

Education as a double-edged sword: Determinants of self-rated health among mobile gamers making in-game purchases based on the rainbow model

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ABSTRACT

Mobile gaming has surged globally due to smartphone portability and fragmented play, yet health effects of flow through gaming remain underexplored. Using the Dahlgren-Whitehead Rainbow Model, this study examines self-rated health among 189 mobile gamers who make in-game purchases. Regression analysis shows flow experience, perceived usefulness of continued purchasing, and playing foreign games significantly enhance perceived health by fostering environmental mastery and psychological escape, while education negatively affects self-rated health. In-game spending and higher education significantly boost flow experience, revealing education as a double-edged sword in digital contexts. These findings underscore complex relationship between socioeconomic factors and digital coping mechanisms.

Keywords: education, flow, mobile gamers' in-game purchases, self-rated overall health, the rainbow model

1. INTRODUCTION

With the advancement of smartphones and internet infrastructure, mobile gaming has become one of the primary forms of leisure and entertainment in modern society. According to a survey conducted by the Institute for Information Industry, more than 70% of Taiwanese gamers use mobile games as their primary gaming platform (e.g. Su *et al.*, 2024).

Since most mobile games operate under a free-to-play model with in-game purchases, developers encourage player spending through strategies such as limited-time events, rare virtual items, and gacha (loot-box) systems (e.g. Digital Literacy Education Resource Network for Primary and Secondary Schools, 2025). A portion of 44% mobile gamers are reported spend between NT\$300 and NT\$1,000 on in-game purchases each month (e.g. Su *et al.*, 2024). Thus, in-game spending has gradually evolved from a simple form of game consumption into a behavioral and psychological phenomenon worthy of in-depth investigation (e.g. Chen, 2026). However, empirical research examining the impacts of in-game spending in mobile games on gamers' health remains relatively limited. Most existing studies focus primarily on the determinants and patterns of spending behavior, while the potential health implications have received comparatively little attention. As a result, this study aims to explore **why mobile game players are unwilling to put down their games and to understand the impact of mobile gaming on their health.**

The Dahlgren and Whitehead Rainbow Model (1991; 2021) is a classic public health framework mapping how individual lifestyle and general socioeconomic factors shape health outcomes. The Rainbow Model provides a fundamental theory in health assessment. It includes social factors to help healthy individuals (e.g. Dahlgren and Whitehead, 1991; 2021). Mobile gaming provides a

path for leisure and entertainment in modern society. Therefore, this study is motivated to investigate the impact of flow, in-game spending-related factors in mobile games, and education on the self-rated overall health of gamers. Through empirical investigation and data analysis, this study seeks to understand the association between in-game spending of mobile games and the self-rated health. The findings are expected to contribute to both academic research and practical applications by providing valuable insights into consumer behavior and the health of in-game spending mobile gamers.

2. LITERATURE REVIEW

2.1 The Rainbow Model

Awareness has expanded regarding the limitations of healthcare alone in enhancing overall health outcomes or eliminating health disparities in isolation from environmental and social conditions. Substantial empirical research has since established critical connections between social determinants and physiological mechanisms, establishing a robust scientific basis for social medicine (Braveman *et al.*, 2011; Dahlgren and Whitehead, 2021). As a result, not only does medical care affect health, but economic and social opportunities and resources, living and working conditions in homes and communities, and personal behavior are also important factors. Improving healthcare alone then is not enough to improve overall health. This emphasizes that **social determinants of health**, such as income, education, living conditions, etc., play a major role in shaping health outcomes.

First proposed by Dahlgren and Whitehead in 1991, the Rainbow Model of health determinants has become the most widely used framework globally for defining

population health (Dahlgren and Whitehead, 2021). The model presents a nested hierarchical structure, similar to concentric circles, which categorizes factors influencing health into five levels from the inside out (Dahlgren and Whitehead, 1991; 2021). At the core are biological factors such as age, sex, and genetics, which are considered relatively fixed and difficult to change through policy. The first layer consists of individual lifestyle factors, such as smoking habits, diet, and physical activity. The second layer refers to social and community networks, emphasizing mutual support and social circles. The third layer encompasses living and working conditions, including housing, education, water and sanitation, and healthcare services. Finally, the fourth layer represents macro-environmental conditions, such as the socio-economic, cultural, and environmental status that influences all other layers (Dahlgren and Whitehead, 1991; 2021). This model was originally designed to provide a visual framework illustrating how multiple sectors beyond the healthcare system must collaborate to affect population health (Dahlgren and Whitehead, 2021). On the 30th anniversary of the model in 2021, the original authors conducted a deep reflection to correct long-standing misunderstandings and address contemporary challenges (Dahlgren and Whitehead, 2021). A primary distinction was made between health determinants and determinants of inequities; the authors clarified that the Rainbow Model depicts determinants for the entire population (Dahlgren and Whitehead, 2021). The 2021 update introduces the concept of driving forces such as racism and commercial determinants that span all layers of the model (Dahlgren and Whitehead, 2021). Commercial interests are recognized for driving profits by influencing what we eat and drink and the accessibility of medical services (Dahlgren and Whitehead, 2021). Furthermore, the update emphasizes multidirectional arrows between layers (Dahlgren and Whitehead, 1991; 2021).

From 1991 to 2021, the Dahlgren and Whitehead Rainbow Model has evolved from a simple level-based diagram into a more dynamic framework emphasizing structural driving forces. It not only assists policymakers in thinking across medical sectors but also provides rigorous theoretical support for addressing social factors impact (Dahlgren and Whitehead, 1991; 2021).

Traditionally, health status has been evaluated within an illness-oriented or curative framework, with assessment measures primarily focusing on mortality, morbidity, disability, dysfunction, and impairment (Pender, 2015). However, health assessment is more than a physical examination. Self-rated health is not merely a spontaneous evaluation of one's health status and related behaviors; similar to self-concept, it may also be shaped by self-regulatory efforts aimed at achieving personally important health-related goals. As a result, health assessment should incorporate the social determinants that influence individuals' health (Pender *et al.*, 2015). Commercial interests, such as in-game purchases in mobile games, are recognized as driving profits by influencing gamers' in-game spending (Dahlgren and Whitehead, 2021). The first layer of the Rainbow Model includes individual lifestyle factors. Individual lifestyle factors, such as making in-

game purchases for mobile games, could also affect health (Dahlgren and Whitehead, 1991). The third layer encompasses education. This study is, therefore, motivated to understand factors related to mobile games and in-game purchases, and education, to include the socioeconomic factor, in affecting in-game purchase gamers' self-rated overall health,

2.2 Players' flow of mobile games, average daily game playing time, and health

Moderate video game play can temporarily relieve stress, regulate emotions, and enhance social interaction through online multiplayer gaming, thereby reducing feelings of loneliness and symptoms of depression (e.g., Pei *et al.*, 2013). Mobile games, contrast with stationary gaming systems, can be integrated into various daily contexts through their ability of portability. This convenience encourages spontaneous, short-burst sessions that readily facilitate the transition into flow. As described by Csikszentmihalyi (1975a), this deep state of absorption and enjoyment becomes more accessible when gaming fits seamlessly into the user's lifestyle routines.

Flow theory has been widely applied in diverse areas, such as education, information system design, etc. When the difficulty of a task appropriately matches a respondent's ability, flow experiences are more likely to occur (Shernoff *et al.*, 2003).

Flow is a psychological state proposed by Csikszentmihalyi (1975a; 1975b). It is characterized by deep focus and total immersion in an activity. During a flow state, individuals experience a loss of sense of time, reduced self-consciousness, and enhanced intrinsic motivation. The key conditions for achieving a flow state include having clear goals, receiving immediate feedback, and maintaining a balance between challenge and skill (Csikszentmihalyi, 1990). When these conditions are met, individuals have continuous interaction with the environment, and often report a strong sense of control and satisfaction, which in turn fosters learning, creativity, and performance (Csikszentmihalyi, 1990).

Online flow experience in computer-mediated environments transcends human-computer interaction, embodying a higher synthesis of concentration, curiosity, and enjoyment (Chen and Lu, 2016; Chin *et al.*, 2024; Csikszentmihalyi, 1975a). It signifies the hedonic value of voluntary engagement, where users achieve intrinsic happiness and environmental mastery. Particularly in mobile entertainment, this state facilitates a psychological escape from daily stressors such as boredom, pressure, or loneliness. As Hoffman and Novak (1996) highlight, flow further induces positive outcomes, including enhanced learning, an exploratory mindset, and time distortion. Therefore, this study measures the flow experiences of mobile gamers and the average daily game playing time of mobile gamers making in-game purchases due to the flow state, and verifies their impacts on the self-rated overall health of gamers.

The Rainbow Model includes individual lifestyle factors. Playing mobile games reflects individual lifestyles and could affect health psychologically (Dahlgren and Whitehead, 1991; 2021). The hypotheses are proposed.

H1: The flow of mobile gamers making in-game purchases increases their self-rated overall health.

H2: The average daily game playing time of mobile gamers making in-game purchases increases their self-rated overall health.

2.3 Perceived value for money of in-game purchases, perceived usefulness of continuing to make in-game purchases, average monthly game expense, flow, and health

Mobile games are particularly effective at inducing flow due to their accessibility, adaptive challenge levels, and immersive design elements. Flow in mobile gaming has been studied as a predictor of player engagement and satisfaction. One study by Choi and Kim (2004) highlights that flow experiences in mobile and online games are significantly influenced by factors such as clear goals, immediate feedback, and a balance between game difficulty and player skill. Without the balance between game difficulty and player skill, flow cannot be achieved. With low player skill, in-game purchases then occur, intended to enhance player competence. They are sometimes used as a shortcut to achievement and stress relief.

Perceived value for money is the subjective trade-off consumers make between the benefits they receive from a product or service and the total cost of acquiring it (Zeithaml, 1988). It refers to the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given" (Zeithaml, 1988). This can be also applied to service. When mobile gamers perceive value for money of their in-game purchases, their flow state can be achieved due to the enhanced capabilities in mobile games in balancing between game difficulty and player skill. Players may also perceive the usefulness of continuing to make in-game purchases. They not only increases flow, but enhances the self-rated overall health. Therefore, this study proposes the impacts of perceived value for money of in-game purchases and perceived usefulness of continuing to make in-game purchases on both flow and self-rated overall health. Finally, due to the in-game purchases, the average monthly game expense can affect the flow of players and their self-rated overall health. The hypotheses are also proposed.

In-game spending is a component of an individual's lifestyle; it is profoundly shaped by the social environment, such as peer pressure and game design mechanics. Commercial interests drive profits by influencing lifestyles (Dahlgren and Whitehead, 2021). The layer of the Rainbow Model includes individual lifestyle factors (Dahlgren and Whitehead, 1991; 2021). The hypotheses are then proposed.

H3: Perceived value for money of in-game purchases increases the flow of mobile gamers making in-game purchases.

H4: Perceived usefulness of continuing to make in-game purchases increases the flow of mobile gamers making in-game purchases.

H5: Average monthly game expense increases the flow of mobile gamers making in-game purchases.

H6: Perceived value for money of in-game purchases increases the self-rated overall health of mobile gamers making in-game purchases.

H7: Perceived usefulness of continuing to make in-game purchases increases the self-rated overall health of mobile gamers making in-game purchases.

H8: Average monthly game expense increases the self-rated overall health of mobile gamers making in-game purchases.

2.4 Education, playing foreign mobile games, flow and health

According to Braveman et al. (2011), educational attainment influences health through three primary, interrelated pathways. First, it enhances health literacy, empowering individuals to make informed medical decisions and adopt health-promoting behaviors. Second, education dictates employment opportunities, which secure the economic resources necessary for healthy living conditions and provide better occupational benefits. Third, it strengthens psychosocial factors, such as personal control and social support networks, which act as buffers against stress. Therefore, this study verifies the impact of education on health. Furthermore, education not only improves health but also enhances players' flow by better balancing game difficulty and player skill. The hypothesis of the impact of education on flow is also proposed.

In addition, many mobile gamers do not play local games. Instead, they play foreign mobile games that require higher player skill to achieve flow. Players are then in good cognitive health and may enter the flow state. Therefore, this study measures the dummy variable of playing foreign mobile games and explores its impact on health and flow.

The Dahlgren and Whitehead Rainbow Model (1991; 2021) is a classic public health framework that includes individual lifestyle and general socioeconomic factors in shaping health outcomes. Therefore, the hypotheses are proposed.

H9: Education increases the flow of mobile gamers making in-game purchases.

H10: Playing foreign mobile games increases the flow of mobile gamers making in-game purchases.

H11: Education increases the self-rated overall health of mobile gamers making in-game purchases.

H12: Playing foreign mobile games increases the self-rated overall health of mobile gamers making in-game purchases.

3. RESEARCH METHODS

To empirically validate the impact of these factors on the self-rated overall health of mobile game players who make in-game purchases, the survey method was adopted. The constructs include self-rated overall health, playing foreign games, perceived value for money, perceived usefulness of continuing to make in-game purchases, perceived flow, education level, average daily mobile game playing time, and average monthly mobile game expenditure. The operational definitions and measurements are listed below.

Self-rated overall health. Health is defined as overall health. It was measured using a five-point Likert scale based on players' subjective evaluations of their overall health.

Playing foreign mobile games. In this study, playing foreign mobile games is measured as a dummy variable, with foreign games coded as 1 and local games coded as 0.

Perceived value for money. Perceived value for money is defined as mobile game players' perceptions of the value they receive from in-game purchases relative to the amount of money they spend (Zeithaml, 1988). Two questions were measured: 'I am very concerned about the prices of in-game purchase items,' and 'I expect in-game purchase items to provide value that is commensurate with the amount of money I spend on them' (Chen and Sun, 2014). They are measured on Likert's five-point scale.

Perceived usefulness of continuing to make in-game purchases. Perceived usefulness of continuing to make in-game purchases is defined as mobile game players' perception of the usefulness in continuing to make in-game purchases (Davis, 1989). Four questions were adapted based on existant studies (Davis, 1989; Venkatesh and Davis, 2000). They include: 'Continuing to make in-game purchases improves my performance in playing mobile games,' 'Continuing to make in-game purchases enhances my effectiveness in playing mobile games,' 'Continuing to make in-game purchases increases my efficiency in playing mobile games,' and 'I find continuing to make in-game purchases useful when playing mobile games.' They are also measured on Likert's five-point scale.

Flow. Flow refers to players' experienced psychological state characterized by deep focus and total immersion in playing mobile games (Csikszentmihaly, 1975a). It is measured on Likert's five-point scale. The measure includes 'When I play mobile games, I become so absorbed that I do not pay attention to other activities,' 'When I play mobile games, I usually spend more time playing than I originally planned,' 'I sometimes lose track of time while playing mobile games,' 'Playing mobile games helps me temporarily forget about the worries of everyday life,' and 'I have experienced a sense of immersion while playing mobile games.'

Education. Education level is measured by high school, college, university, and graduate school and above.

Average daily mobile game playing time. Average daily mobile game playing time was measured by asking respondents to report their average daily time spent playing mobile games. It is on Likert's five-point scale.

Average monthly mobile game expenditure. Average monthly mobile game expenditure was measured by asking respondents to report their average monthly expenditure on mobile games. It is also measured on Likert's five-point scale.

3.1 Data collection

To gather data, a questionnaire was built online. The information was given via social media websites and social apps. Respondents answered the questions based on the mobile game they played most frequently and in which they had made in-game purchases. Finally, after more than three months, data from 189 valid respondents were gathered. These respondents not only played mobile games but also had experience in making in-game purchases.

A total of 189 participants were surveyed in this study. The majority of respondents were between 22 and 30 years old, with 32.3% aged 22–25 and 28.6% aged 26–30. Only a small proportion were above 45 years old (1.6%). This indicates a relatively young sample, which aligns with the study's digital nature, particularly in the context of mobile gaming behavior.

In terms of educational background, the largest proportion held a university degree (49.2%), followed by graduate school education (36.0%), suggesting a relatively high educational attainment among the respondents. Only 2.1% had high school as their highest level of education.

Regarding gender, females accounted for 49.7%, and males for 50.3%. Students accounted for 48.1%, and non-students for 51.9%.

The demographic profile suggests that the majority of participants were educated but relatively young. The description of the respondents is shown in Table 1.

Table 1. The description of the respondents

Descriptive	Items	Frequency	Percent
Gender	Female	94	49.7%
	Male	95	50.3%
Age	18-21 years old	31	16.4%
	22-25	61	32.3%
	26-30	54	28.6%
	31-35	24	12.7%
	26-30	8	4.2%
	41-45	8	4.2%
	Above 45	3	1.6%
Education	High school	4	2.1%
	College	24	12.7%
	University	93	49.2%
	Graduate school and above	68	36.0%
Marriage	Not married	167	88.4%
	Married	22	11.6%
Occupation	Student	91	48.1%
	Not Student	98	51.9%
Total		189	100.0%

The results in Table 2 show that the most frequently played games of the respondents were not local games; their percentage was 55.0%.

In addition, regarding average daily gaming time, most respondents reported playing mobile games for 1–3 hours per day, accounting for 59.8%. Regarding average monthly gaming expenditure, the majority of respondents

reported spending less than NT\$500 per month, accounting for 56.6%. These results indicate that the respondents were active mobile game players who had experience spending money on mobile games, suggesting that they were appropriate participants for this study. The description of the respondents is shown in Table 2.

Table 2. Mobile game in a foreign language, average daily mobile game playing hours and average monthly mobile game expense

Descriptive	Items	Frequency	Percent
Mobile game	Non-foreign games	85	45.0%
	Foreign games	104	55.0%
Average Daily Mobile Game Playing Time	Below 1 hour	37	19.6%
	1-3 hours	113	59.8%
	3-5 hours	31	16.4%
	5-7 hours	4	2.1%
	Above 7 hours	4	2.1%
Average Monthly Mobile Game Expenditure	Below NT\$500	107	56.6%
	NT\$501-1000	42	22.2%
	NT\$1001-3000	27	14.3%
	NT\$3001-5000	12	6.4%
	Above NT\$5000	1	0.5%
Total		189	100.0%

The results in Table 3 show that most mobile game players indicate that their health was ordinary or good; the

percentage was 80.9% (40.2% for ordinary and 40.7% for good). Only 1.1% indicate that their health was very bad.

Table 3. The self-rated overall health of mobile game players making in-game purchases

Descriptive	Items	Frequency	Percent
Self-rated Overall Health	Very bad	2	1.1%
	Bad	3	1.6%
	Ordinary	76	40.2%
	Good	77	40.7%
	Very good	31	16.4%
Total		189	100.0%

4. DATA ANALYSIS AND THE RESULTS

With the limited data, regression analyses were done. Before regression analyses, the Cronbach's α of perceived value for money, perceived usefulness of continuing to make in-game purchases, and flow were first calculated. The Cronbach's α of perceived value for money was 0.76; the Cronbach's α of perceived usefulness of continuing to make in-game purchases was 0.91; the Cronbach's α of flow was 0.82. The Cronbach's α values were all higher than 0.7 and were acceptable. The averages of the three constructs were then calculated. However, because the constructs were not on the same measurement scale, all constructs were standardized before regression analyses, except for the dummy variable of playing foreign games.

With acceptable construct measurement, the regression analyses were then done.

4.1 The impacts on health

The first regression analyzed the impact of different constructs on the self-rated overall health of mobile game players who made in-game purchases. The F value was 7.702 with significance of 0.000. The adjusted R-squared value was 20.0%. The results are shown in Table 4.

The results show that flow, perceived usefulness of continuing to make in-game purchases and playing foreign mobile games significantly increased mobile game players' self-rated overall health. Therefore, the hypotheses of H1, H7, and H12 were supported. The

results indicated that when players perceived flow in playing mobile games, perceived usefulness of continuing to make in-game purchases, and played foreign mobile games, their health was enhanced. Furthermore, the impact of average daily game playing time, perceived value for money, and average monthly game expense

were not significant. Therefore, the hypotheses of H2, H6, and H8 were not supported but rejected. However, the impact of education on players' self-rated overall health was significantly negative; the hypothesis of H11 was not supported. The results indicated that when players had higher education, their health was negatively affected

Table 4. The results of the regression analysis on self-rated overall health

Variables	Standardized coefficient	t value	Significance
Constant		-1.49	0.137
Flow	0.21	2.51	0.013*
Average daily game playing time	0.08	1.00	0.320
Perceived value for money	-0.15	-1.96	0.052
Perceived usefulness of continuing to make in-game purchases	0.16	2.17	0.031*
Average monthly game expense	0.15	1.95	0.052
Education	-0.25	-3.62	0.000***
Playing foreign mobile games	0.13	2.01	0.046*

*: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

4.2 The impacts on flow

The second regression analyzed the impact of different constructs on flow of mobile game players who made in-game purchases. The F value was 21.695 with significance of 0.000. The adjusted R-squared value was 35.5%. The results are shown in Table 5.

The results show that perceived value for money, perceived usefulness of continuing to make in-game purchases, average monthly game expense, and education

significantly increased mobile game players' flow. Therefore, the hypotheses of H3, H4, H5, and H9 were supported. The results indicated that when players perceived value for money of their in-game purchases, perceived usefulness of continuing to make in-game purchases, spent more money, and had higher education, their flow of playing mobile games was increased. Furthermore, the impact of playing foreign mobile games was not significant. Therefore, the hypothesis of H10 was not supported but rejected.

Table 5. The results of the regression analysis on flow

Variables	Standardized coefficient	t value	Significance
Constant		0.30	0.765
Perceived value for money	0.35	5.64	0.000***
Perceived usefulness of continuing to make in-game purchases	0.28	4.40	0.000***
Average monthly game expense	0.21	3.43	0.001**
Education	0.18	2.98	0.003**
Playing foreign mobile games	-0.02	-0.40	0.688

*: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

5. DISCUSSION

The global expansion of the mobile gaming market in recent years is primarily driven by the widespread adoption of smartphones and the enhanced availability of mobile internet. The Rainbow Model illustrates that lifestyle is not an independent factor but is deeply influenced by the social and environmental surroundings. This study is, therefore, motivated to understand the lifestyle of in-game purchases for mobile games and education on players' self-rated health.

5.1 The impacts on health

First, the results show that flow, perceived usefulness of continuing to make in-game purchases, and playing foreign mobile games significantly increased mobile game players' self-rated overall health. Distinguished by deep concentration, a sense of environmental mastery, and inherent pleasure, the flow state is frequently associated with constructive psychological outcomes, notably mood enhancement and the mitigation of stress (Csikszentmihalyi, 1975a; 1975b; 1990). The results validate that flow positively increases mobile game players' self-rated overall health. The transition from daily activities into playing mobile games, inducing flow,

helps players' health.

In addition, perceived usefulness of continuing to make in-game purchases and playing foreign mobile games also positively increased mobile game players' self-rated overall health. When players perceive in-game purchases as useful, it is often because they help overcome in-game obstacles and maintain environmental mastery. This success in achieving goals through resource allocation not only sustains the flow state, but enhances overall perceived health. Furthermore, engaging with foreign mobile games may offer a more potent psychological escape. Elements of foreign culture satisfy curiosity, allowing players to detach more completely from real-world stressors and enter a deeper state of immersion, which provides positive feedback for health. Moreover, the foreign games are mostly in foreign languages. They enhance players' cognition and language ability through playing. Consequently, in-game spending and playing foreign games are viewed as active choices in entertainment investment; this autonomy bolsters overall health.

Besides, the impacts of average daily game playing time, perceived value for money, and average monthly game expense were not significant. The results show that the time and money spent on games did not significantly affect players' overall health.

Finally, the results show that, in the digital environment, education had a significant negative impact on health. This study found a negative association between educational attainment and overall self-rated health, a finding that is inconsistent with most previous studies on the relationship between education and health (Braveman et al., 2011). Individuals with higher educational backgrounds often face high-stress academic or professional environments. The adverse impact of high-stress environments during the prolonged pursuit of higher education had a negative impact on the psychological health of adolescents and adults. When real-life achievements are difficult to attain, in-game spending may serve as a shortcut for psychological escape to regain a sense of control (Chen and Lu, 2016). This explains the positive impact of flow, perceived usefulness of continuing to make in-game purchases, and playing foreign mobile games on health, but the negative impact on education.

Although games can provide various health benefits, excessive gaming may lead to internet gaming addiction, insufficient sleep, and vision problems. However, the results of the study show that players who made in-game purchases spent in a rational way; they evaluated the usefulness of continuing to make in-game purchases. Spending on mobile games was then only a means to release stress. This helps balance between stress and life. To maximize the benefits while minimizing potential risks, individuals are encouraged to maintain a regular daily routine, set a daily time limit for gaming, and choose games that promote cognitive engagement or physical activity rather than relying solely on reflex-based gameplay.

The results of the study corresponded to the study of Dahlgren and Whitehead (2021) about the importance of commercial determinants. The impact of in-game

spending on mobile games reflects the commercial interests driving profits by influencing lifestyles. The study also reflects the structural driving force of education, corresponding to the dynamic framework of Dahlgren and Whitehead (2021), addressing the impacts of social factors.

5.2 The impacts on flow

First, the results show that perceived value for money, perceived usefulness of continuing to make in-game purchases, and average monthly game expense significantly increased mobile game players' flow. The results show that spending money on games significantly affected players' flow. The commercial interests increased players' flow and drove profits by influencing their lifestyle (Dahlgren and Whitehead, 2021). Thus, the only spending on mobile games needs to be cautious because it only increases flow but does not enhance health.

In addition, the results show the positive impact of education on flow. Higher educational attainment is often linked to stronger personal control and cognitive resources. This allows players to achieve environmental mastery more readily, effectively employing strategies within complex game mechanics to enter a deeply focused and enjoyable flow state. The results corresponded to Braveman et al. (2011) that education strengthens psychosocial factors, such as personal control, which act as buffers against stress. Furthermore, through flow, education had a positive indirect impact on players' health. The results of the study demonstrate how education serves as a double-edged sword for mobile gamers making in-game purchases. Higher educational attainment is often associated with elevated expectations, which can lead to greater frustration. As a result, individuals with higher education may engage in gaming to achieve a state of flow, thereby mitigating the negative impact of these expectations on their health.

6. LIMITATIONS AND SUGGESTIONS

This study assesses self-rated overall health of mobile game players. However, the complexity of health assessment provides valuable opportunities for advancing research and refining assessment methodologies (Pender et al., 2015). Future studies should adopt a more comprehensive approach by incorporating additional social determinants of health to enhance understanding of the factors that influence self-rated health.

Furthermore, education shows a negative direct impact but a positive indirect impact on health. However, this study employed a cross-sectional design. Future research should incorporate variables such as work-related stress, sleep quality, and health consciousness to further elucidate the mechanisms underlying the associations. Future studies, not only in traditional healthcare settings but also in emerging digital environments, are suggested

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