Exploring Factors Related to Adoption of Exergaming among Young Adults in Indian Context

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ABSTRACT

A sedentary lifestyle among many individuals has raised a lot of concern as it has led to serious health issues like heart attacks at an early age. Lack of regular exercise in their daily routine has resulted in people struggling with obesity, hypertension, and social health risks. Exergaming is a technology-induced exercise program that focuses on improving physical strength and well-being among a diverse age group. But in spite of exergaming providing many health benefits, the adoption rate among various age groups was very low. Therefore, this study investigates the factors influencing the adoption of exergaming among young adults in the Indian context. The study employed a mixed-methods approach using questionnaires to explore user perspectives on existing exergames, motivational factors, and sociocultural influences. A total of 30 aged 18–23 years were included in the study. Aspects like health safety, accessibility, cost, cultural relevance, space for exergaming and its technical challenge were highlighted. The key findings reveal factors like cost and accessibility play a major factor in adoption of exergaming among young adults. Additionally cultural factors in Indian setting and flexibility towards technology were found to play a decisive role in exergaming adoption. This study highlights the importance of considering variables such as affordability of exergaming equipment in promoting exergaming among the diverse Indian population.

Keywords: Exergaming, Social Impact, Indian Context, User experience

INTRODUCTION

Obesity is a global problem that has caused many health issues among young adults, men, and women. As per the survey conducted by the Aims National Family Health Survey (NFHS), over 38.4% of men and 36.2% of women are obese/overweight [1]. The major reason that contributes to obesity is lack of physical activity (PA), sedentary lifestyle, and dietary habits among individuals. Any movement of the body caused by skeletal muscle that requires use of energy is considered physical activity (PA)[2][4]. Lack of physical activity (PA) also results in hypertension and heart disease. The World Health Organization (2006) recommends 150 minutes of moderate physical activity per week for obese children and adults to lower the risk of heart disease and high blood pressure [3]. A study conducted by the Indian Council of Medical Research (ICMR) among 14277 individuals across India reported that around 54.4% were inactive, 31.9% were active, and 13.7% were highly active[5]. This parameter for activity was calculated using metabolic equivalence (MET), which is a person's working metabolic rate compared with the resting metabolic rate[5]. Physical activity plays a very important role in the mental and social development of an individual. Activities such as walking, dancing, and cycling are among the list of activities that have proven to increase social and mental development [7]. The use of computers, tabs, mobile phones, and consoles has replaced playing, socializing, and physical activities among people. People spend more time getting themselves involved in digital mediums and video game tents to take a majority share in this space. Video games contribute to sedentary behavior and obesity; however, exergaming technology encourages physical activity by turning gaming interest into a health benefit. Exergaming technology leverages interactive gaming systems to enhance physical activity among individuals. By utilizing motion-tracking cameras and sensors, it captures critical data on body posture and movement. This facilitates the development of experiences that promote physical exercise among the general population,

support physical education and learning in students, and aid in rehabilitation efforts. But there are factors like adaptability, enjoyment, and how long an individual will continue to experiment in an environment that is partially digital and physical. As per the study, 50% of class grade 9 students were found to continue being part of exergaming for 2-3 years[6]. But when considering young adults, the adoption rates were less than 15% [6]. These individuals possess access to the latest technologies, including mobile phones and consoles, and exhibit a strong enthusiasm for exploring new technological innovations that may be advantageous to them. But the factors and the conditions that led them to accept these new technologies were the major need for these studies. This study explores the key motivations and ideal conditions that encourage consistent exergaming participation among youth and adults. Technology adoption in exergaming may be tested via the Technology Acceptance Model (TAM), which emphasizes perceived usefulness and perceived ease of use as critical determinants of generation reputation. In the context of exergaming, perceived usefulness may also relate to predicted fitness and health benefits, whilst perceived ease of use may also contain technological familiarity and interplay complexity. However, adoption withinside the Indian context will also be formed through contextual concerns together with affordability, availability, family space, and sociocultural perceptions. Accordingly, this examine makes use of generation-reputation principles as an interpretive attitude for analyzing mentioned adoption intentions and perceived obstacles amongst younger adults.

LITERATURE REVIEW

Global take on Exergaming

Exergaming, a novel approach combining exercise with gaming, has attracted international attention as a viable means to enhance physical activity and overall health. Studies have demonstrated that exergaming not only supports social well-being and helps combat loneliness but also fosters positive attitudes towards physical activity [7]. The exergaming market has experienced rapid expansion, presenting new opportunities across entertainment, recreational, and healthcare sectors [8][9]. Furthermore, intergenerational exergaming has been proposed as an innovative way to facilitate physical activity among family members and friends separated by geographical distances or constrained by time [10]. While research indicates that exergames can elevate physical activity levels, the results regarding long-term activity and factors that increase the engagement level remain mixed, suggesting a need for ongoing research and enhancement in exergame design and functionality [11]. The international perspective on exergaming highlights its diverse benefits and the active efforts to optimize its health-promoting potential globally.

Exergaming in India: Its trend and Challenges

The gaming industry has grown quickly as a result of India's rapid adoption of new technology and speedier internet access for vast numbers of people. With the rise of digital gaming, various new sectors of technological advancement like artificial reality (AR), virtual reality (VR) and mixed reality (MX) have found their way into the lives of people. Whether it be watching movies in a VR headset to get all together a new experience or playing games in a mixed reality environment. People have started adopting this new technology for the mere experience it imparts on its users. Mixed reality games have even found their way into homes, wherein to increase the physical activity of its user, the game is designed in such a way that the user needs to make some motion, which mostly include motion of hands and legs, to progress in the game. With this, the overall physical activity of the person increases, at the same time, he gets the thrill of playing the game in a completely new experience. Indian social context also plays an important role in the adoption of exergaming among people.

Age in Exergaming

Exergaming is a hybrid of video gaming and physical exercise that has been thoroughly studied across a range of age groups. Exergaming, especially with Kinect-based training, has been shown to significantly enhance balance and postural stability in older persons (over 60) [12,13]. Additional research has shown that, in comparison to their contemporaries who are not active, older adults who participate in exergame programmes report considerable improvements in strength, balance, aerobic capacity, and general quality of life [14]. On the other hand, research on younger adults particularly during the COVID-19 pandemic has shown that,

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although exergaming did not entirely restore pre-pandemic levels of physical activity, it did make a substantial contribution to overall physical activity. This highlights the potential of exergaming as a useful tool for encouraging physical activity, especially in situations like prolonged home confinement caused by a pandemic [15].

Health and wellbeing in Exergaming

Exergaming, a combination of video games and exercise, has been demonstrated to lessen stress and enhance mental health. Exergames can be a suitable alternative to typical exercise regimens, according to research, especially for healthy older people. This is because they have been shown to improve mood, reduce feelings of apathy, anxiety, and despair, and boost emotional well-being and self-esteem [16]. For older persons, exergames is also recommended to promote mental health and social interaction, which may improve their overall independence and well-being[17].Moreover, despite the common belief that playing video games relieves stress, research has examined the connection between gaming and stress in greater detail, examining variables such as game type, age, gender, and play time in relation to anxiety levels[18].Collectively, insights from this literature review establish that exergaming serves as an effective strategy for stress management and the enhancement of mental health across various demographic contexts.

Gap in the literature review

The rapid integration of new technologies and internet connectivity in India has expedited the expansion of digital gaming, including exergaming. However, there are multiple elements that were not taken into account in this study, such as cultural adjustment, where exergaming can be culturally tailored to fit into the Indian context. Comprehending cultural inclinations and integrating them into the game can enhance the acceptance rate of exergaming. With the advancement of technologies like augmented reality (AR), virtual reality (VR), and mixed reality (MX) progressing rapidly, similarly, if exergaming is in the market, then how can it be made more reachable and cost-effective for a wider population segment and whether the price will be the determining factor for individuals embracing exergaming. Lastly, the role of social context in the adoption of exergaming is not thoroughly explored. Further research is required to comprehend social impacts and familial dynamics that influence the adoption of exergaming.

METHODOLOGY

Research Design

This research utilizes a mixed-methods methodology to examine the uptake of exergaming within the Indian setting. The questionnaire was formulated taking into account the social context within Indian culture, with a focus on aspects such as social norms, cultural values, and community perceptions relating to technology and physical well-being. The research design encompasses quantitative and qualitative elements, merging statistical examination with thematic analysis to offer a thorough comprehension of the factors impacting exergaming adoption.

Participants

The research encompassed a heterogeneous group of individuals from a range of demographic profiles, comprising distinct age groups, genders, educational attainments, and geographical settings across India. The study enlisted 30 participants who contributed to the investigation by sharing their perspectives on physical activity routines, utilization of technology, and perspectives on exergaming.

Data Collection

Data was gathered via an online questionnaire comprising both closed-ended and open-ended inquiries. The questionnaire was structured to gather data on demographic details, frequency of engaging in physical activities, proficiency with digital technology, and distinct beliefs and attitudes towards exergaming. The crucial segments of the questionnaire encompassed: demographic, technology usage, exercise habit,

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exergaming perceptions. The questionnaire focused on several key dimensions to gather comprehensive insights. Demographic factors such as age, geographical location, level of education, and professional background were emphasized for their potential to reveal how skill levels may influence exergaming adaptability. Technology usage was assessed by examining users' comfort with adopting technology and their use of it alongside physical activities. Exercise habits were explored by documenting the types and frequency of physical activities individuals engaged in. Lastly, perceptions of exergaming were evaluated by identifying factors that influence its adoption, users' willingness to embrace it, perceived benefits, and the challenges posed by cultural differences.

Data Analysis

The data collection process, which utilized questionnaires, incorporated both qualitative and quantitative responses. Various analytical techniques were employed to interpret the findings. Descriptive statistics were used to outline key aspects such as demographic attributes, physical activity routines, and technology usage among participants. Cross-tabulation was applied to explore correlations between different variables. Inferential statistics were conducted to determine the statistical significance of observed patterns. Additionally, thematic analysis was performed to identify recurring themes and perceptions from the open-ended responses.

RESULT

Descriptive Statistics

The examination provided the mean age of the participants as 20.5 years, with the minimum and maximum ages being 18 and 23, respectively, indicating a predominance of young adults in the sample. A higher proportion of the respondents resided in urban areas. Regarding educational attainment, there was an even distribution among individuals with backgrounds in high school, college, graduate, and postgraduate studies. The findings indicated a greater preference for weekly physical activity among users, with only a small number engaging in daily exercise. Additionally, the results revealed that the participants exhibited a high comfort level in embracing technological advancements.

Cross tabulation analysis

The examination indicated that 80% of males and 77.78% of females displayed a significant tendency for engaging in exergaming. Semi-urban participants predominantly engaged in weekly physical activity (60%), whereas urban participants displayed a more diverse range of frequencies, with 38.46% engaging in daily exercise. Postgraduate participants demonstrated elevated levels of comfort with digital technology, with 60% expressing comfort, whereas individuals with lower educational attainment exhibited more diverse levels of comfort.

Inferential Statistics

Chi-square analyses were employed to investigate the associations between demographic variables and factors such as interest in engaging in exergaming, frequency of physical activity, and proficiency in digital technology. A significance threshold of 0.05 was utilized for the analysis. The principal discovery encompasses the relationship between gender and the propensity to engage in exergaming. The p-value of 1.0 denoted the lack of a statistically significant correlation, suggesting that both male and female individuals exhibit a comparable inclination to participate in exergaming activities.

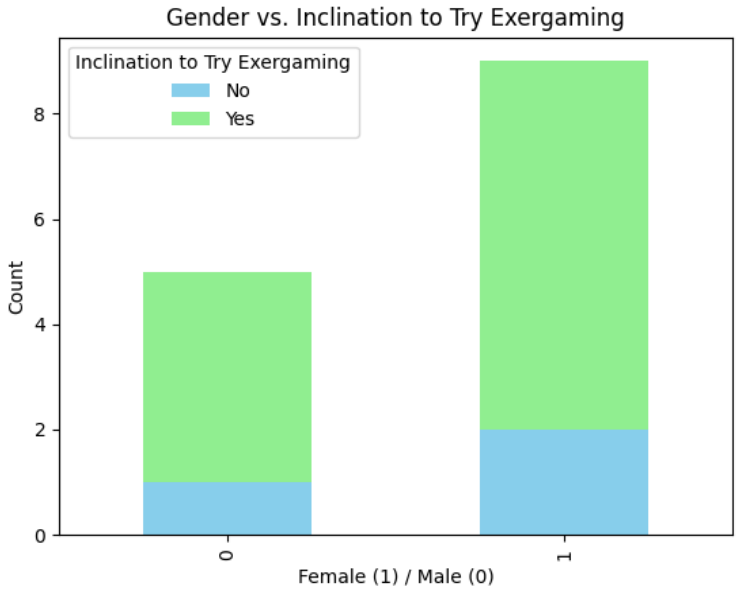
The obtained p-value of 0.1219 pertaining to the correlation between Location and Frequency of Exercise indicates a lack of a statistically significant relationship, thereby suggesting that there exists no meaningful disparity in the frequency of exercise among participants residing in urban versus semi-urban locales. The p-value of 0.5852 pertaining to the correlation between Educational Attainment and Comfort with Digital Technology implies a lack of statistically significant association, thereby suggesting that the respondents' level of education does not exert a significant influence on their comfort with digital technology.

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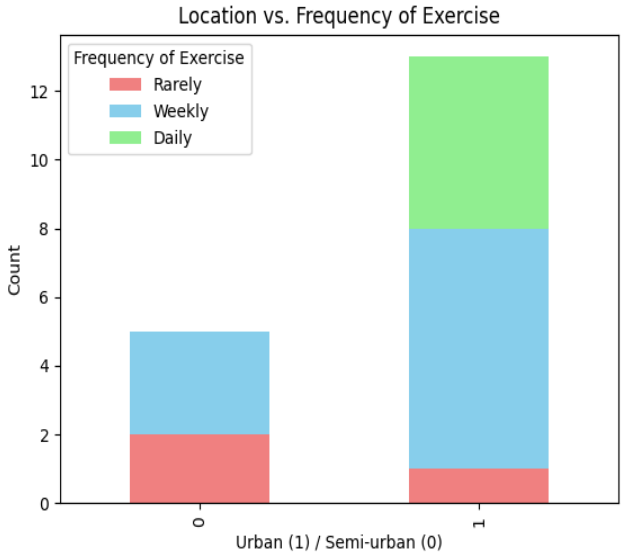
Table 1. Comparison of Chi-square value and p-value

Sr.No	Comparison	Chi-square value	p-value
1	Gender vs. Inclination to Try Exergaming	3.0808	0.2143
2	Location vs. Frequency of Exercise	6.6797	0.1219
3	Education Level vs. Comfort with Digital Technology	10.8624	0.5852

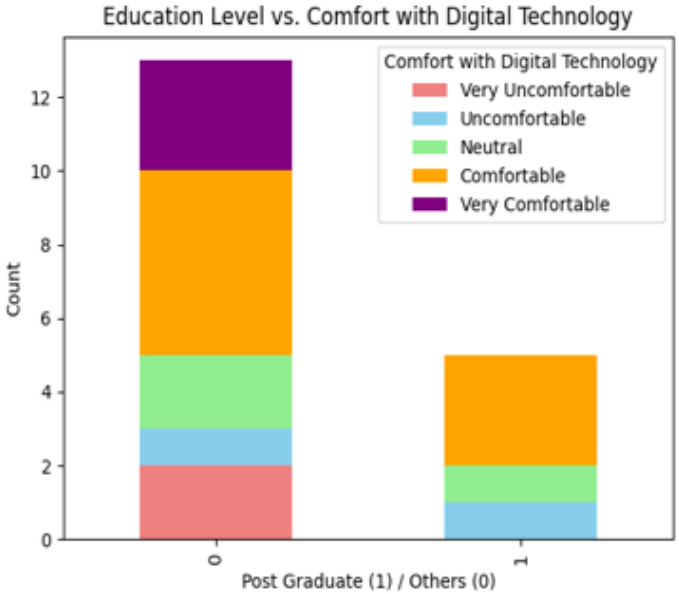
Figure 1. (a) Gender vs Inclination to exergaming (b) Location vs Frequency to Exercise (c) Education Level vs Comfort with digital Technology



(a)



(b)



(c)

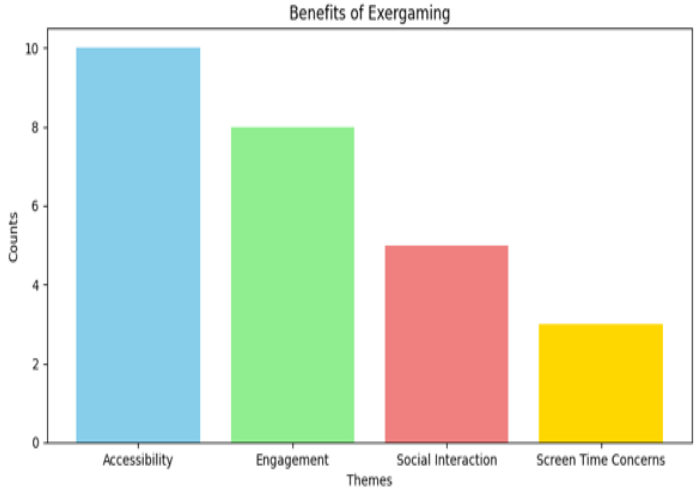
Thematic Analysis

The thematic analysis of unstructured responses revealed numerous pivotal themes concerning the advantages of exergaming, factors impacting acceptance, and cultural obstacles. Benefits of Exergaming the most frequently referenced advantage pertains to accessibility, which is closely succeeded by levels of engagement,

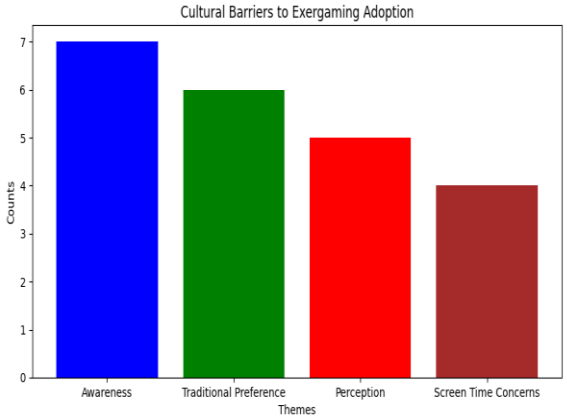
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opportunities for social interaction, and concerns surrounding screen time. Factors Influencing Adoption of Exergaming Financial considerations are regarded as the primary determinant affecting the decision to adopt, with factors such as availability, cultural significance, health safety, social endorsement, and spatial considerations closely trailing. Cultural Barriers to Exergaming Adoption The principal challenges that have been identified include awareness deficits, traditional preferences, the perception of exergaming as frivolous, and apprehensions related to screen time.

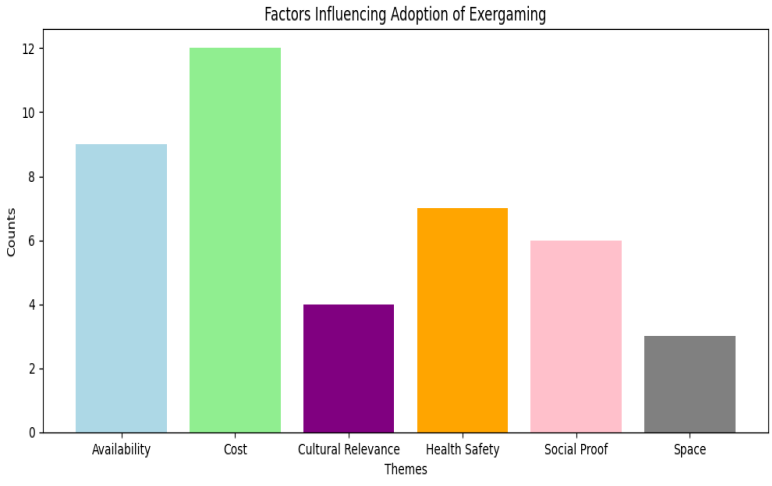
Figure 2. (a) Result showcasing User perception on benefit of exergaming on different (b) Result showcasing effect of cultural barrier in exergaming adoption (c) Graph denoting cost as major factor in adoption of exergaming



(a)



(b)



(c)

DISCUSSION

The research finding has shown that there was no significant difference in the frequency of exercise based on the different demographics, which aligns with the findings of Fox KR's study [6], which emphasized the broad benefits of physical activity across various demographic groups. This showcases the universal appeal of exergaming, which was echoed in the response shown in Fig 1. This discovery highlighted accessibility and engagement as the crucial advantages of exergaming, aligning with the findings of prior studies such as that by Baskaran [7]. This study proposes that for exergaming platforms to effectively increase physical activity levels, they must be both easily accessible and engaging. The qualitative and quantitative data provided valuable insights through a comparison of the results obtained from inferential statistics and thematic analysis,

revealing a complementary relationship between the two. An example of this synergy can be seen in the identification of themes such as 'Accessibility' and 'Cost' in the qualitative analysis, which align with the patterns observed in the quantitative data concerning the widespread recognition and consideration of cost implications across various demographic groups. The promotion of exergaming in India faces several obstacles, including cultural barriers and social context. The results of the thematic analysis indicate that strategies focusing on 'Social Proof' and 'Health Safety' are crucial in marketing and educational campaigns to encourage the adoption of exergaming in both urban and rural areas in India. This is further reinforced by Jana and Chattopadhyay's research on health disparities between rural and urban areas in India [2], as well as Fernandes et al.'s recent study highlighting the positive impact of exergaming on mental health and advocating for the widespread implementation of mental health strategies[18].Recognizing the constraints of the study, such as the limited sample size and its concentration on urban demographics, suggests potential avenues for future research. One potential approach could be expanding the scope of the research to include a diverse array of populations and examining its long-term effects on exergaming, as briefly mentioned by Erin et al. (2023) in their longitudinal investigation of exergaming in Canada [12].

CONCLUSION

This exploratory examine investigated elements related to exergaming adoption intentions amongst 30 teenagers in India. The findings spotlight the perceived significance of affordability, accessibility, engagement, fitness safety, and sociocultural issues in shaping participants' attitudes in the direction of exergaming. These insights propose that designing technologically attractive exergaming reviews can be inadequate without addressing sensible and contextual boundaries to adoption. From a product layout perspective, the findings imply possibilities for growing affordable, accessible, culturally relevant, and adaptable exergaming solutions. However, given the constrained pattern length and cross-sectional studies layout, the effects must be interpreted as preliminary. Future investigations regarding large and extra various populations, direct product trials, and longitudinal checks are required to set up the relative have an effect on of adoption elements and examine sustained engagement and fitness outcomes.

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