

## Article

# Exploring the Impact of Gamification on Users' Engagement for Sustainable Development: A Case Study in Brand Applications

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**Abstract:** Game elements and mechanics have been widely applied as marketing strategies for sustainable development. Seldom have studies explored the relationships between the components of the game and consumer continuous usage with gamification. This study analyzed how game mechanics impact users' gaming behavior and awaken positive feelings so as to increase the stickiness of the brand. This research model empirically surveyed 411 Nike Run Club (NRC) app users, based on the Mechanics–Dynamics–Aesthetics (MDA) framework. The results show that the self-challenge is a pre-factor that affects self-benefit, fun, and social interaction, while self-benefit and social interaction affect fun. The results also show that fun is of primary importance among all others, as it is a factor that affects brand attitude and sustained use. The results provide valuable insights into sustainable strategies for industries related to the operation of an app-based brand.

**Keywords:** gamification; MDA model; brand attitude; continued intention to use; gamification marketing

## 1. Introduction

Gamification is drawing growing attention from both researchers and practitioners [1–3]. For the innovation and sustainable developments in related industries, combining game features and game-thinking into non-gaming contexts, gamification can incentivize and motivate people, as well as enhance their perception and engagement. Therefore, gamification as a powerful engagement tool has been widely utilized in various fields, such as education, healthcare, entertainment, and non-profit enterprises [1–6]. As reported in TechSci Research [7], the gamification market is estimated to reach 40 USD billion by 2024. The emergence of gamification marketing not only changes business marketing strategy, but also alters consumption behavior. As a marketing tool, gamification, apart from aiming to boost sales and to increase profit, can improve customer engagement, enhance product/brand identification, and build loyalty [8–11]. To further gain a competitive advantage, it is of key importance for practitioners to identify the core elements and important attributes contributing to most of the users' experience and to boost engagement with gamification in marketing.

Many companies or corporations have launched special apps and used gaming techniques, such as competition, scoring systems, and incentives, to attract and retain customers, thus expanding their brand reach and generating more sustainable development possibilities. One example of a major business with successful gamification marketing is Nike. Launched in 2010, Nike Run Club (NRC) (originally called Nike + Running App) has become a popular running app, which allows users to personally monitor and record their workouts, and to socially share and compare accomplishments. Besides gathering customers' information and connecting them, NRC's enticing features, including

immediate/daily feedback that fosters empowerment, ranking on leaderboards that encourages social relatedness, as well as trophies and badges awarded that sustain engagement, has attracted millions of players/users, who have turned into brand fans. As evident in the above example, gamification enhances businesses' competitive advantage in the market for sustainable development, and the key lies in whether the tactics can foster engagement and sustain continued intention to use.

The diverse aspects and applications of gamification have been studied, including education and learning [8,12,13], commerce [14,15], healthcare [4,16–18] and games themselves [5,19]. Moreover, studies on gamification marketing have explored the impacts of game design on players' motivation, satisfaction, or behavioral intention [10,20]. Nevertheless, in the era of e-commerce, how gamification marketing impacts or sustains continued intention to use has rarely been systematically examined. Furthermore, examining the relationships between continuous usage of a brand app with gamification and the component of the game would be of importance for market segmentation and marketing strategy formulation.

To fill in the knowledge gap, this study explores, from the perspective of game design, how the integration of game dynamics into a brand app contributes to better user experiences and boosts engagement. The analytical tool adopted was the Mechanics–Dynamics–Aesthetics (MDA) framework [20]. In contrast to other studies on gamification, the proposed model adopts the theory of social comparison process proposed by Festinger [21] and identifies two constructs, i.e., self-achievements and team-achievements, as the components of the game (Mechanics). Important constructs related to dynamics and esthetic features of gamification are also established, such as self-benefit, fun, and social interaction ties as the “Dynamics” features, and brand attitude and continued intention to use as the “Aesthetics” features. Structural equation modeling (SEM) is applied to investigate proposed models. Results provide reference for practitioners in mechanisms design to encourage user engagement and to improve brand identity in the competitive environment.

## 2. Theoretical Background

### 2.1. Gamification

Gamification, a term coined by computer programmer/game designer Nick Pelling in 2002, is defined as the use of game elements and mechanics in non-game contexts [1] for user engagement and problem-solving [10]. On the other hand, Huotari and Hamari [2] emphasized the experiential nature of gamification as a process to support users' overall value creation. Hence, gamification design is more than just games and fun, it serves specific goals, with the users enjoying the entire process. Zichermann and Linder [11] expounded on how gamification revolutionizes business thinking and practices and concluded that game mechanics, when integrated with business strategy, serve as an invaluable change agent for the management to motivate employees and customers. Regardless of how gamification is defined, its main purpose is to create fun, to stimulate significant motivation, to enhance user experience, to encourage engagement, and to develop opportunities for sustained engagement.

Conaway and Garay [22] highlighted that gamification, while sharing the same characteristics of gaming such as points, tokens, badges, levels, rewards, and competition, must also involve fun for the consumer. Palmer, Lunceford, and Patton [23] summarized four principal elements of gamification; namely, (1) progress paths that use challenges and stories to motivate users to complete tasks and to remain engaged; (2) feedback and rewards that motivate users to upgrade to a higher level; (3) social connection that creates competition and cooperation through social networks; and (4) an interface and user experience that allow users to have a fun and enjoyable experience. Behavioral changes of consumers brought about by gamification may, in part, be attributed to the inherent human tendencies to engage with competition, challenge, and social interaction [10]. In a game design, the rules should be simple, allowing users to have a sense of control and to perceive fun in achieving the goals through repetitive practice. In addition, upon completion of a small task, there should be prompt feedback in the form of “Likes” on Facebook, points for accumulation, or

badges/awards. Finally, social interaction functions should be added, such as making new friends, sharing, cooperating, and competing.

A game is a structured form of play with goals and rules [24], whereas gamification is a strategy that utilizes game elements as well as mechanics [1] to enhance engagement and motivation through the fun of the game. A game-like experience created by gamification [5] promises fun and makes employees and customers enjoy what they are obligated to do, which smoothens and makes business exchanges more appealing. Werbach and Hunter [6] proposed six steps of gamification design: define the objectives of corporate, delineate target behaviours, give details about players, devise activity loops, take into consideration the fun, and deploy appropriate tools.

To sum up, gamification integrates gaming elements, incentive mechanics, rule structure, and feedback systems into non-game situations to attract and motivate people to engage, and then to change their behavior.

## 2.2. Gamified Brand Marketing

Companies and brands are applying "gamification" to brand marketing strategies, focusing on consumers and incorporating amusing elements into the Internet, social media, and daily operations in an attempt to build a good interactive relationship with consumers, so as to increase the connection between consumers and brands in a concerted effort for value creation [25]. Gamification is a process that enables users to create overall value through various gaming experiences. The mechanics are used to generate fun in the usage process to increase user engagement and loyalty [2].

The main focus of gamified marketing is (1) engagement is the consumer's performance and investment in cognition, emotion, and behavior during their interaction with the brand or in other relevant activities [26]. A consumer's faith in brands can be considered cognitive engagement. A consumer identifying with and developing a sense of belonging toward brands leads to an emotional engagement with the brand. A consumer's reaction toward brands is engagement through behavior [27]. (2) Brand loyalty is divided into attitudinal loyalty and behavioral loyalty. Attitudinal loyalty is an internal manifestation at a consumer's psychological level. For example, a customer may recommend focus products to another customer [28]. Behavioral loyalty is an external manifestation and is about a consumer's actual purchase behavior, and an example of behavioral loyalty is repeat purchases [29]. (3) Brand awareness refers to the degree to which consumers can consider and identify a brand when a certain category of products is mentioned [30]. Keller [31] pointed out that brand awareness is related to how strongly a brand sticks to a consumer's memory. It reflects the ability of consumers to recognize the degree of a brand's difference. This translates into stronger brand connection or improves a brand's foothold in a consumer's memory. Analyzing consumer brand attitudes and behavior can enable corporates to determine brand marketing strategies that can be used to influence consumers to use sustainable services and goods [32]. Negruşa et al. [33] examined the role of gamification and sustainable development from an economic, social, and environmental perspective. Gamification is a way to achieve goals such as engagement, brand loyalty, and brand awareness [34]. Gamified marketing can be an effective way to enhance service value and the experience of consumers [22,35]. However, there are no current studies identifying the core elements of gamification mechanics, which are important to the success of gamification as a marketing strategy in sustainability development.

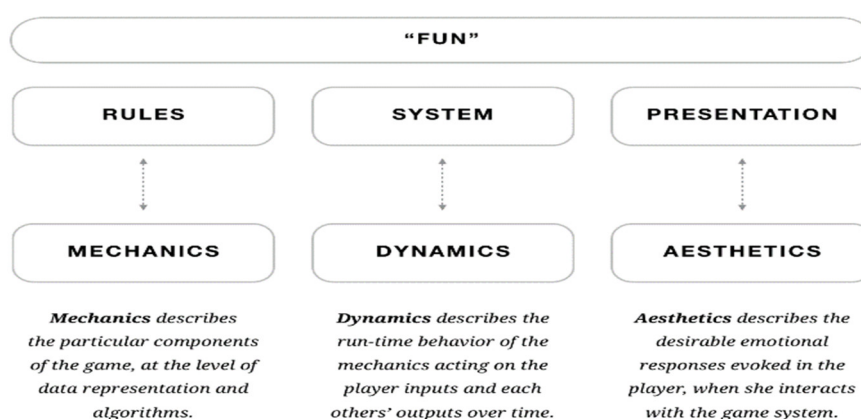
## 2.3. Mechanics–Dynamics–Aesthetics Framework

Figure 1 shows the MDA framework. As can be seen, this methodological architecture of game design proposed by Hunnicke, LeBlanc, and Zubek [20] comprises three components: mechanics, dynamics, and aesthetics, which complement each other.

The mechanics are the core of the game, and comprise the constructs of goals, rules, and feedback loops with enticing features of points, leaderboards, levels, challenges, virtual treasures, and badges [13] for active engagement. According to Lundgren and Björk [36], mechanics refers to part of a game's rule system or a summary of game rules and types of interactions that may occur in a game. While a game can contain multiple mechanics, a mechanic can be used by multiple games.

Dynamics refer to behaviors in the duration of the game. As the interaction between players and the mechanics evolves over time, dynamics undergo changes as a function of user feedback, such as what strategies are derived from the rules and how players interact with the game. Dynamics evoke esthetic experiences such as: (1) challenge created under time pressure and competition against opponents; (2) fellowship encouraged by sharing information or winning strategies with fellow players; (3) expression allowing players to leave their mark on the game and to create a unique personalized gaming experience; and (4) narrative/dramatic tension with suspense and release, generating tension and a denouement [20]. Dynamics entail interpretation and prediction, i.e., understanding what is happening and guessing what will happen, and the uncertainty involved is what makes a game fascinating and engaging.

Aesthetics describe the players' overall feelings when interacting with the game. A well-designed game can resonate strongly with players in terms of emotions, including fun, frustration, fantasy, and friendship. Hunnicke et al. [20] suggested a more directed vocabulary for describing the aesthetics of a game, including (1) sensation, enabling players to have a stimulating experience with the audio-visual game effects; (2) fantasy, creating an immersive experience with a make-believe world; (3) narrative, engaging players with well-scripted plots; (4) challenge, posing obstacles to boost mastery; (5) fellowship, promoting a social network for cooperation and interaction; (6) discovery, exploring the unknown; (7) expression, fostering creativity; and (8) submission, pursuing a pastime for enjoyment or alleviating boredom. Again, these emotional responses all contribute to making the game "fun," thus enhancing engagement.



**Figure 1.** The Mechanics–Dynamics–Aesthetics (MDA) framework (Hunnicke, LeBlanc and Zubek, 2004 [20]).

Zichermann and Cunningham [10] believe that the so-called "game elements" refer to the basic constituents that comprise a game, and are also the basis for guiding the entire gaming process; the "gaming mechanic," on the other hand, is the design employed to optimize and strengthen the game elements. The DMC pyramid system proposed by Werbach and Hunter [6] uses "Mechanics" to refer to the basic process that drives the game's progress and player engagement, including Challenge, Chance, Feedback, Win states, etc., and "Components" describes the specific elements that make up a mechanic, including Points, Badges, and Leaderboards, among others. After collating the relevant literature, Hunnicke et al. [20] reached a consensus on ten gamification elements: Leaderboards, Points, Achievements/Badges, Challenges/Missions, Levels, Story/Theme, Feedback, Clear goal, Rewards, and Progress.

Schell [37] also mentioned four gamification elements that can increase user immersion and engagement, including Story, Mechanics, Aesthetics, and Technology. Story elements can enhance user experience, while the mechanics should present the game's flow and rules, so that users may understand the game's goals, how to accomplish the goals, and the expectations and feedback they can expect to get when they give the game a try. Such game mechanisms make the game more dynamic and create a specific user experience [2]. In terms of aesthetics, it can improve and deepen

the immersive experience of users. Finally, the technology elements play an intermediary role, which can inspire users to enter the characters and plots, creating an immersive gaming experience.

As an example, for a monotonous activity such as running, Nike uses gamified data, levels, feedback, interaction (Mechanics) to motivate users to invest more in fitness and jogging, thereby making running fun (Aesthetics). Users have easy access to their running history through an app, such as running distance and time (Feedback). The trajectories of their movement are displayed on a map to create user favorite patterns or texts (Expression). Different awards are granted (Accomplishment), and it is possible to challenge either oneself or to compete against a team at the same time (Challenge). It is also possible to use the social network's sharing function to let friends know one's running status (Social influence).

In addition, the Nike Run Club (NRC) app is characterized with various fascinating designs such as a virtual "running buddy" avatar. The partner will be encouraged when one exercises regularly, and will become disheartened when one slumps into sluggishness (Dynamics). Since the brand app launched in 2006, the user base has been accumulated to include 250 countries and more than 3 million members. The above evidences that the success of gamification of Nike and the characteristics fit the definition of the MDA framework. The derivation of constructs in the framework, as well as the hypotheses, are further represented in Section 3.

### 3. Model and Hypotheses

Figure 2 depicts the model and constructs. On the basis of the MDA framework, it was analyzed how a game's mechanics changes the user's behavior (Dynamics), which in turn evokes emotional responses (Aesthetics). Specifically, the model shows that Self-Achievement (SA) and Team-Achievement (TA) in the gamification design mechanism affect Self-Benefit (SB), Fun, and Social Interaction Ties (SIT)—all three of which influence brand attitude and continued intention to use (CIU). The following sections further define the interrelation of the research constructs.

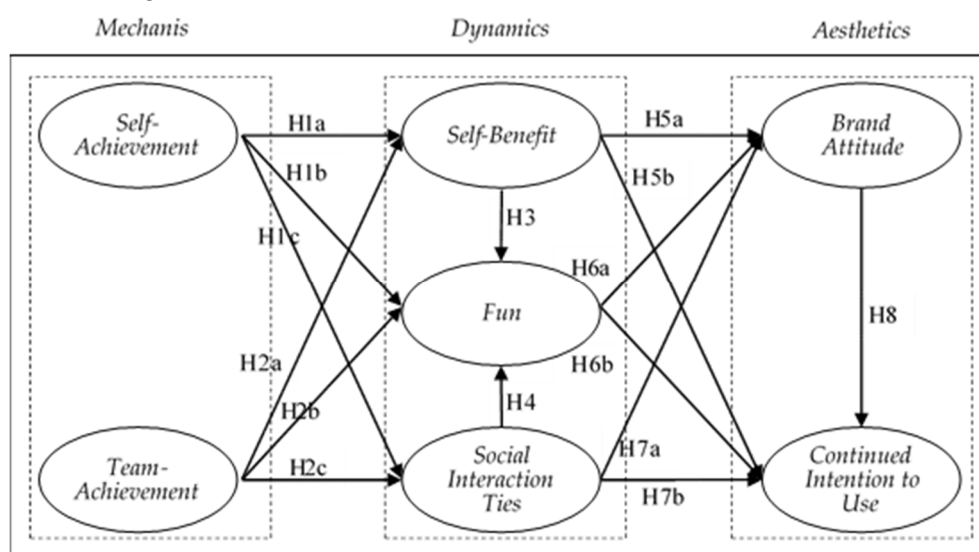


Figure 2. Research model.

#### 3.1. Mechanics

As mentioned in Section 2.3, a game's mechanics are the core of entire operation and refer to the game's procedures and rules, including how players achieve their goals and how to get rewards. In a game, players gain instant feedback such as scores, badges, upgrades, and rewards by overcoming obstacles such as levels, tasks, and challenges to perceive a sense of achievement, which allows them to have a better experience of the game [38]. The desire for accomplishment is an inherent instinct in human beings. Achieving challenging goals in gamification can generate strong incentivizing effects [39]. In order to pursue the sense of accomplishment generated by success, people with a strong need for achievement focus on overcoming challenges in the game and play for increased Self-Benefit. In

addition, users are able to engage with the community for entertainment and to receive increased motivation for their engagement. Based on the work of Lungren and Björk [36] and Festinger [21], two constructs, i.e., Self-Achievement and Team-Achievement, are identified as mechanics. In terms of the case of Nike, the mechanics of the NRC app allow users to compete with themselves in its game design. Users can track the distance and speed of each run, and they can also receive trophies and badges when they reach milestones. Such a design not only encourages users to exercise and break through their personal limits, but also promotes health and fitness, and makes monotonous running fun. Among the designed mechanics, self-achievements encourage users to pursue better results than in the past. The achievements of self-challenge could further lead to a fulfillment of a user's pleasure and fun. Based on social comparison theory [21], users are motivated to evaluate themselves by a comparison with others for accurate self-evaluation when objective means are not available [40]. According to the above arguments, we hypothesize that:

**H1a:** *Self-Achievement positively influences Self-Benefit.*

**H1b:** *Self-Achievement positively influences Fun.*

**H1c:** *Self-Achievement positively influences Social Interaction Ties.*

Competition is a form of social interaction. In order to achieve better results, members of a community increase their social interaction with others. A sense of accomplishment can be obtained through actions such as conquest and challenge [17,18,41]. In addition, Prensky [42] pointed out that there are conflicts, competitions, challenges, and oppositions in a game to excite and thrill players. It is believed that the win state can generate self-satisfaction. When games are fun, challenging, achievable, etc., it becomes easy to make participants compete and cooperate to obtain rewards. The NRC app uses gamification to make running fun; it tracks a user's running history (such as time, distance, and speed), and measures their progress in achieving their goals [43]. In addition, it is connected to social networking platforms, allowing users to show off to or compete with friends or others, thus stimulating more user engagement. Through these runners' data, Nike is able to understand runners' behaviors and preferences, which is then used to improve products and to promote sales. Competition can create a sense of belonging, while cooperation can promote players to work together to achieve common goals [41].

The NRC app uses a comparison mechanism among team members in game design to motivate users to exercise. Through achievable goals, progress indicators, and encouragement, it allows users to have fun, thereby stimulating runners to increase their exercise volume [44]. Through the operation of the comparison mechanism with team members, the NRC app allows users to easily share achievements on Facebook and other social networking sites after each run. The purpose of this is not complicated. A user may share his/her own practice results to let friends know the running status of the day, which creates a competing mentality. Friends who run faster or more frequently may encourage someone to find more time to run and to share the results with the community, creating an atmosphere in which everyone feels motivated to increase their frequency of exercise and to compete with friends to receive points. According to the above arguments, we make the following hypotheses:

**H2a:** *Team-Achievement positively influences Self-Benefit.*

**H2b:** *Team-Achievement positively influences Fun.*

**H2c:** *Team-Achievement positively influences Social Interaction Ties.*

### 3.2. Dynamics

Dynamics is a process by which the gaming mechanics interact with a player during the game; this is a dynamic system. A good gamification design should contain elements such as fun, challenge, and entertainment. Lazzaro [45] puts forward four key points related to a player's emotions: (1) Easy fun—players can play the game by following simple rules, and the game will be immersive and amusing; (2) Hard fun—this is a kind of fun is generated by conquering challenges, surmounting difficulties, completing tasks, and grasping the overall situation, which can bring people a sense of accomplishment; (3) People fun—when others are playing with you, the sense of victory and failure

is stronger than when playing alone, and this kind of fun is generated through competition, cooperation, communication, and leadership; and (4) Serious fun—a game that changes thinking, feelings, and behaviors, for example, dissatisfaction with the boss being vented through shooting games, losing weight through exercise, etc.

Keller [31] regards benefit as the consumer's comprehensive assessment of what he “obtains” from the product or services. Puth, Mostert, and Ewing [46] describe benefits as what consumers are pursuing when buying goods, which determines the final state or value that consumers seek. The NRC app tracks the user's running footprint through Global Positioning System (GPS), analyzes speed and mileage, and counts the calories burnt, so that individual users can create their own running records. Such features also improved users' understanding of details within each run so as to develop a regular exercise habit. In addition, the NRC app allows runners at all levels to receive encouragement from Nike elite coaches and athletes during the running process. The Self-Benefit effects provided help users to take advantage of the gamification process and to receive pleasant feelings. According to the above arguments, the following hypothesis is made:

**H3:** *Self-Benefit positively influences Fun.*

People use social networking functions to interact with friends and to work together to solve tasks. When consumers establish Social Interaction Ties with others, a greater sense of pleasure is created for them, both physically and psychologically [47]. According to Lazzaro [45], gamers can have fun by interacting with others. That is, the more people the gamers get to know in a brand app, the more they will be encouraged by friends and the more they will become more immersed in the game. Through social interactions such as communication, coordination, and collaboration, a player's psychological immersion can be improved. When people have more Social Interaction Ties, they can get more pleasure, both psychologically and physically [47]. Users of the NRC app can interact with other running enthusiasts. For example, when one of user's friends starts running, the user will receive reminders and can determine whether to send messages or use cheering actions to encourage each other. Social interactions can stimulate the interest and willingness of users to participate in sports. According to the above arguments, we make the hypothesis:

**H4:** *Social Interaction Ties positively influence Fun.*

The entertainment effect provided by a gamified brand app allows users to have a pleasant experience while using it, effectively increasing the appeal of the app and improving consumers' attitudes towards the brand. When a consumers' attitude turns more positive, they are more likely to acknowledge the brand [2,9]. In a state of immersion, people show a high degree of attention, lose the concept of time, and feel a considerable sense of happiness [48]. Thus, when consumers are immersed in a brand app, a greater curiosity will lead them to explore the brand app further. At this time, the sense of pleasure will also be transferred to the products or brands that they are in contact with, resulting in a positive brand attitude [49]. Therefore, consumer willingness to establish and maintain relationships with the brand will be increased, thereby developing an emotional attachment. Davis [50] indicates that when users utilize information systems to help improve work performance and efficiency, they will keep on using the system in the near future [18,50]. Bhattacharjee [51] states that when users think that they can get some help from using a product or through doing a certain behavior, they will continue to use the product or stick to that behavior. Much research has confirmed the positive impact of Self-Benefit on behavioral intentions, as well as on actual behavior [19]. We make the hypotheses:

**H5a:** *Self-Benefit positively influences Brand Attitude.*

**H5b:** *Self-Benefit positively influences Continued Intention to Use.*

Choi and Kim [19] believe that once a player obtains the overall immersive experience, including enjoyment or entertainment effects from the game, this experience will help them develop the intention to continue playing the game. Many studies have found that the entertainment effect of games is an important antecedent to players' continued intentions of use [9,19]. When information technology becomes more entertaining, people will develop a positive attitude toward it [52].

According to Prensky [42], a fun game can give users a sense of enjoyment and fun throughout the duration, and can allow users to engage enthusiastically. Nike makes users realize that running sports are like playing a game, guiding users to enjoy the process of running, thus creating dependence on its products, improving user stickiness, and making fun the driver of users' long-term engagement. The gaming mechanics induce increased user engagement, and also enhance brand awareness. Therefore, we make the following hypotheses:

**H6a:** *Fun positively influences Brand Attitude.*

**H6b:** *Fun positively influences Continued Intention to Use.*

Past studies have concluded that social interaction is a significant factor affecting user engagement in a community [17,18,41,53,54]. A study by Yang et al. [9] pointed out that when a gamer plays with a group of friends, the gamer will be affected by the community and will immerse themselves in an interactive relationship with the others. Members will share their experience of self-efficacy and improvement to assist other members, and community members will think that they belong to the same brand community, that is, they develop a sense of belonging to the community. Gamification generates new marketing tactics in which users share and interact with friends to increase their recognition of the brand, and of the brand community at large [2,8,9]. This results in a dependence on the product. Nike allows users to see their running history (creation) and receive different medals (achievements). When a runner shares their running status with friends (community impact), they gradually help others develop a habit of exercise, and in the process increases their own running mileage and number of runs. As a result, they will perhaps purchase more sportswear, sneakers, etc., which will boost Nike sales. It is undeniable, however, that this does also strengthen their willingness to run. Therefore, we make the following hypotheses:

**H7a:** *Social Interaction Ties positively influence Brand Attitude.*

**H7b:** *Social Interaction Ties positively influence Continued Intention to Use.*

### 3.3. Aesthetics

Aesthetics refers to the ultimate goal of participating in the game experience. When a user interacts with the game system, aesthetics involve desirable emotional responses evoked in the player [20,55]. Through a gamified experience, customers resonate with the values and concepts conveyed by the brand, build a relationship with it, and eventually become a brand enthusiast. In this study, the "Aesthetics" dimension consists of attitude and continued intention to use.

Attitude is mainly an expression of emotion, and brand attitude is the feeling that consumers have toward a brand. Brand attitude denotes how favorably customers view a particular brand [56]. Keller [31] thinks that brand attitude is the basis of consumers brand behavior, that is, consumers' evaluation of brand integrity. When consumers feel favorable toward a brand, the likelihood of using that brand increases. Kotler [57] also mentioned that a better brand image of a product leads to lower perception risk of consumers, which means that the consumer has a higher sense of trust in the brand, i.e., the brand attitude toward the product is positive. Hamari and Koivisto [18] mentions that a good attitude toward gamification has led to the intentional continued usage of gamification services. The study argues that the positive attitude of the NRC app users has demonstrated the relationships between attitude and continued use based on [17,18]. According to the above arguments, we make the following hypothesis:

**H8:** *Brand Attitude positively influences Continued Intention to Use.*

## 4. Research Methodology

### 4.1. Data Collection and Sampling

This study used the survey questionnaire, conducted on NRC app users. NRC is currently one of the largest running communities in the world. The respondents were those who have experienced the NRC app. An online questionnaire was used to collect sample data, and information about the



questionnaire was posted on Facebook, the NRC community, and the largest BBS forum in Taiwan. During the formal questionnaire survey conducted from May 1 to May 30 2018, a total of 425 samples were obtained. After deleting the incomplete and repeated responses, a total of 411 questionnaires were applied for analyzing the data. Table 1 shows sample demographics.

**Table 1.** Sample demographics ( $n = 411$ ).

Measure	Item	Frequency	Percentage (%)
<b>Gender</b>	Female	227	55.2
	Male	184	44.7
<b>Age</b>	Less than 20	41	9.9
	21–30	200	48.6
	31–40	97	23.6
	41–50	52	12.6
	More than 51	21	5.1
<b>Education</b>	High school and below	32	7.7
	College/University	249	60.5
	Master's/Ph.D.	130	31.6
<b>Running Experience</b>	Less than 6 months	164	39.9
	6 months–1 year	64	15.5
	1–3 years	84	20.4
	3–5 years	46	11.1
	Over 5 years	53	12.8
<b>Nike Run Club (NRC) app usage frequency</b>	Almost every day	40	9.7
	About 2 or 3 times per week	11	2.6
	About once per week	112	27.2
	Once a month	3	0.7
	Irregular	245	59.6

#### 4.2. Measurement

The questionnaire and operational definitions were designed with reference to previous research (Table 2), and the content of the questions was adjusted based on Nike's gamification context. The questions of continued intention to use were based on studies by Bhattacharjee et al. [58]; the questions on brand attitude were revised from the studies by Holbrook and Batra [59]; Self-Achievement (SA) and Team-Achievement (TA) questions were revised from the study by Vogel et al. [60]; Self-Benefit questions were revised from the study by Koivisto and Hamari [44]; questions on Fun were revised from Chiu et al. [53]; and Social Interaction Ties (SIT) were revised from Feng et al. [61]. The questionnaire was measured using a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). Details are listed in Appendix A.

A pre-test was conducted to attain questionnaire effectiveness. Five doctoral candidates from information management were invited to review the questions, amend the wording, clarify the meaning of the questions, and remove any confusion. Then, a pilot test was performed on 82 users of the NRC app to verify the reliability and validity. The formal survey was conducted after a reliability and validity analysis.

**Table 2.** Operational definitions of the constructs.

Constructs	Definition	Reference
<b>Self-Achievement</b>	The game design mechanism encourages users to pursue better results than those in the past	Vogel et al. [60]
<b>Team-Achievement</b>	The game design mechanism encourages users to pursue better results as compared to other members	Vogel et al. [60]
<b>Self-Benefit</b>	The extent to which users feel the benefit from NRC usage	Koivisto and Hamari [44]
<b>Fun</b>	The extent to which users feel NRC is interesting and fun	Chiu et al. [53]
<b>Social Interaction Ties</b>	The extent to which users can interact with members using NRC	Feng et al. [61]
<b>Brand Attitude</b>	Whether the user is in favor of Nike	Holbrook and Batra [59]
<b>Continued Intention to use</b>	Users' intention toward continuous usage of NRC	Bhattacharjee et al. [58]

## 5. Results

This study employed the statistical application technology of Structural Equation Modeling, adopted AMOS 22.0 (Analysis of Moment Structure) for data analysis, and took a two-step approach to test the appropriateness of the research architecture model [62]. First, a Confirmatory Factor Analysis (CFA) was performed on the questionnaire table in order to test the reliability and validity of the questionnaire. Second, a Structural Equation Model (SEM) was employed to examine the fit of the model and to perform path analysis.

### 5.1. Measurement Model

This study examined the reliability and validity of each research aspect, and the measurement items were verified to develop a stable test mode. The model-fit indices of the model in this study ( $\chi^2/df = 2.177(\leq 3)$ , GFI = 0.91 ( $\geq 0.9$ ), AGFI = 0.88 ( $\geq 0.8$ ), NFI = 0.96 ( $\geq 0.9$ ), CFI = 0.98 ( $\geq 0.9$ ), RMSEA = 0.054 ( $\leq 0.08$ )) all show a good fit and meet the standard values based on Hair et al. [63].

In order to check the stability and consistency, this study employed the alpha value (Cronbach's alpha) and Composite Reliability (CR) to evaluate the internal consistency of the model. Table 3 shows the results of discriminant validity testing. The Cronbach's  $\alpha$  coefficients of each construct lie within 0.922 and 0.966, which are higher than the threshold of 0.7 suggested by scholars [64]. In addition, the CR value is between 0.924 and 0.967, which is also higher than the 0.7 suggested by scholars [65], showing that each construct exhibits a high level of reliability.

In terms of validity verification, this study employed Convergent Validity and Discriminant Validity. Convergent Validity measures whether multiple questions are developed by a variable falling in the same expected construct. The measurement uses Factor Loading and Average Variance Extracted (AVE). The factor loading threshold of each construct should be greater than 0.7, and the average variable extraction rate greater than 0.5 [65], in compliance with the suggestion made in previous studies [66]. Table 3 shows that the factor loading of each item in this study is greater than 0.7, and the AVE value is greater than 0.5. The above results show good Convergent Validity.

Discriminant validity was further utilized to measure the degree of discrimination between the different constructs. The square root of good Discriminant validity AVE should not be smaller than the correlation coefficients between this and the other constructs [65]. For example, Table 4 shows the matrix of the correlation coefficients of all of the constructs, and the results demonstrate that each construct in the scale performs Discriminant validity against each other.

**Table 3.** Composite reliability and average variance extracted.

Constructs	Items	FL	CR	AVE	Cronbach's $\alpha$	Mean	SD
Self-Achievement	SA1	0.885	0.950	0.825	0.950	3.982	0.764
	SA2	0.905					
	SA3	0.920					
	SA4	0.923					
Team-Achievement	TA1	0.913	0.967	0.879	0.966	3.682	0.846
	TA2	0.946					
	TA3	0.951					
	TA4	0.939					
Self-Benefit	SB1	0.925	0.946	0.815	0.945	4.054	0.754
	SB2	0.921					
	SB3	0.925					
	SB4	0.837					
Fun	FUN1	0.901	0.948	0.860	0.947	3.929	0.766
	FUN2	0.953					
	FUN3	0.927					
Social Interaction Ties	SIT1	0.940	0.963	0.896	0.963	3.608	0.857
	SIT2	0.958					
	SIT3	0.942					
Brand Attitude	BA1	0.911	0.924	0.801	0.955	4.159	0.796
	BA2	0.851					
	BA3	0.922					
Continued Intention to use	CIU1	0.945	0.963	0.896	0.922	4.058	0.771
	CIU2	0.946					
	CIU3	0.948					

**Table 4.** Discriminant validity.

Construct	SA	TA	SB	FUN	SIT	BA	CIU
SA	<b>0.908</b>						
TA	0.655**	<b>0.937</b>					
SB	0.703**	0.577**	<b>0.903</b>				
FUN	0.692**	0.592**	0.737**	<b>0.927</b>			
SIT	0.497**	0.666**	0.559**	0.574**	<b>0.947</b>		
BA	0.501**	0.412**	0.555**	0.548**	0.362**	<b>0.895</b>	
CIU	0.542**	0.455**	0.511**	0.572**	0.485**	0.595**	<b>0.946</b>

Note: \*\* =  $p < 0.01$ . Abbreviations: SA, Self-Achievement; TA, Team-Achievement; SB, Self-Benefit; FUN, Fun; SIT, Social Interaction Tie; BA, Brand Attitude; CIU, Continued Intention to Use. The square root of AVE is shown in bold (at diagonal) and factor correlation coefficients.

## 5.2. Structural Model

From the perspective of overall model-fit indices, the structural model shows a good fit ( $\chi^2/df = 2.41$  ( $\leq 3$ ), GFI = 0.90 ( $\geq 0.9$ ), AGFI = 0.87 ( $\geq 0.8$ ), NFI = 0.96 ( $\geq 0.9$ ), CFI = 0.97 ( $\geq 0.9$ ), RMSEA = 0.059 ( $\leq 0.08$ )). The results of the structural model of this study (see Figure 3) are as follows: Self-

Achievement (SA) versus Self-Benefit (SB) ( $\beta = 0.62, p < 0.001$ ), Fun ( $\beta = 0.32, p < 0.001$ ), and Social Interaction Ties (SIT) ( $\beta = 0.11, p < 0.05$ ) show a significant positive impact and support H1a, H1b, and H1c. Team-Achievement (TA) shows a significant positive influence on SB ( $\beta = 0.17, p < 0.01$ ) and SIT ( $\beta = 0.62, p < 0.001$ ), supporting H2a and H2c. However, TA did not reach a significant level of effect on Fun, so it rejects H2b. SB ( $\beta = 0.40, p < 0.001$ ) and SIT ( $\beta = 0.18, p < 0.001$ ) have a significant positive impact on Fun, supporting H3 and H4. Fun ( $\beta = 0.39, p < 0.001$ ) and SIT ( $\beta = 0.21, p < 0.001$ ) have significant positive impacts on Brand Attitude (BA), supporting H6a and H7a. However, the attitude of SB toward the brand, BA, did not reach a significant level, and thus H5a is rejected. SB ( $\beta = 0.14, p < 0.05$ ), Fun ( $\beta = 0.54, p < 0.001$ ), SIT ( $\beta = 0.10, p < 0.05$ ), and Continued intention to use (CIU) have a significant positive impact, thus supporting H5b, H6b, and H7b. BA ( $\beta = 0.10, p < 0.05$ ) has a significant positive impact on CIU, supporting H8.

In addition, the variance explained ( $R^2$ ) of each dependent variable is the explanatory power of BA ( $R^2 = 0.4$ ), CIU ( $R^2 = 0.6$ ), Fun ( $R^2 = 0.66$ ), SB ( $R^2 = 0.56$ ), and SIT ( $R^2 = 0.48$ ), indicating that the research model has good explanatory capabilities.

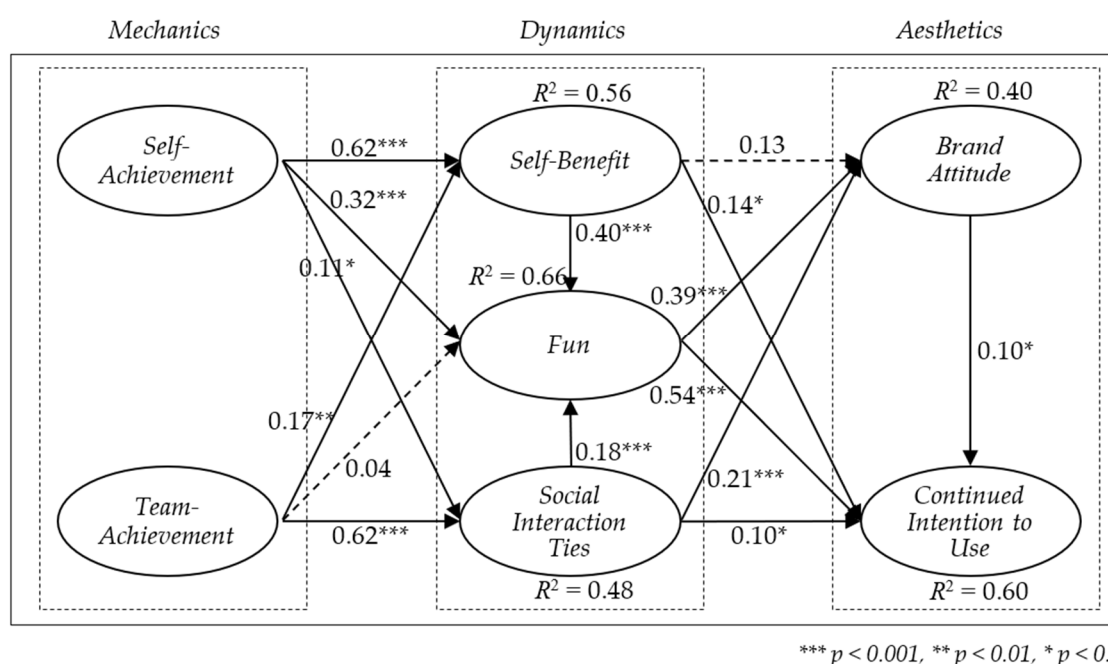


Figure 3. Results of the structural model.

### 5.3. The Influence on Different Groups

The sample was further divided into two groups in accordance with the running age to understand whether there is a significant difference in the path relationship between novice runners (less than 1 year) and experienced runners (more than 1 year). The results are shown in Table 5; Table 6. Other than H2a, H2b, H5a, H5b, and H7b, all other hypothetical tests are valid; for experienced runners, all hypothetical tests are valid, except for H2b, H5a, and H8.

Among the novice runners, Self-Achievement (SA) was shown to be of significance to Self-benefit (SB) and fun. However, SA did not achieve significance in relation to Social Interaction Ties (SIT), showing that the novice runner's circle of friends is not closely connected, and the self-challenge mechanism only allows runners to improve their running ability. Conversely, among experienced runners, SA achieved significance in relation to SB, Fun, and SIT, showing that experienced runners can challenge themselves and allow themselves to constantly break their own records, to experience the fun of running, and to improve health from the activity. Novice runners pay more attention to the pursuit of fun than experienced runners (novice runners  $p < 0.001$ ; experienced runners  $p < 0.01$ ), showing that novice runners value the fun experience in the gamification process.

Of the two groups, Team-Achievement (TA) has a significant impact on SIT, showing that the mechanism of competing amongst team members allows more interaction between them. The closeness of the community motivates the intention to run, increasing confidence and connection. However, the mechanism for TA does not have an impact on Fun, which is achieved through SB and SIT. Running is a monotonous sport, and encouragement from like-minded friends is needed to motivate users to exercise more. Through achievable goals, progress indicators, and encouragement, runners can generate more possibilities for breakthroughs. Experienced runners can enjoy the benefits of sports more than novice runners.

Of the two groups, Fun and SIT achieved significance in relation to Brand Attitude (BA). However, the attitude of SB toward BA did not reach a significant level. In addition, Fun for Continued Intention to Use (CIU) did not achieve significance in either group. Among experienced runners, SB, SIT, and CIU achieved significant levels. Conversely, among novice runners, SB, SIT, and CIU did not achieve significance. BA for CIU achieved significance among novice runners ( $p < 0.05$ ), but did not achieve significance among experienced runners.

**Table 5.** Comparison of the corresponding path coefficients.

Hypothesis	Relationship	Novice Runner Beta (n = 228)	Experienced Runner Beta (n = 183)
H1a	SA→SB	0.649***	0.615***
H1b	SA→FUN	0.367***	0.248**
H1c	SA→SIT	0.089	0.162*
H2a	TA→SB	0.133	0.190*
H2b	TA→FUN	0.018	0.063
H2c	TA→SIT	0.609***	0.601***
H3	SB→FUN	0.378***	0.433***
H4	SIT→FUN	0.198**	0.171*
H5a	SB→BA	0.112	0.145
H5b	SB→CIU	0.145	0.150*
H6a	FUN→BA	0.383***	0.373***
H6b	FUN→CIU	0.501***	0.541***
H7a	SIT→BA	0.229**	0.217**
H7b	SIT→CIU	−0.027	0.245***
H8	BA→CIU	0.171*	0.015

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

**Table 6.** Testing results.

Hypothesis	Relationship	All Results	Novice Runner Result	Experienced Runner Result
H1a	SA→SB	Supported	Supported	Supported
H1b	SA→FUN	Supported	Supported	Supported
H1c	SA→SIT	Supported	Non-Supported	Supported
H2a	TA→SB	Supported	Non-Supported	Supported
H2b	TA→FUN	Non-Supported	Non-Supported	Non-Supported
H2c	TA→SIT	Supported	Supported	Supported
H3	SB→FUN	Supported	Supported	Supported
H4	SIT→FUN	Supported	Supported	Supported
H5a	SB→BA	Non-Supported	Non-Supported	Non-Supported

<b>H5b</b>	SB→CIU	Supported	Non-Supported	Supported
<b>H6a</b>	FUN→BA	Supported	Supported	Supported
<b>H6b</b>	FUN→CIU	Supported	Supported	Supported
<b>H7a</b>	SIT→BA	Supported	Supported	Supported
<b>H7b</b>	SIT→CIU	Supported	Non-Supported	Supported
<b>H8</b>	BA→CIU	Supported	Supported	Non-Supported

## 6. Discussion

### 6.1. Implications for Theory and Research

To enhance the competitive advantages for sustainable development, marketing activities are designed based on creating communicating, and delivering superior value to targeted consumers. The importance of sustainability marketing should emphasize building and maintaining sustainable relationships with consumers and the social environment. Gamification motivates consumers to become more sustainable while entertaining them. In other words, companies are turning to gamification to enhance their sustainability efforts and to try to generate behavior change in consumers and thus increase the stickiness of the brand. This study fills in the knowledge gap and explores how the integration of game dynamics into a brand app contributes to improve users' experience and to boost engagement from the sustainable perspective point of view.

This research adopted the MDA framework as theoretical basis to analyze how game mechanics influence users' gaming behavior (Dynamics) and awaken positive feelings (Aesthetics), so that the stickiness of the brand increases. The main contributions are the following: first, the MDA results show that the features of Self-Achievement (SA) and Team-Achievement (TA) are identified as important indicators of well-designed gamification. Challenges allow users to get instant feedback such as scores, badges, upgrades, and rewards for overcoming obstacles such as levels, tasks, and challenges to perceive a sense of not only self-achievement, but also of Team-Achievement, thus allowing users to have the best experience in the game [38]. Second, the user's game behaviors (Dynamics) are instant responses made after receiving feedback from their gaming operations, which are connected to other game mechanisms to generate different game behaviors (Dynamics). Zichermann and Linder [11] pointed out that the gamification mechanism must establish three foundations: feedback (to let users know their own progress), friends (users' links amongst communities), and fun (entertainment or an amused feeling). The design of Self- and Team-Achievement has various impacts on Fun, Self-Benefit, and Social Interaction Ties. In the gamification design, adding Self- and Team-Achievement will allow users to have fun; additionally, interactions with friends and substantial feedback on Self-Benefit (e.g., gaining health and slimming effects) are all appealing elements in the gamification process.

Aesthetics is the overall feeling that the game presents to the player, which can help the player develop a strong emotional connection with the brand. In this research, we found that fun is the most important factor affecting users' engagement with the gamification process, and entertainment is the most important factor that motivates users. These results are in keeping with the study by Yang et al. [9], in which Fun is influenced by Self-Benefit and Social Interaction Ties. In the context of gamified marketing, a fun-filled experience improves user stickiness; it also affects Brand Attitude and Continued Intention to use. These results agree with the views of Hamari and Koivisto [17,18].

This study investigated the impacts of groups with various levels of experience (running age) on continuous usage of the brand app, and outlined a preliminary image. The results can provide reference for the company to segment the market and to formulate marketing strategies. Bhattacharjee [51] stated that when users believe that they can gain benefits from using a product or through doing a certain behavior, they will continue to use the product or adopt the behavior. This argument was explored by this study and many fundamental insights were provided. The results of this study found that for novice runners, challenging themselves is the main factor that allows them to gain Self-Benefit and Fun. Competing with team members is also an important factor affecting

Social Interaction Ties, showing that members of the community, in order to strive for better results, will increase social interaction with other community members. These results are consistent with the views of [17,18,41]. For experienced runners, well-designed Self- and Team-Achievement mechanics reinforce Self-Benefit, Fun, and Social Interaction experiences. However, the results show that Team-Achievement does not directly generate fun, but rather produces fun through Self Benefit and Social Interaction Ties. Therefore, gamified marketers should design mechanisms such as comparison, sharing, and ranking to encourage user engagement and to improve brand identity.

Novice and experienced runners attach great importance to the entertainment effects obtained during gamification. This part is consistent with the views of Choi and Kim [19]. In the gamification design, it is necessary to integrate players into the game. The more fun and interesting the game is, the more users will continue to use the brand app. Experienced runners are more likely to be affected by Self-Benefit, Fun, and Social Interaction Ties than novice runners and are more likely to continue using the brand app. The continued use intention of novice runners mainly comes from brand attitude. This may be because novice runners have a preconceived bias for the brand. In addition, it may be that their engagement with the brand's app is relatively recent, and they are still in the exploration stage. Therefore, their interaction behavior with the game's mechanics has not yet produced a significant effect. Experienced runners have been engaged in the brand game for a while, and understand the various features of the brand game. Therefore, experienced runners are more likely to gain a sense of accomplishment and to continue to use the brand app.

### 6.2. Implications for Practice

If gamified marketing can be effectively implemented, the brand stickiness of consumers will be increased. However, the success of gamification is not just to increase the fun of the game, but to give equal weight to the elements of gamification, mechanics, and feedback. Fun is the most basic and important element of gamified marketing; in the activities thereof, the content and rewards launched by salespersons must hold consumers' immediate interest, and then allow consumers to indulge in the activities. The design of the mechanics must create incentives, such as fun and appeal, and provide unique feedback, so that consumers can not only enjoy an interesting game, but can also enter into competition unknowingly in pursuit of glory. Only in this way can the stickiness of the brand app be improved to create business benefits, and to contribute to sustainable corporate development.

The era of mobile commerce requires good gamification design mechanics. Each game mechanic implements one or more dynamics elements to stimulate users to make investments, helping them to obtain an inspiring entertainment experience, or in other words, aesthetics. Gamification marketing, when introduced in corporate brand management, deepens the sense of engagement by game playing, and the fun generated attracts more people to choose the brand. This has important implications on the sustainability of corporate brand gamification marketing. The design of gamification mechanics can benefit from these next views. First, the design of different challenge mechanics allows users to gain a sense of accomplishment by comparing themselves to team members. Achievement is the inherent driving force for people to want to make progress, improve their skills, and overcome challenges. In addition, using social features helps create sustainable and engaging gamification. Finally, gamification should create opportunities for Social Interaction Ties and provide immediate feedback and support. Gamification marketing does not just mean designing a game, but also means a way to give users a novel and interesting experience that resembles playing a game. This is also a kind of brand marketing-oriented "gamification." Applying gamified thinking to business marketing strategies can remove many of the negative impacts of promotional advertising on users, thereby improving the consumer experience, driving users to understand brands and products, and enabling users to enjoy the experience.

### 6.3. Limitations and Suggestions

The main limitation of our study lies in the study's sample, with questionnaires intended for 411 NRC app users. Although the NRC app has a wide range of users around the world, due to the

different features of each app, the users show different considerations in their choices. Future studies may apply the model to different companies, as well as brand apps. Such studies should validate, through well-designed experiments, whether the results of this study still hold. Engagement in gamification should take into account internal and external motivations, which were not included in this study. This study was aimed at groups with various running experiences, and explored the differences between various impacts. Although the criteria for separating runner groups are commonplace and conventional, they lack a rigorous academic theoretical basis. In this study, users who had running experience and who used the NRC app were taken as test participants; therefore, the conclusion of this study should not be overgeneralized. With regard to suggestions for future research, since this study explored gaming mechanics from the perspective of making comparisons between Self- and Team-Achievements, discussions around other aspects are therefore found wanting. It is recommended that follow-up studies consider factors such as the influence of feedback, reward, and other variables on game behavior, which is expected to improve the comprehensiveness of this study's research model. Such research should verify whether the results of this study are still held through well-designed experiments.

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## Appendix A: Questionnaire

Construct Definition and Sources	Items
Self-Achievement (SA)	SA1. The Nike Run Club (NRC) app provides me the function of "Comparison with past running results."
	SA2. The NRC app provides me the function of "Breaking past running records."
	SA3. The NRC app provides me the function of "Continuously surpassing past running results."
	SA4. The NRC app provides me the function of "Refreshing past running records."
Team-Achievement (TA)	TA1. The NRC app provides me the function of "Comparison with friends' running results."
	TA2. The NRC app provides me the function of "Surpassing friends' running results."
	TA3. The NRC app provides me the function of "Continuously exceeding friends' running results."
	TA4. The NRC app provides me the function of "Refreshing friends' running records."
Self-Benefit (SB)	SB1. The NRC app helps me stay healthy.
	SB2. The NRC app helps me maintain a good comportment.
	SB3. The NRC app helps me improve my fitness.
	SB4. The NRC app helps me increase my training volume for running.



Fun	Fun1. The NRC app makes me happy. Fun2. The NRC app allows me to have fun. Fun3. I think the NRC app is interesting.
Social Interaction Ties (SIT)	SIT1. The NRC app keeps up my social ties with friends. SIT2. The NRC app keeps me in touch with friends. SIT3. The NRC app helps me maintain communication with friends.
Brand Attitude (BA)	BA1. I like the Nike brand (like/dislike). BA2. The Nike brand has left a good impression on me (positive/negative). BA3. The Nike brand is attractive (appealing/not appealing).
Continued Intention to use (CIU)	CIU1. I plan to continue using the NRC app. CIU2. I will still use the NRC app. CIU3. I will continue to use the NRC app in the future.

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