

*Research Article (English)/ บทความวิจัย (ภาษาอังกฤษ)***Modeling the Impact of Perceived Frustration on Challenge-Seeking Behavior through Motivation, Effort, and Resilience: Evidence from Chinese Hyper-Casual Game Players**Yalong Wang^{1*}, Yingji Li²^{1,2}*Doctor of Philosophy in Business Administration, Graduate School, Stamford International University, Bangkok, 10250 Thailand*
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Received: 7 October 2025 / **Revised:** 11 November 2025 / **Accepted:** 14 May 2026**Abstract**

Background and Objective: The hyper-casual games industry in China has rapidly expanded, offering simple gameplay yet highly competitive engagement patterns. However, many players experience frustration due to repetitive challenges and limited rewards, which can influence their motivation and persistence. This study aimed to construct and test a structural model explaining how perceived frustration affects players' challenge-seeking behavior intention through the mediating roles of challenge motivation, player effort, and player resilience. The objective was to deepen understanding of player psychological dynamics and propose strategies for sustaining engagement in the hyper-casual gaming sector.

Methodology: The study employed a quantitative approach using a survey design. Data were collected from 553 Chinese players of hyper-casual games through an online questionnaire containing 10 constructs measured by 30 indicators on a seven-point Likert scale. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine both direct and indirect relationships among variables. Reliability, convergent validity, and discriminant validity were established before hypothesis testing.

Results: The findings confirmed that perceived frustration significantly influenced challenge motivation, player effort, and resilience. All three mediators positively predicted challenge-seeking behavior intention. Moreover, the indirect effects of perceived frustration on challenge-seeking behavior intention through challenge motivation, player effort, and resilience were significant, with challenge motivation showing the strongest mediating effect. The model explained 72% of the variance in challenge-seeking behavior intention, indicating strong predictive power and model fit.

Discussion and Suggestion: The results highlight that frustration, when perceived as manageable and meaningful, can enhance motivation and resilience rather than discourage players. Game developers are encouraged to design adaptive challenges that balance difficulty and reward to foster positive motivational states. Future studies may explore cultural or genre-specific factors influencing frustration tolerance and player engagement across different gaming contexts.

Keywords: perceived frustration; player resilience; player effort; challenge-seeking behavior; hyper-casual games

Introduction

The global gaming industry has seen sustained growth in recent years, with the market size reaching 1,177.37 billion yuan in 2023, representing a year-on-year increase of 6.00%. This growth can be attributed to a variety of factors, including technological advancements, the expansion of market demand, and industry innovation. In the international market, the United States and Japan, as major gaming nations, exert a significant influence on global gaming culture, while China's gaming industry is also emerging as an important force within the global gaming sector.

The competition in the Chinese gaming market is extremely fierce, especially as the gross value of games continues to increase and the consumer base keeps expanding, gradually amplifying its impact on the economy. The value of a game is directly related to the number of players it attracts, implying that the more players a game has, the greater its value. Consequently, how gaming companies design their games to attract a larger player base has a profoundly significant impact on their development.

They are designed to provide a quick and easy gaming experience for a broad audience, making them suitable for playing during short, fragmented periods of time hyper-casual games, with their simple and intuitive game mechanics, have rapidly captured the market. These games are easy to pick up and typically have a short life cycle, ranging from a few weeks to a few months. This simplicity not only attracts a broad player base but also brings significant profits to developers in a short period of time (Deterding et al., 2011). With the proliferation of smartphones and mobile devices, hyper-casual games, as one genre of mobile gaming, are closely linked to

technological advancements and have brought substantial market potential to the mobile gaming industry (Flanagan & Nissenbaum, 2014).

Despite the rapid development of the hyper-casual gaming sector, which provides players with immediate entertainment and relaxation opportunities, it has also triggered a sense of frustration among players. This is a complex emotional experience resulting from the game's challenges. Perceived frustration has multidimensional characteristics, including, but not limited to, perceived challenge, failure experience, perceived resource constraints, negative social interactions, and expectation-reality discrepancies. These dimensions significantly affect the players' challenge motivation, which may, in turn, influence their intention to engage in challenge-seeking behavior.

In the context of hyper-casual games, frustration plays a paradoxical yet vital role in sustaining player engagement. Rather than being purely negative, mild or controllable frustration functions as a motivational feedback loop that encourages players to retry and adapt after each failure. Prior studies have shown that frustration can increase focus, persistence, and task engagement when challenges are perceived as attainable (Bowman, Keene, & Najera, 2021; Kosa & Uysal, 2022). This emotional tension between failure and achievement creates a dynamic state that keeps players within an optimal zone of engagement, similar to the "flow" experience (Csikszentmihalyi, 1990). In hyper-casual games, where progress depends on rapid cycles of attempt and reward, understanding how frustration transforms from an aversive feeling into motivational energy is crucial for explaining players' sustained participation and resilience.

Research Question

How does perceived frustration influence players' challenge-seeking behavior intention through the mediating roles of challenge motivation, player effort, and player resilience among Chinese players in the hyper-casual games industry?

Research Objectives

To analyze the multidimensional characteristics of perceived frustration among Chinese players in the hyper-casual games industry.

To examine the relationships between perceived frustration, challenge motivation, player effort, player resilience, and players' challenge-seeking behavior intention.

To develop and validate a theoretical model explaining how perceived frustration influences players' challenge-seeking behavior intention through mediating psychological factors.

To provide theoretical insights and practical recommendations for game developers to enhance players' challenge intention and satisfaction through optimized game design.

Literature Review

Self-Determination Theory (SDT) was proposed by Deci and Ryan (2013). It emphasizes that three basic psychological needs—autonomy, competence, and relatedness—drive intrinsic motivation and well-being. In the field of games, studies focus on how to enhance players' experience and engagement by satisfying these needs (Przybylski et al., 2010). When the design of Hyper-Casual Games is unbalanced, and players feel that their competence or autonomy is restricted due to excessively high challenges, they tend to experience frustration (Ryan et al., 2006). This study uses SDT as a framework to explore the mechanism of the impact of players' Perceived Frustration on Challenge-Seeking Behavior Intention in Hyper-Casual Games.

Perceived Frustration and Player Effort

Perceived Frustration is not a concept exclusive to games but a product of the intersection and evolution of psychology and human-computer interaction research. The Frustration-Aggression Hypothesis (Dollard et al., 1939) points out that obstacles can induce preparation for aggression. The PENS Model (Ryan et al., 2006) further introduces Self-Determination Theory into the game context, arguing that frustration arises when players' needs for autonomy, competence, or relatedness are hindered. This study defines Perceived Frustration as "a negative emotional experience caused by an individual encountering obstacles or failures when pursuing important goals, which may affect the individual's motivation and subsequent behaviors" (Riediger & Freund, 2004).

Frustration Theory divides Perceived Frustration into two core components: "challenge" and "failure", laying the foundation for subsequent dimensionalization (Amsel, 1992). The subsequent stress-evaluation perspective supplements that resource constraints are key situational factors inducing frustration. Meanwhile, the

social dimension also proposes that negative interpersonal interactions can independently trigger frustration experiences (Lazarus & Folkman, 1984). Furthermore, the cognitive mechanism of Expectation-Reality Discrepancy can also be used to explain the formation process of frustration emotions (Berkowitz, 1989). Integrating the aforementioned viewpoints, a computer frustration model is constructed, formally listing Perceived Challenge, Resource Constraints, and Expectation-Reality Discrepancy as measurable dimensions, thereby completing the paradigm integration from single-point discussion to a multi-dimensional framework (Bessière et al., 2007). Based on this, the study operationalizes Perceived Frustration in the game context into five sub-dimensions: Perceived Challenge, Failure Experience, Perceived Resource Constraints, Negative Social Interactions, and Expectation-Reality Discrepancy.

Player Effort originates from the fields of game research and user experience. With the expansion of the industry, it is defined as the sum of time, energy, and psychological-behavioral resources invested by players to achieve game goals (Larche & Dixon, 2020). From a cognitive perspective, this construct is regarded as a volitional process that combines value evaluation, strategy selection, and failure response. It is regulated by cognitive control and determines resource allocation compared with the early focus on motivation and player types (Yee, 2006). Recent studies have regarded effort as a core variable explaining variations in game participation and experience. This study defines Player Effort as a volitional behavior, that is, an active action taken by an individual to achieve a certain goal (Lee et al., 2025)

Perceived Frustration is not a purely negative experience; in Hyper-Casual Games, it can be transformed into a driving force for effort through multi-dimensional mechanisms. Moderate Perceived Challenge can stimulate the desire to win, driving players to invest more cognitive and behavioral resources (Agrawal & Dalvi, 2023). Controllable failures induce repeated attempts and strategy adjustments, thereby strengthening continuous efforts. However, if the frequency of failures is too high and there is no compensation mechanism, it can lead to players quitting. The scarcity of props, time, or health points increases a sense of urgency, prompting players to optimize strategies and increase cognitive investment (Agrawal & Dalvi, 2023). Competition, comparison, and even taunting trigger negative emotions but can stimulate the motivation for self-validation (Agrawal & Dalvi, 2023). When the results do not meet expectations, emotional fluctuations occur, but this instead strengthens subsequent investment, as long as the goals and feedback are designed reasonably (Agrawal & Dalvi, 2023). Comprehensively considering the above dimensions, Perceived Frustration generally presents a "double-edged sword" effect in the Hyper-Casual Games context. When challenges, failures, resource constraints, social comparisons, and expectation gaps are designed to be moderate and overcomeable, they can all positively enhance Player Effort by strengthening cognitive control and intrinsic motivation.

Based on the above discussion, Perceived Frustration can promote Player Effort. Therefore, this study proposes the following research hypothesis:

H1: Perceived Frustration has a positive impact on Player Effort.

Perceived Frustration and Challenge Motivation

Challenge Motivation originates from the distinction of "approach-avoidance" tendencies in Achievement Motivation Theory (Atkinson, 1957). Later, it was defined by mastery goal orientation research as a cognitive framework that "views challenges as opportunities for learning" (Dweck & Leggett, 1988). After entering the game context, this construct was operationalized as the experience of "players actively seeking obstacles that require effort to overcome in order to test and improve their abilities". Its degree of satisfaction is positively correlated with the satisfaction of competence needs and continuous participation (Ryan et al., 2006; Yee, 2006). The study defines Challenge Motivation as the obstacles or difficulties that players encounter in games and need to make efforts to overcome (Ryan et al., 2006; Yee, 2006).

The measurement of Challenge Motivation follows two paths: achievement orientation and situational adaptation. Early Achievement Motivation Scales listed challenge-seeking as an independent dimension (Yee, 2006). The Work Preference Inventory further included task difficulty preference and persistence as indicators of

intrinsic motivation (Amabile et al., 1994). After entering the game context, the Online Game Motivation Scale described challenges through three question clusters: progress and power-game mechanics-competition (Yee, 2006). The Game Experience Questionnaire included challenges, competence, and flow experience simultaneously. The Player Experience of Need Satisfaction Scale based on Self-Determination Theory reflected challenges indirectly through competence needs (Ryan et al., 2006). The Digital Game Motivation Scale supplemented it with "skill development-competition" (Demetrovics et al., 2011). Integrating the above internal and external motivations, the study divides Challenge Motivation into two dimensions: Self-Transcendence Motivation and Social Competition Motivation.

Although Perceived Frustration is often classified as a negative experience, it can be transformed into Challenge Motivation in the Hyper-Casual Games context through multi-dimensional mechanisms. Firstly, Perceived Challenge and Failure Experience weaken immediate self-efficacy, triggering reflection and strategy adjustment, thereby strengthening the willingness to try repeatedly (Bowman et al., 2021). Secondly, Perceived Resource Constraints increase a sense of urgency through the scarcity of time and props, prompting players to optimize strategies and invest additional cognitive resources (Cacciata et al., 2022). Thirdly, Negative Social Interactions (rankings, taunting, competitive comparisons) stimulate the motivation for self-validation and Social Competition, making players double their efforts under the goal of surpassing others (Kosa & Uysal, 2022). Finally, Expectation-Reality Discrepancy evokes the pursuit of progress through cognitive dissonance. When the feedback mechanism indicates "achievable success", the discrepancy is transformed into a driving force for continuous investment (Cacciata et al., 2022). Self-Determination Theory further points out that the above dimensions jointly weaken the sense of competence and control, thereby activating the intrinsic compensation mechanism, making players restore psychological balance with a higher level of Challenge Motivation (Mills et al., 2018). Based on this, the following research hypothesis is proposed:

H2: Perceived Frustration has a significant positive impact on Challenge Motivation.

Perceived Frustration and Player Resilience

The concept of Player Resilience originally originated from physics, used to describe the ability of materials to return to their original state after being subjected to external forces. Later, this concept was borrowed by psychologists to describe an individual's ability to adapt and recover when facing adversity (Masten, 2001). In the field of game research, the concept of Player Resilience is derived from psychological resilience research, specifically referring to players' ability to cope when facing frustration and challenges in games (Masten, 2001). This study defines Player Resilience as players' ability to cope when facing frustration and challenges in games.

Moderate Perceived Challenge and controllable failures force individuals to adjust strategies repeatedly. In the cycle of approaching-failing-trying again, the abilities of problem-solving and emotional regulation are strengthened (Larche & Dixon, 2020). Perceived Resource Constraints induce a sense of urgency through the scarcity of time and props, driving players to optimize resource allocation and develop adaptive decision-making (Larche & Dixon, 2020). Although Negative Social Interactions (rankings, taunting, competitive comparisons) weaken immediate emotions, they stimulate the motivation for self-validation and Social Competition, enabling players to improve their psychological resilience under the goal of surpassing opponents (Cacciata et al., 2022). Expectation-Reality Discrepancy triggers self-reflection and goal revision through cognitive dissonance. When feedback indicates that the gap can be narrowed, individuals continue to invest and enhance their tolerance for failure (Cacciata et al., 2022). Comprehensively speaking, all dimensions jointly weaken the sense of instantaneous control and self-efficacy, forcing players to use deeper coping resources, thereby transforming frustration experiences into the growth of resilience (Cacciata et al., 2022). Based on the above discussion, Perceived Frustration can promote Player Resilience. Therefore, this study proposes the following research hypothesis:

H3: Perceived Frustration has a positive impact on Player Resilience.

Challenge Motivation and Player Effort

Challenge Motivation drives Player Effort through two dimensions: Self-Transcendence and Social Competition. The former focuses on skill improvement and achievement pursuit, enabling players to maintain cognitive investment in high-difficulty levels and repeatedly optimize strategies (Hoffman et al., 2022). The latter uses social pressure caused by rankings, achievement systems, and real-time battles to stimulate players to invest additional time and energy to gain a competitive advantage. Physiological indicators (heart rate, skin conductance) increase simultaneously, forming a positive competition-effort cycle (Smith et al., 2008). Both types of motivation can enhance intrinsic motivation and self-efficacy, prompting players to maintain focus and persistence in the failure iteration process, and ultimately improving overall performance (Larche & Dixon, 2020). Based on the above discussion, Challenge Motivation can promote Player Effort. Therefore, this study proposes the following research hypothesis:

H4: Challenge Motivation has a positive impact on Player Effort.

Challenge Motivation and Challenge-Seeking Behavior Intention

Players' Challenge-Seeking Behavior Intention in games is rooted in three classic frameworks. Achievement Motivation Theory regards it as the intrinsic driving force for pursuing excellence (McClelland et al., 1953). Flow Theory points out that moderate challenges are key conditions for maintaining immersion and enjoyment, thereby prompting players to continuously seek new difficulty levels to continue the flow experience (Csikszentmihalyi, 1990). Self-Determination Theory further emphasizes that continuous challenges strengthen intrinsic motivation by satisfying competence needs, making players actively invest in more difficult tasks (Ryan & Deci, 2000). Game research also places challenges at the core of the experience, clearly pointing out that well-designed progressive difficulty can stimulate players' Challenge-Seeking Behavior (Juul, 2013). Integrating the above viewpoints, Challenge-Seeking Behavior Intention is defined as the behavior of players actively pursuing increasingly difficult tasks or challenges in the game environment (Brandse & Tomimatsu, 2014).

Challenge Motivation strengthens Challenge-Seeking Behavior Intention through two parallel paths: Self-Transcendence and Social Competition. The former focuses on skill breakthroughs and growth experiences, and enhances intrinsic persistence through the progress-sense of achievement cycle, enabling players to maintain long-term investment even in the failure iteration process (Ryan & Deci, 2000; Juul, 2013). The latter relies on rankings, competitive modes, and social comparisons to stimulate the desire to "surpass others". Along with physiological arousal (heart rate, skin conductance) and self-esteem enhancement, it drives players to continuously meet higher difficulties to gain status recognition (Bäcklund et al., 2022). Both types of motivation are mediated by the balance of skills and challenges, and positive emotional regulation. When players perceive moderate challenges and timely feedback, their self-efficacy is enhanced, forming a closed loop of motivation-effort-re-challenge, which significantly extends the game's lifespan (Bäcklund et al., 2022). Based on the above discussion, Challenge Motivation can promote Challenge-Seeking Behavior Intention. Therefore, this study proposes the following research hypothesis:

H5: Challenge Motivation has a positive impact on Challenge-Seeking Behavior Intention.

Challenge Motivation and Player Resilience

Challenge Motivation strengthens Player Resilience through two paths: Self-Transcendence and Social Competition. The former focuses on task orientation, enabling players to view failures as opportunities for ability improvement under the framework of long-term goals. Through strategy iteration and self-efficacy accumulation, psychological resilience is enhanced (Smith et al., 2008). The latter relies on rankings, social comparisons, and honor incentives. With the help of external competitive pressure, it triggers rapid emotional regulation and strategy adjustment to ensure an advantageous position in subsequent confrontations, thereby improving the ability to adapt to adversity (Kosa & Uysal, 2022). Both types of motivation can mitigate frustration's negative affect via positive emotional processes and by strengthening self-efficacy, thereby supporting a higher-level coping cycle of repeated failure and re-challenge; evidence shows that manageable difficulty and constructive feedback foster persistence, while resilient players reinterpret failure and quickly recover to re-engage. (Ryan & Deci, 2000; Kosa

& Uysal, 2022). Based on the above discussion, Challenge Motivation can promote Player Resilience. Therefore, this study proposes the following research hypothesis:

H6: Challenge Motivation has a positive impact on Player Resilience.

Player Effort and Challenge-Seeking Behavior Intention

In Hyper-Casual Games, concise mechanisms and high-frequency micro-challenges coexist, and players' multi-dimensional efforts have become the core driving force for promoting Challenge-Seeking Behavior Intention. Specifically, the continuous investment of time and energy will strengthen the sunk cost and game identity, making players willing to restart immediately after encountering failures (Larche & Dixon, 2020). At the same time, cognitive efforts significantly improve self-efficacy through immediate decision-making and strategy iteration, thereby promoting players to actively choose more difficult tasks (Larche & Dixon, 2020). In addition, emotional efforts help alleviate frustration and anxiety, accelerate psychological recovery, and maintain positive emotions in the closed loop of effort-achievement-re-challenge (Lalla & Sheldon, 2021). Studies further show that the synergy of the above dimensions significantly and positively predicts Challenge-Seeking Behavior Intention. Moreover, in the design context of hierarchical unlocking and immediate feedback, it can effectively enhance players' psychological adaptability (Bäcklund et al., 2022). Based on the above discussion, Player Effort can promote Challenge-Seeking Behavior Intention. Therefore, this study proposes the following research hypothesis:

H7: Player Effort has a positive impact on Challenge-Seeking Behavior Intention.

Player Resilience and Challenge-Seeking Behavior Intention

In Hyper-Casual Games, resilience is defined as the psychological ability of players to recover quickly and continue moving forward when encountering failures or setbacks. It significantly improves Challenge-Seeking Behavior Intention through four paths: emotional regulation, psychological recovery, learning adaptation, and social interaction. The ability of emotional regulation enables players to quickly calm the negative emotions caused by frustration and maintain a positive gaming attitude (Larche & Dixon, 2020). The ability of psychological recovery helps players quickly adjust their cognitive and emotional states after failures, shorten the interval between re-challenges, and enhance persistence (Larche & Dixon, 2020). The ability of learning adaptation promotes individuals to extract experience from failures and optimize strategies, forming a positive cycle of failure-reflection-re-attempt, thereby enhancing confidence and investment in future challenges (Larche & Dixon, 2020). The ability of social interaction provides external encouragement through rankings, teamwork, and social support, further consolidating players' Challenge Motivation and continuous participation intention (Bäcklund et al., 2022). Comprehensively speaking, players with high resilience show stronger self-efficacy, positive emotions, and stress resistance when facing increasing difficulties. These psychological resources are jointly transformed into stable Challenge-Seeking Behavior Intention (Smith et al., 2008). Based on the above discussion, Player Resilience can promote Challenge-Seeking Behavior Intention. Therefore, this study proposes the following research hypothesis:

H8: Player Resilience has a positive impact on Challenge-Seeking Behavior Intention.

Perceived Frustration and Challenge-Seeking Behavior Intention

In Hyper-Casual Games, Perceived Frustration is not a purely negative experience. Instead, it stimulates Challenge-Seeking Behavior Intention through the synergy of five dimensions: Perceived Challenge, Failure Experience, Resource Constraints, Negative Social Interactions, and Expectation-Reality Discrepancy. Moderate Perceived Challenge induces flow and self-improvement motivation, making players actively improve their skills to maintain the balance between difficulty and ability (Larche & Dixon, 2020). Controllable failures provide opportunities for strategy iteration. In the cycle of "trying-adjusting-trying again", players enhance their adaptability and strengthen their intention for subsequent investment (Larche & Dixon, 2020). Resource Constraints force players to optimize allocation, improving the depth of decision-making and goal commitment

(Kosa & Uysal, 2022). Negative interactions caused by rankings and social comparisons temporarily weaken emotions but trigger competitive drive, prompting players to extend their gaming time for status validation (Lalla & Sheldon, 2021). When the actual results are lower than expected, cognitive dissonance drives players to narrow the gap by modifying strategies, thereby transforming frustration into long-term motivation (Liao et al., 2016). Comprehensively speaking, all dimensions jointly transform immediate frustration into the motivation for "re-challenge" by enhancing self-efficacy, strategy reflection, and emotional regulation, significantly improving Challenge-Seeking Behavior Intention. Based on the above discussion, Perceived Frustration can promote Challenge-Seeking Behavior Intention. Therefore, this study proposes the following research hypothesis:

H9: Perceived Frustration has a positive impact on Challenge-Seeking Behavior Intention.

Mediating Variables

In the Hyper-Casual Games context, Perceived Frustration is transformed into Challenge-Seeking Behavior Intention through three parallel paths. Firstly, frustration triggers additional efforts: players increase their investment simultaneously at the cognitive, emotional, and behavioral levels. They alleviate negative experiences through strategy iteration and emotional regulation, thereby improving self-efficacy and re-challenge motivation (DiMenichi & Tricomi, 2015). Secondly, frustration is amplified into Challenge Motivation by the game difficulty curve, stimulating the goal of mastery-surpassing and driving players to try repeatedly and maintain a high level of investment (Yu et al., 2018). Finally, players with high resilience weaken the negative effects of frustration through rapid emotional recovery and failure reconstruction mechanisms, maintaining long-term participation intentions (Yu et al., 2018). Empirical evidence consistently shows that effort, Challenge Motivation, and resilience all exhibit significant mediating effects between Perceived Frustration and Challenge-Seeking Behavior Intention. Based on the above content, the following hypotheses are proposed:

H10: Player Effort plays a significant mediating role between Perceived Frustration and Challenge-Seeking Behavior Intention.

H11: Challenge Motivation plays a significant mediating role between Perceived Frustration and Challenge-Seeking Behavior Intention.

H12: Player Resilience plays a significant mediating role between Perceived Frustration and Challenge-Seeking Behavior Intention

Research Conceptual Framework

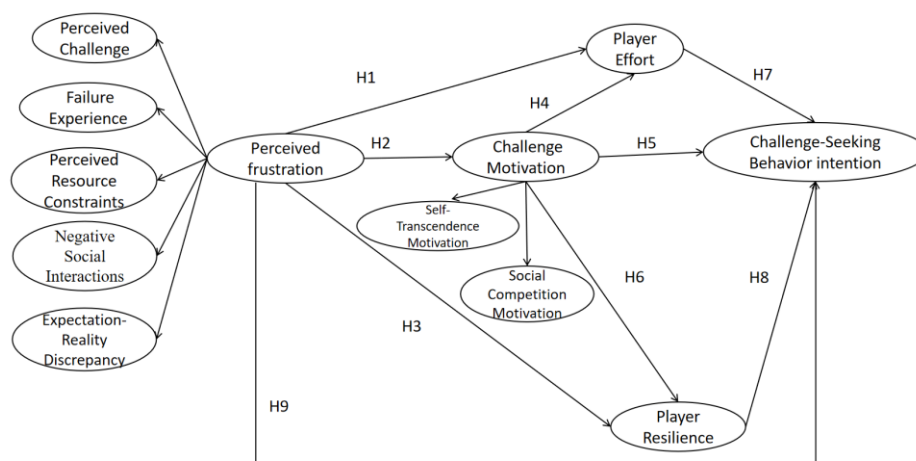


Figure 1. Research Conceptual Framework

Source: Analysis by the researchers

Created to define the independent variables, mediating variables, and dependent variables.

Materials and Methods

The questionnaire adopts a mature scale that has been tested in existing studies. It covers demographic information and ten variables: five dimensions of Perceived Frustration (Perceived Challenge, Failure Experience, Resource Constraints, Negative Social Interactions, Expectation-Reality Discrepancy), two dimensions of Challenge Motivation (Self-Transcendence, Social Competition), Player Effort, Resilience, and Challenge-Seeking Behavior Intention. Each variable is measured with three 7-point Likert items. Respondents answer from "strongly disagree" to "strongly agree" based on their own Hyper-Casual Games experience. The sources of the scale are all based on literature included in Web of Science to ensure the validity and reliability of the structural dimensions and operability.

Table 1. Content of Scale

Variable	Items	Reference
Perceived frustration	Perceived Challenge The level design in hyper-casual games is challenging. I need to try different approaches to pass levels in hyper-casual games. The difficulty of the levels keeps me highly focused.	conceptually adapted from Csikszentmihalyi (1990)
	Failure Experience I refuse to give up after each failure. After multiple failures, I am more determined to try again. After failing, I try new strategies.	conceptually adapted from Kissane et al. (2004)
	Perceived Resource Constraints I realize that the number of level-up items is limited. Using items wisely is crucial to passing levels. When the items are limited, I hesitate whether to use them.	conceptually adapted from Hobfoll (1989)
	Negative Social Interactions I feel competitive pressure when I see my ranking is low. I feel competitive pressure when I see my friends pass levels. Passing levels demonstrates my ability.	conceptually adapted from Brakus (2009)
	Expectation-Reality Discrepancy I feel anxious when I fail due to careless mistakes. The difficulty of the game exceeds my expectations. I often fail to pass levels because of small mistakes.	conceptually adapted from Higgins (1987)
	Self-Transcendence Motivation I hope to improve my pass rate through effort. The game is a way for me to improve myself. Faster level completion is a reflection of personal growth.	conceptually adapted from Guo et al. (2023)
Challenge Motivation	Social Competition Motivation I feel happy when I pass levels faster than my friends. I will try harder to pass levels faster than my friends. I feel a sense of achievement when I pass levels before my friends. I improve my pass rate by continuously trying.	conceptually adapted from DiMenichi & Tricomi (2015)
Player Effort	 I am willing to invest effort to pass levels. I am willing to watch ads to obtain items to pass levels.	conceptually adapted from He et al. (2009)
Player Resilience	 I can quickly recover from the frustration of failure. I learn from repeated failures.	conceptually adapted from Smith et al. (2008)

Challenge-Seeking Behavior intention	I believe I can pass levels through repeated failures.	conceptually adapted from Fishbein & Ajzen (1977)
	I plan to continue playing hyper-casual games when I have time.	
	I am interested in trying other hyper-casual games when I have time.	
	After passing a level, I immediately want to try again.	

This study adopts Judgmental Sampling for questionnaire collection. For researchers, it is usually impossible to determine the composition of the basic population. Data collection was conducted over a four-week period between April and May 2024. The online questionnaire was distributed through multiple popular Chinese gaming and social platforms such as WeChat game groups, QQ communities, TapTap forums, and Baidu Tieba to reach diverse player groups. Participants were invited using open survey links and encouraged to share them within gaming communities to increase response diversity. Prior to the full data collection, the questionnaire was translated into simplified Chinese and back-translated into English to ensure semantic equivalence. All respondents were required to provide electronic informed consent before participation and were screened to ensure that they had played at least one hyper-casual game within the past month and were 18 years of age or older. Participation was voluntary and anonymous, and respondents were free to withdraw at any time. Although the data collected in the study has potential selection bias, it is impossible to randomly select user samples because there is no complete website directory of (the number of Hyper-Casual Games players & survey scenarios). Before the official distribution, the study randomly selected 150 players for a pre-test. The results showed that the reliability and validity of the questionnaire met the standards. After the pre-survey, the study officially distributed and collected 553 questionnaires.

The study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) as its core data analysis tool. PLS-SEM integrates the iterative estimation techniques of principal component analysis and multiple regression, forming a powerful method for causal modeling (Hair et al., 2014; Hair et al., 2019; Hair et al., 2023). The advantage of this method is that it has relatively loose requirements on the normality and randomness of variables and can effectively analyze complex prediction models (Hair et al., 2019; Petter et al., 2007). It is based on these advantages that PLS-SEM is selected for data analysis in this study. When implementing PLS-SEM analysis, this study adopts a two-stage method. In the first stage, the Reliability and Validity of the questionnaire are analyzed to ensure data quality. In the second stage, the path coefficients of the structural model and their explanatory power are calculated and verified to gain a deeper understanding of the structural relationship between variables (Hulland, 1999). These two stages together constitute an important process for this study to verify the structural relationship.

Results

Demographic Analysis

The study surveyed the basic information of the respondents, including gender, age, marital status, education level, monthly disposable income, and occupation, and conducted a frequency analysis to present the basic characteristics of the sample. The analysis results are as follows:

The study collected data from 553 respondents who participated in hyper-casual games in China. Among them, female players accounted for 53.3%, slightly exceeding male players (46.7%), indicating a relatively balanced gender distribution. In terms of age, the majority were 18–25 years old (43.6%), followed by 31–40 years (19.2%), 26–30 years (14.5%), 41–50 years (10.7%), and above 50 years (12%), showing that young adults constitute the core group of hyper-casual game players.

Regarding marital status, 49.7% were unmarried, 44.3% married, and 6% divorced or separated, suggesting a predominantly single and younger player base. For education, most respondents held an associate degree (34.9%), followed by bachelor's degrees (22.6%), high school or technician qualifications (19.7%), master's degree and above (16.5%), and only 6.3% had junior high school education or below.

In terms of monthly disposable income, 36% earned below 3,000 yuan, while the remainder were distributed across 3,001–6,000 yuan (12.7%), 6,001–9,000 yuan (14.8%), 9,001–12,000 yuan (14.8%), 12,001–15,000 yuan (15.4%), and 6.3% earned above 15,001 yuan. These results suggest that most participants belong to the low- to middle-income group. With respect to occupation, private enterprise employees formed the largest

share (37%), followed by students (24.7%), state-owned enterprise staff (19.4%), government employees (14.6%), and teachers or researchers (4.3%).

Overall, the demographic profile reflects a diverse yet predominantly young, educated, and moderately earning player population, which is consistent with the general characteristics of hyper-casual game users in China.

Reliability and Validity Test

Firstly, the study used the data collected from participants to test the reliability and validity of the research scale. Cronbach's α Analysis, which is widely used to measure scale reliability, was used to test the reliability of the questionnaire in this study. On the other hand, Confirmatory Factor Analysis (CFA) was adopted to determine whether the Convergent Validity (explaining the internal reliability of items used to measure the same construct) and Discriminant Validity (explaining the extent to which different constructs are not related to each other and whether constructs can be distinguished from each other) of the scale fall within the numerical range of the literature (Bagozzi & Yi, 1988). To test the reliability and Convergent Validity of the scale, the study calculated the Standard Load Factor, Cronbach's α , Composite Reliability (CR), and Average Variance Extracted (AVE) values of all behavioral constructs in the study. For Discriminant Validity, the study calculated the Fornell-Larcker Criterion.

According to the requirements of reliability and convergence standards, the Standard Load Factor should be greater than 0.6 for acceptability, and ideally greater than 0.7 (Chin, 1998). The Cronbach's α coefficient should be greater than 0.7, the Composite Reliability (CR) should be greater than 0.6, and the Average Variance Extracted (AVE) should be higher than 0.5. When the Average Variance Extracted (AVE) exceeds 0.5, it indicates that the measurement model has good Convergent Validity (Hair et al., 2014)

Table 2. Reliability and Convergent Validity of Each Construct

Variable	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
PC	0.941	0.941	0.894
FE	0.931	0.932	0.879
PRC	0.939	0.939	0.891
NSI	0.939	0.939	0.891
ERD	0.934	0.934	0.883
STM	0.941	0.941	0.895
SCM	0.933	0.933	0.882
PE	0.932	0.933	0.880
PR	0.941	0.942	0.894
CSB	0.942	0.943	0.895

The meticulous process of assessing discriminant validity involves carefully examining the correlation between the AVE square root of a latent variable and the other latent variables, as per the Fornell-Larcker criterion in Table 4.3. It mandates that each latent variable's AVE square root value (value on the diagonal) must be more significant than its correlation with the other latent variables, ensuring the highest level of discriminant validity.

Table 3. Fornell-Larcker Criterion

Variables	PF	CM	PE	PR	CSB
Perceived frustration (PF)	0.886				
Challenge Motivation (CM)	0.592	0.917			
Player Effort (PE)	0.662	0.740	0.938		
Player Resilience (PR)	0.659	0.686	0.760	0.946	
Challenge-Seeking Behavior intention (CSB)	0.621	0.714	0.761	0.694	0.946

Path Analysis

To evaluate the model structure, the study adopted a bootstrapping procedure with 5000 resamples to obtain the standardized β (β), t-values, and coefficient of determination (R^2) (Hair et al., 2014). The model was used to estimate path coefficients and T-values. The path coefficient represents the strength and direction of the variable relationship to show the functional relationship between observed variables and latent variables. The R^2 value represents the explanatory power of the model (Hair et al., 2023).

Table 4. Path Coefficients

Hypothesis	Relationship	Original sample(O)	Sample mean(M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Decision
H1	PF->PE	0.344	0.345	0.048	7.151	0.000	Supported
H2	PF->CM	0.592	0.592	0.041	14.291	0.000	Supported
H3	PF->PR	0.389	0.391	0.044	8.788	0.000	Supported
H4	CM->PE	0.537	0.536	0.049	11.041	0.000	Supported
H5	CM->CSB	0.264	0.264	0.059	4.507	0.000	Supported
H6	CM->PR	0.455	0.454	0.046	9.803	0.000	Supported
H7	PE->CSB	0.368	0.369	0.067	5.512	0.000	Supported
H8	PR->CSB	0.155	0.154	0.057	2.738	0.006	Supported
H9	PF->CSB	0.119	0.120	0.055	2.172	0.030	Supported

Notes: PC, Perceived Challenge, FE, Failure Experience, PRC, Perceived Resource Constraints, NSI, Negative Social Interactions, ERD, Expectation-Reality Discrepancy, STM, Self-Transcendence Motivation, SCM, Social Competition Motivation, PR, Player Resilience, PE, Player Effort, CSB, Challenge-Seeking Behavior intention.

The results of the study indicate that all hypotheses are supported. To further discuss the impact of entrepreneurial passion on international performance, this paper investigates the mediating effect of Perceived Frustration on Challenge-Seeking Behavior Intention, with specific mediating effect test data shown in Table 4.5.

Table 5. Specific Indirect Effects

Hypothesis	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Decision
H10	PF->PE->CSB	0.127	0.127	0.028	4.510	0.000	Supported
H11	PF->CM->CSB	0.156	0.156	0.036	4.346	0.000	Supported
H12	PF->PR->CSB	0.060	0.060	0.024	2.527	0.012	Supported

Note: *** indicates $p < 0.001$, ** indicates $p < 0.01$, * indicates $p < 0.05$.

All three indirect paths demonstrate statistical significance, with P-values less than 0.05, indicating that the mediating effects are reliable. The strongest indirect effect is through Challenge Motivation (0.156), followed

by Player Effort (0.127), and Player Resilience (0.060). These results suggest that both Challenge Motivation and Player Effort are crucial mediators in the relationship between PF (Perceived Frustration) and CSB (Challenge-Seeking Behavior Intention), with Player Resilience contributing to a lesser extent.

The results of the data analysis show that all hypotheses are supported, indicating that the chain path of Perceived Frustration-Challenge Motivation-Effort-Resilience in the Hyper-Casual Games context is highly consistent with existing theories and empirical findings. Specifically, H1-H3 confirm that Perceived Frustration significantly promotes Player Effort, Challenge Motivation, and Resilience, confirming the core position of frustration as an emotional driving force. H4-H6 further reveal that Challenge Motivation not only directly strengthens Effort and Challenge-Seeking Behavior Intention but also enhances Resilience through the improvement of self-efficacy, which is consistent with the functional discussion of the satisfaction of challenge needs in Intrinsic Motivation Theory. H7 and H8 indicate that Effort and Resilience are two pillars for maintaining long-term Challenge Behavior, and their positive effects provide psychological resources to guarantee sustainable participation. H9 illustrates the direct impact of Perceived Frustration on Challenge-Seeking Behavior Intention, highlighting the key signaling role of emotional experience in behavioral decision-making. The mediating results of H10-H12 clarify that frustration indirectly shapes Challenge-Seeking Behavior through the sequence of "Effort-Motivation-Resilience", highlighting the importance of the emotion-cognition-behavior synergy mechanism. Comprehensively, if Perceived Frustration is designed to be moderate and overcomeable, it can be transformed into a core catalyst for engagement, providing empirical evidence for game designers to use emotional stimulation to optimize retention and experience.

Discussion

The discussion addresses all four research objectives: (1) identifying the multidimensional characteristics of perceived frustration, (2) examining the relationships among perceived frustration, motivation, effort, resilience, and challenge-seeking intention, (3) validating the proposed theoretical model through empirical testing, and (4) providing practical recommendations for enhancing player engagement. Each objective is systematically discussed below in relation to the study's findings.

The findings of this study demonstrate that perceived frustration serves as a pivotal motivational signal that can positively influence challenge-seeking behavior intention when framed as a manageable and meaningful experience. Although frustration is traditionally regarded as a negative affective response, the results reveal its potential to stimulate cognitive and emotional engagement, leading to sustained effort and perseverance in gaming contexts. This supports recent perspectives emphasizing that frustration and difficulty are not inherently detrimental but can, under certain conditions, enhance motivation and learning outcomes (Chamarro et al., 2020). When players encounter obstacles that are challenging yet achievable, they tend to reappraise frustration as a sign of progress, engage in adaptive strategies, and experience satisfaction from overcoming adversity.

The empirical relationships confirmed in this study indicate that perceived frustration significantly enhances challenge motivation, player effort, and resilience. These findings resonate with prior research suggesting that moderate difficulty enhances intrinsic motivation and fosters the state of "flow," where players experience enjoyment from balancing competence and challenge (Fuster et al., 2014). This study provides additional evidence that frustration, rather than discouraging participation, can facilitate adaptive persistence when players perceive feedback as constructive and success as attainable. Furthermore, it has been demonstrated that need frustration in online video games uniquely predicts motivational outcomes, showing that frustration is not equivalent to mere dissatisfaction but represents a complex motivational construct that can mobilize effort when properly regulated (Kosa & Uysal, 2022). Our results expand this view by empirically validating frustration as a functional antecedent of motivation and resilience, suggesting that negative effects can act as a catalyst for personal growth and engagement.

Challenge motivation emerged as a central mediator in the process linking frustration to behavior, indicating that players transform negative affect into purposeful action when driven by intrinsic or mastery-oriented goals. Similar to educational contexts where challenge-based learning enhances engagement and skill

acquisition, game players translate perceived obstacles into motivational energy that sustains long-term participation. Player effort and resilience also proved essential psychological resources that stabilize emotional fluctuations and maintain engagement, supporting the theoretical model of emotional regulation and self-determination. This mechanism aligns with evidence that resilient players reinterpret failure as an opportunity to improve, thereby reinforcing their sense of competence and maintaining persistence even in the face of repeated setbacks (Yu et al., 2018). Collectively, these findings advance the understanding of the “frustration–motivation–behavior” chain by illustrating how emotional dissonance is transformed into a motivational force through cognitive reappraisal and adaptive coping.

From a practical standpoint, these insights carry important implications for game designers and digital experience developers. Games that intentionally integrate adaptive difficulty, constructive feedback, and calibrated failure can sustain engagement by channeling frustration into motivation. Recent studies on dynamic difficulty adjustment (DDA) suggest that systems that adapt to player skill levels can improve emotional balance and enhance enjoyment by maintaining an optimal level of challenge (Lee et al., 2025). In this regard, frustration becomes a design element rather than a flaw: it keeps players within the motivational “sweet spot” where challenge exceeds ability slightly but remains attainable. Additionally, moderate levels of social comparison, as observed in competitive gaming environments, can enhance motivation by providing reference points for self-improvement and achievement (Lee et al., 2025). How does competition enable social comparison? A comparison of behavior in competitive internet-based games. However, excessive competitive pressure may produce negative affect, suggesting that balance in social interaction design is crucial for sustaining engagement. For managers and platform administrators, cultivating resilience through supportive design, such as clear feedback loops, progress indicators, and restorative break mechanics, can mitigate the adverse emotional effects of frustration and maintain long-term player retention.

Overall, this research enriches the theoretical and practical understanding of how emotional experiences in games, particularly frustration, interact with motivational and behavioral outcomes. By validating the mediating roles of challenge motivation, player effort, and resilience, the study contributes to an integrated framework of adaptive engagement in hyper-casual gaming. Beyond gaming, the findings offer broader implications for the design of learning and training environments where controlled frustration can be used to enhance persistence and mastery. When appropriately balanced, frustration does not diminish enjoyment; instead, it becomes a psychological trigger for growth, resilience, and continuous challenge-seeking behavior.

Limitations and Future Research

This study has three limitations. Firstly, the sample focuses on Hyper-Casual Games players, and whether the framework is applicable to other game types or real-life scenarios remains to be verified. Secondly, Self-Transcendence and Social Competition Motivation are only included as dimensions, and their dynamic interaction with Resilience and Challenge Behavior needs to be further explored. Thirdly, the data relies on self-reporting, and external variables such as cultural background and platform characteristics have not been examined (Larche & Dixon, 2020). Future studies can adopt longitudinal or experimental designs, introduce behavior tracking, physiological indicators, and cross-cultural comparisons to clarify the causal path and expand the external validity of the model. At the same time, the applicability in multiple scenarios, such as education and training, should be investigated.

Conclusions

This study confirms that perceived frustration, when experienced at a moderate and manageable level, acts as a constructive motivational force rather than a deterrent in hyper-casual gaming. The results demonstrate that frustration significantly enhances players’ challenge motivation, effort, and resilience, which in turn strengthen their intention to engage in continuous challenge-seeking behavior. Challenge motivation emerged as the most influential mediator, showing how emotional tension can transform into purposeful engagement. Overall, the research contributes to understanding how emotional regulation and motivation interact in digital play. It highlights that well-balanced frustration, supported by adaptive difficulty and constructive feedback, can sustain player engagement and promote long-term persistence and psychological growth in gaming and related learning contexts.

Authors' Contributions

All authors have participated in drafting, reading, and approving the manuscript's final version.

Conflict of Interest

The authors report no conflicts of interest in any research sponsored by the research that may have influenced the outcome of this work.

Data Availability

The data supporting the findings of this study are available upon request from the authors.

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