Category	Adults (n = 46)	Category
Enjoyment	4.51	Very High	4.25	Very High
Self-Development	4.26	Very High	3.95	High
Physical Fitness	4.12	High	4.03	High
Exploration	3.83	High	3.96	High
Social	3.76	High	3.47	High

Motivation by playing experience

Table 7. Mean motivation scores by playing experience

Playing Experience	n	Mean	SD	Category
1–5 years	16	3.87	0.62	High
6–10 years	15	3.96	0.67	High
>10 years	29	4.12	0.53	High

The >10 years group recorded the highest mean score (M = 4.12), followed by the 6–10 years group (M = 3.96) and the 1–5 years group (M = 3.87). Pearson correlation analysis indicated a weak positive relationship between playing experience and total motivation (Table 8).

3 Table 8. Pearson correlation between playing experience and total motivation

Variable	r	p	Interpretation
Playing Experience × Total Motivation	0.12	0.36	Weak positive correlation

Discussion

The findings revealed that overall motivation to play PIU fell within the high to very high category, with 83.4% of respondents classified as highly to very highly motivated. The dominance of the enjoyment dimension (M = 4.31) suggests that enjoyment functions as the primary factor sustaining continued participation in exergaming. Unlike conventional exercise, which is often perceived as obligatory or effortful, PIU embeds physical exertion within an entertaining and rewarding experience, making sustained engagement feel less like a chore and more like a voluntary leisure activity. This may explain why players continue to participate despite the physical demands of the activity.

21 This is consistent with Self-Determination Theory, which posits that the fulfillment of autonomy, competence, and relatedness needs generates stronger 42 and more sustained intrinsic motivation (Ryan & Deci, 2000; Rahman et al., 2017). This perspective aligns with the view that exergame research should consider both intrinsic and extrinsic motivation as a continuum, rather than treating them as isolated constructs (Høeg & Van der Kaap-Deeder, 2024). PIU's integration of music, rhythm, and real-time movement response creates an immersive and challenging experience that reinforces players' sense of competence and enjoyment. This is closely related to Flow Theory (Csikszentmihalyi, 1990), in which full absorption in an activity that balances challenge with ability produces intrinsic satisfaction that sustains continued participation.

The high scores for physical fitness (M = 4.05) and self-development (M = 4.01) suggest that players engage with PIU not solely for enjoyment, but also with an awareness of its physical benefits and improvements in coordination and 30 physical endurance. These findings are consistent with Moller et al. (2023), who found that exergames effectively enhance motivation while delivering tangible physical benefits, and with Medeiros et al. (2024), who confirmed that movement-based games contribute to improvements in balance, motor 7 coordination, and cardiovascular fitness. Hoffmann et al. (2025), in their scoping 7 review, further confirmed that exergames produce significant physical and motivational effects in healthy adults.

The social dimension ranked lowest (M = 3.54), though still within the high category, suggesting that PIU engagement is more individually oriented than directly social in nature. Nevertheless, the structured competitive ecosystem comprising leaderboards and tournaments such as the World Pump Festival

continues to provide a meaningful social dimension for a portion of players (Moller et al., 2023). This finding also reflects the broader role of social support and facility accessibility in shaping exercise behavior among Indonesian youth (Iwanta et al., 2023).

The Independent Samples T-test results showed no significant difference in total motivation between the adolescent and adult groups ($t = 1.362$; $p = 0.182$). This finding can be interpreted as evidence that PIU possesses a motivational appeal that transcends age, making it equally capable of engaging adolescents and adults despite their differing developmental needs and lifestyle priorities. Such universal appeal is a particularly valuable characteristic for a technology-based physical activity intervention, as it suggests that PIU does not require age-specific adaptation to remain effective across a broad population. This aligns with Rahayu et al. (2025), who demonstrated that technology-based physical activity sustains user motivation evenly regardless of age, and with, who found that social and psychological factors exert a greater influence on motivation than demographic differences alone.

The only dimension showing a significant difference was self-development ($t = 2.142$; $p = 0.040$), with adolescents scoring higher ($M = 24.86$) than adults ($M = 22.72$). This finding can be explained through the psychosocial developmental characteristics of adolescents, who are in a phase of identity formation and competence-seeking, during which self-achievement and skill mastery serve as central sources of self-worth (Ryan & Deci, 2000; Cachón-Zagalaz et al., 2023). For adolescents, the structured grading system and progressive level advancement in PIU may function not merely as a gameplay feature, but as a meaningful avenue for validating personal growth and competence relative to peers. Within the context of PIU, the structured grading system and progressive level advancement provide competence-related feedback that is highly relevant to adolescents motivated to demonstrate and develop their abilities. This is further supported by a statement from a young player from Bandung, who noted that the challenge of mastering difficult songs was their primary motivation to continue playing and practicing.

Among adults, while self-development scores were comparatively lower, physical fitness and exploration motivations were proportionally more prominent. This pattern suggests that adults tend to view PIU as an efficient and enjoyable form of physical activity, consistent with findings that adults place greater consideration on health benefits and time efficiency when choosing physical activities (Molanorouzi et al., 2015). Regarding playing experience, although the > 10 years group recorded the highest mean motivation score ($M = 4.12$), Pearson correlation analysis revealed a weak relationship ($r = 0.12$) between playing experience and total motivation. This weak relationship indicates that playing experience alone is insufficient to explain motivational

differences, suggesting that other psychosocial factors may play a more substantial role. This weak correlation suggests that the duration of play alone does not substantially determine motivation. Rather, motivation appears to be more strongly shaped by the quality of the play experience itself, such as the sense of progression, social connection, and enjoyment derived during gameplay, regardless of how long an individual has been playing. This implies that even newer players can experience motivation levels comparable to long-term players, provided the gameplay experience offers sufficient engagement and challenge.

This finding suggests that motivation to play PIU is not primarily determined by length of experience, but is more strongly influenced by the quality of the play experience itself, which consistently provides intrinsic value for players across all experience levels (Ryan & Deci, 2000). The predominance of young adults actively playing PIU also indicates that the game is relevant as a physical activity alternative for individuals with limited time (Nur et al., 2019). Globally, exergaming research has expanded considerably over the past decade, with major contributions originating from the United States, Europe, and parts of Asia, reflecting growing international interest in technology-based physical activity (Kayhan et al., 2025). However, much of this research has focused on Western populations or general exergame platforms, leaving rhythm-based competitive exergames such as PIU, which are particularly popular in Asian gaming communities, comparatively underexplored. This gap suggests that findings from the present study may contribute a regionally and culturally distinct perspective to the broader international literature on exergame motivation.

These findings carry several practical implications. For exergame developers, the dominance of enjoyment as the primary motivational factor underscores the importance of prioritizing engaging gameplay design, such as music variety and responsive feedback, over purely fitness-oriented features. For community managers, the relatively lower social motivation scores suggest an opportunity to strengthen community-building initiatives, such as local meetups or team-based challenges, to enhance the social dimension of play. For sports practitioners and policymakers, PIU's universal motivational appeal across age groups indicates its potential as an inclusive tool for promoting physical activity within school or community health programs.

Limitations

This study has several limitations. First, the unequal sample distribution between adolescents (n = 14) and adults (n = 46) may have limited the statistical power to detect differences between groups, and results should be interpreted with this imbalance in mind. Second, data were collected through

self-reported online questionnaires, which may be subject to social desirability bias. Third, the cross-sectional design does not allow for conclusions about how motivation may change over time as players continue to engage with PIU. Future research employing larger and more balanced samples, longitudinal designs, and comparative data from other countries would help to further validate and extend these findings.

CONCLUSION

This study aimed to analyze motivation levels to play Pump It Up among adolescent and adult groups, identify the dominant motivational factors within each age group, and examine the potential of PIU as a technology-based modern exercise alternative. The findings revealed that PIU generates high overall motivation among its players, with enjoyment serving as the primary driving force behind continued participation. This confirms that PIU's appeal lies not merely in its physical activity component, but in the immersive and rewarding gameplay experience it offers. Motivation to play PIU was found to be consistent across adolescents and adults, indicating that the game holds broad and inclusive appeal regardless of age. The one notable distinction observed was in self-development motivation, which was more pronounced among adolescents, reflecting their developmental focus on building competence and self-identity. Adults, meanwhile, appeared to value PIU more for its physical and recreational benefits.

Based on these findings, Pump It Up appears to have strong potential as a technology-based modern exercise alternative capable of consistently motivating diverse age groups. These results suggest that exergames like PIU can serve as an inclusive and engaging strategy for encouraging physical activity participation, particularly among populations who may be less inclined toward conventional forms of exercise. This study is hoped to serve as a scientific reference for digital sports program developers, educators, and health communities in leveraging exergames as an enjoyable and sustainable medium for increasing physical activity. For future research, it is recommended that larger and more balanced sample sizes across age groups be employed, and that additional factors influencing motivation to play be considered, such as social support, facility accessibility, and competition frequency.

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support provided. It is hoped that this research can offer useful insights for the development of digital sports and physical activity promotion in Indonesia.

AUTHOR CONTRIBUTION STATEMENT

All authors contributed to the completion of the manuscript. MAR was responsible for the manuscript, development of the idea, and preparation of the research design. HS and MZ assisted with problem-solving and data analysis, as well as final proofreading.

AI DISCLOSURE STATEMENT

No artificial intelligence (AI) tools were used in the preparation of this manuscript.

CONFLICTS OF INTEREST

The authors declare no financial, institutional, or personal conflicts of interest that could have influenced the conduct or reporting of this study.

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