

## Research Article

# Sports App User Behavior Analysis: Participation Motivation, Satisfaction, and Loyalty

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Received 17 August 2021; Revised 14 November 2021; Accepted 11 March 2022; Published 1 April 2022

Academic Editor: Feiran Huang

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With the development of information technology, high-speed transmission of electronic information resources, and explosive growth of information data, traditional data processing cannot meet the development of the times. With the arrival of the digital age, massive virtual numbers are deeply analyzed to turn the data into understandable information. As a product of the information age, sports app is widely used. With the increase of sports apps, the development of sports apps also has a bottleneck. In this paper, the survey data of sports app users are analyzed and processed by Excel 2016 and SPSS 23.0: (1) descriptive statistics of the research objects through technical statistical analysis; (2) testing the validity and credibility of the data through exploratory factor analysis and confirmatory factor analysis; (3) analysis of variance performed by independent sample t-test, one-way ANOVA, and Duncan's test; (4) analyzing the correlation between factors through correlation analysis; (5) analyzing the influence among factors through multiple regression analysis. The results show that, through variance analysis, sports app users have significant differences in demographic characteristics ( $P < 0.05$ ). Through correlation analysis, the participation motivation, satisfaction, and loyalty of sports app users are highly correlated ( $P < 0.01$ ). Through multiple regression analyses, the participation motivation, satisfaction, and loyalty of sports app users have a significant positive impact ( $P < 0.001$ ). The purpose of this study is to provide theoretical references for the related research and decision-making of sports apps.

## 1. Introduction

With the rise of network and the development of electronic resources, the user behavior of mobile Internet has changed, and the focus of attention has changed from public traffic to private traffic [1, 2]. In August 2015, the State Council formally put forward the Action Plan for Promoting the Development of Big Data. Information technology triggered rapid data growth, and big data had an important impact on economic development and social lifestyle; the survey showed that, by June 2017, the number of netizens in China had reached 751 million and the Internet penetration rate was 54.3%. China's Internet and mobile Internet users are large in scale, and there are obvious advantages in the development and utilization of data resources, deepening the application of big data resources and tapping the potential

value of big data; sports app drives the diversified development of China's sports undertakings [3, 4]. Various kinds of software have appeared one after another, and sports apps have problems such as homogenization of content and reduction of user stickiness, which leads to bottlenecks in the development of sports apps [5]. Based on this, this paper analyzes and processes the survey data by means of variance analysis, correlation analysis, and multiple regression analysis. The purpose of this study is to provide management decisions for sports apps, expand user groups, and develop sports apps.

The research contents include (1) determining the research theme; (2) determining the theoretical index by consulting literature; (3) determining research objects and methods and conducting data investigation; (4) data collection, collation, and induction; (5) testing the

appropriateness and credibility of the data; (6) carrying out difference analysis, correlation analysis, and multiple regression analysis on the data and then verifying the hypothesis; (7) drawing a conclusion.

Sports app plays an important role in the sports industry and plays an important role in promoting the development of the sports industry and social economy; the analysis of user behavior of sports app provides decision support for managers and theoretical reference for related research, which is of great significance to the development of sports apps. Our contributions are as follows:

- (1) This paper puts forward the user behavior analysis of sports apps and explores the development direction suitable for sports apps from the perspective of user behavior.
- (2) This paper puts forward three dimensions of research models, background argument (participation motivation), independent argument (satisfaction), and subordinate argument (loyalty), and makes a structured analysis of users.
- (3) The user management decisions and suggestions suitable for the development of sports apps are put forward.

## 2. Theoretical Background

*2.1. Participation Motivation.* The American psychologist Woodworth first applied it to psychology in 1918, and it is considered as the internal power that determines behavior and the psychological tendency or internal drive that stimulates and maintains the action of an organism and leads the action to a certain goal, so as to stimulate an individual to produce a certain behavior [6]. Motivation is a process of giving direction to a clear goal and regulating action [7]. Many unknown factors will appear in the process of regulating actions, and due to personal differences and environmental constraints, there are certain influences on the production process of motivated behaviors [8]. Sports behavior is produced by intrinsic motivation and extrinsic motivation [9]. Intrinsic motivation can be reflected in joy or happiness, the sense of competence, and the desire and self-reinforcement of controlling the environment without external pressure and producing effects on the environment [10]. Therefore, in sports, motivation is generated in order to get compensation, and the behavior to get some compensation is intrinsic motivation, so intrinsic motivation becomes the fun of sports [11]. Intrinsic motivation is happiness, the purpose of intrinsic motivation is a personal internal experience, which is often fully engaged in with joy, the activity itself is completely consistent, and this state of engagement is the best experience [12]. Intrinsic motivation is to experience the happiness or ability generated by the activity chosen by oneself, without external pressure, and to control the environment by oneself [13]. On the contrary, if the execution results of individual activities fail, negative effects will be triggered, thus reducing the intrinsic motivation of participating in activities [14]. Extrinsic motivation is the process of engaging in activities under external

interference and pressure. Extrinsic motivation is an action adjusted by external resources compensated by others [15]. For example, physical activity in order to improve health and regulate weight can be described as extrinsic motivation. Therefore, extrinsic motivation can be said to be the behavior produced in the nonnatural state of human socialization [16]. If participation in physical activity is controlled by external compensation such as health or bonus, the activity generated in this state is extrinsic motivation. Extrinsic motivation refers to the use of a certain motivation as an end and means or external pressure and interference [17]. Extrinsic motivation and intrinsic motivation are often opposite; on the one hand, it shows the external incentive effect, and on the other hand, it shows the internal independent advantage, which not only oppose each other but also interact with each other [18].

Sports app participation motivation is divided into two aspects: internal motivation and external motivation; internal motivation includes happiness, sense of achievement, and experience, while external motivation is manifested in physical health and social motivation. Every behavior needs to be expressed in the form of motivation, and there is a very close relationship between behavior and motivation [19]. By participating in the research on motivation, we can accurately understand the reasons why users choose sports apps and provide accurate service positioning and promotion for sports apps.

*2.2. Satisfaction.* Satisfaction degree is determined by the purchase of goods or services, which can be determined in the process of obtaining goods or experiencing services [20]. However, in the definition of satisfaction, it can easily be described simply as being satisfied with customers or providing good service to customers. Satisfaction is defined by desire satisfaction, joy, cognitive state, attributes, benefit evaluation, and subjective evaluation of experience. Similarly, in the process of company operation, the company should not simply focus on company operation but change to focus on customer operation so that the company can develop for a long time [21]. The following is the researchers' definition of satisfaction; customers make a comparative evaluation according to the expected value and the performance of receiving, that is to say, the emotional response of customers to the experience value when purchasing goods or receiving services, and this emotional response is the satisfaction degree of customers [22]. Customer satisfaction is defined as the difference between the expected value felt by customers and the actual evaluation in the process of purchasing goods or services, which is called the satisfaction degree of products or services [23]. Different consumers have different evaluation responses to cognitive or emotional value judgments of stimuli given in the process of commodity use and service according to the value-oriented judgment criteria in the empirical process and results [24]. The importance of customer satisfaction degree has been confirmed by existing studies; customer satisfaction degree refers to the feeling of customers in the process of experiencing or using products; to some extent, such feeling

emotion is the comparison of customers' feeling of using products.

Satisfaction is an important factor of behavior [25]. The satisfaction of sports app users is mainly reflected in browsing satisfaction and using satisfaction, which includes happy mood, happiness, and spiritual satisfaction, while using satisfaction is more reflected in the satisfaction of user experience process, product function, and experience result. Through satisfaction, we can know the user's feeling of using sports apps and can improve product performance.

**2.3. Loyalty.** Customer loyalty is defined as those loyal customers who may reduce their exploration of other products and increase their active word-of-mouth activities to other consumers [26]. With the deepening of research, some researchers proposed that customer loyalty should be measured through multiple items [27]. Research has been widely recognized; especially recently, the view that customer loyalty is not limited to a certain aspect of action or attitude but should be considered from both aspects of action and attitude has been supported [28]. Scholars have divided customer loyalty into attitude level and action level; in terms of attitude, they advocate cognitive, emotional, and intentional loyalty; cognitive loyalty is the first stage of loyalty, which is the pure liking state of customers for a specific product, and also the initial stage of loyalty [29]. Attitudinal loyalty refers to customers' willingness to use existing services and their attitude to use the same services in the future during the process of information collection and comparison [30]. Research shows that customers with high loyalty often choose specific websites and stay on network platforms for a longer time [31]. The arrival of the age of the Internet accelerated the competition between enterprises; the existing electric business platform would focus on loyal customers and pay attention to the be fond of loyal customers; this behavior would lead to transmission effect of loyal customers; under the effect of oral loyal customer, new customers of viscous and loyalty are very high also, resulting in the development of positive effect, thus improving the existing customer loyalty, not only for traditional offline operations but also for the development of online cloud platforms.

Loyalty is a process of behavior, showing a process of biased behavior [32]. The arrival of the Internet era accelerates the competition among existing enterprises; the e-commerce platform will focus on loyal customers and pay attention to their preferences; this behavior will promote the oral effect of loyal customers; under the influence of the oral effect of loyal customers, the stickiness and loyalty of new customers are also very high, which will bring about positive development effects. Therefore, improving the loyalty of existing customers is very important not only for traditional offline operations but also for the development of online cloud platforms.

**2.4. Behavior Analysis.** User behavior plays a very important role in the development of online social network [33], but the competition of application stores is very fierce at present, and each country has different needs and priorities for

application stores, so developers need to meet the needs of all users, which will be an arduous task [34]. In order to promote the development of online green behavior, users are analyzed from the aspects of user perception and social responsibility; the research results show that intrinsic participation motivation has the greatest influence on users' behavior intention [35]. Some researchers have pointed out that green consumption habits are the main factor in creating the environment in the green grid, and the concept of green design is integrated into the design of application software to guide consumers to spend green [36–38]. Relevant research suggests that, for Chinese users, the survey of users through questionnaires can accurately reflect the needs of users [39]. Based on this, in order to understand the characteristics of users' behaviors, eliminate potential internal threats, and analyze users' behaviors, this study investigated and analyzed the data of sports app users from three aspects: participation motivation, satisfaction, and loyalty.

**2.5. Research Framework and Hypothesis.** By combining the literature, we can know that there is a close relationship between user behavior and participation motivation, satisfaction, and loyalty. In other words, participation motivation, satisfaction, and loyalty can reflect user behavior. In the research on participation motivation and satisfaction degree, researchers indicated that there was a static influence relationship between participation motivation and satisfaction degree [40–43]. Researchers have proved the interaction between participation motivation and loyalty [44]. Customer satisfaction has a positive impact on loyalty, and the higher the benefit, the higher the customer loyalty [45, 46]. According to the existing research, this paper conducts research from three aspects: participation motivation, satisfaction, and loyalty. See Figure 1 for the specific content:

Based on the analysis of the above research, this paper proposes the following hypotheses:

Hypothesis 1: Participation motivation has a significant impact on satisfaction.

Hypothesis 2: Participation motivation has a significant effect on loyalty.

Hypothesis 3: Satisfaction has a significant effect on loyalty.

### 3. Study Design

#### 3.1. Research Model Design

**3.1.1. Factor Analysis.** The mathematical model of factor analysis can be expressed as

$$\begin{cases} x_1 = a_{11}F_1 + a_{12}F_2 + \cdots + a_{1m}F_m \\ x_2 = a_{21}F_1 + a_{22}F_2 + \cdots + a_{2m}F_m \\ \vdots \\ x_p = a_{p1}F_1 + a_{p2}F_2 + \cdots + a_{pm}F_m \end{cases} \quad (1)$$

In the above formula,  $x_1, x_2, \dots, x_p$  is  $P$  original variables, is a standardized variable with a mean of zero, and a

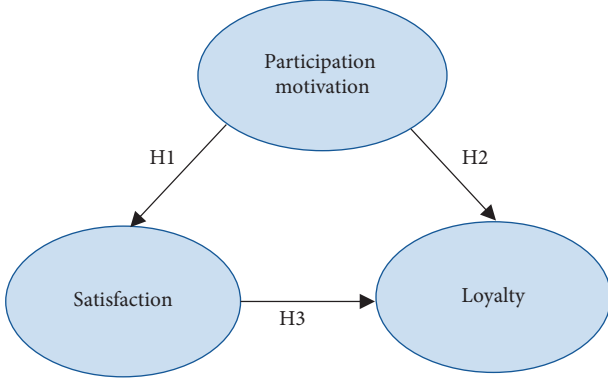


FIGURE 1: Research framework.

standard deviation of 1,  $F_1, F_2, \dots, F_m$  is  $m$  factor variables,  $m$  less than  $P$ , expressed as a matrix as follows:

$$X = AF + a\varepsilon. \quad (2)$$

**3.1.2. Independent Sample T-Test.** The populations of the two independent samples obey  $N(\mu_x, \sigma_x^2)$  and  $N(\mu_y, \sigma_y^2)$ ; given that our null hypothesis is true, the independent sample  $t$ -test uses  $t$  statistics.

When the sample variances are equal, the  $t$  statistic is defined as

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{S_w \sqrt{1/n_1 + 1/n_2}}. \quad (3)$$

$n_1$  and  $n_2$  are two sample sizes, respectively;  $S_1$  and  $S_2$  are the standard deviation of the two samples. The statistic follows a  $T$  distribution with a degree of freedom of  $n_1 + n_2 - 2$ :

$$S_w^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}. \quad (4)$$

When the sample variances are unequal, the  $t$  statistic is defined as

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{\sqrt{S_1^2/n_1 + S_2^2/n_2}}. \quad (5)$$

**3.1.3. One-Way Analysis of Variance.** One-way ANOVA is used to investigate whether different levels of a control variable cause significant differences and changes in observations.  $F$  tests are performed in order to compute the statistics of  $F$ . The sum of squares of the total variation is SST, and the decomposition is divided into two parts: one part is the deviation caused by the control variable, denoted as SSA; the other part is the deviation caused by the random variable, denoted as SSE. The formula is as follows:

$$SST = SSA + SSE. \quad (6)$$

And

$$SSA = \sum_{i=1}^k n_i (\bar{x}_i - \bar{x})^2. \quad (7)$$

$k$  is horizontal;  $n_i$  is the sample size at the  $i$ th level;  $\bar{x}_i$  is the sample mean of the observed variable at the  $i$  level of the control variable;  $\bar{x}$  is the mean value of the observed variables.

$$SSE = \sum_{i=1}^k \sum_{j=1}^{n_i} (x_{ij} - \bar{x}_i)^2. \quad (8)$$

$x_{ij}$  is the  $j$  sample value of the control variable at the  $i$  level. The sum of squares of intragroup deviations is the sum of squares of the deviations of each data from the mean value of the group at this level, reflecting the magnitude of the sampling error of the data.

The  $F$  statistics are as follows:

$$F = \frac{SSA/(k-1)}{SSE/(n-k)}. \quad (9)$$

As can be seen from the formula, if different levels of the control variables have significant effects on the observed variables, then the sum of squares of the intergroup deviations of the observed variables is larger, and so is the value of  $F$ . On the other hand, if the different levels of the control variables do not have a significant impact on the observed variables, then the influence of the sum of squares of deviations within the group will be smaller, and the  $F$  value will be smaller.

**3.1.4. Correlation Analysis of Two Variables.** Pearson correlation coefficient was used to measure the linear relationship between interval scale variables. The calculation formula is

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}}, \quad (10)$$

where  $r$  represents the correlation coefficient of the sample,  $n$  is the sample number, and  $x_i$  and  $y_i$  are the sample observed value of the two variables.

Pearson correlation coefficient hypothesis test: the null hypothesis of the test is the population correlation coefficient  $\rho = 0$ ; in other words, the correlation coefficient is not significant; under the condition that the null hypothesis is true, the  $t$ -statistic related to the sample correlation coefficient  $\gamma$  follows a  $T$  distribution with freedom of  $(n-2)$ :

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}. \quad (11)$$

Based on the observed value of the  $t$ -test statistic and the corresponding significance probability  $P$  value, the significance of the correlation coefficient was judged according to the  $P$  value.

**3.1.5. Linear Regression Analysis.** The unary linear regression model is a linear regression model with only one explanatory variable, which is used to express the linear relationship between the explained variable and another explanatory variable. Its mathematical model is

$$y = \beta_0 + \beta_1 x + \varepsilon. \quad (12)$$

The linear regression equation with one variable is

$$E(y) = \beta_0 + \beta_1 x. \quad (13)$$

Multiple linear regression model, a linear regression model containing multiple explanatory variables, is used to explain the linear relationship between the explained variable and other variables. Its mathematical model is

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p + \varepsilon. \quad (14)$$

The following formula is a linear model of  $P$  element, and there are  $P$  explanatory variables,  $\varepsilon$  is the random error, and  $\beta_0, \beta_1, \dots, \beta_p$  are the unknown parameters in the model, which is the regression constant and the partial regression coefficient, respectively. The regression equation of the multiple linear regression model is

$$E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p. \quad (15)$$

**3.2. Research Methods.** Research object: taking the users of the sports apps as the research object, the research is carried out in the form of an online questionnaire. A total of 420 questionnaires were sent out, all of them were collected, and 400 were valid.

Data source: based on the questionnaire method, the research was carried out by means of an online questionnaire. In addition to invalid questionnaires, valid questionnaires were selected as the final research samples, and Excel 2016 was used for data statistics.

Data processing: use Excel 2016 for data statistics. SPSS 23.0 was used for reliability and validity analysis, independent sample  $T$ -test, one-way (ANOVA), Duncan test, correlation analysis, and multiple regression analysis.

Data analysis software requirements are Excel 2016 and SPSS 23.0.

Questionnaire composition: the measurement variables of the questionnaire include participation motivation, satisfaction, loyalty, and general population; among them, participation motivation atmosphere includes internal motivation and external motivation; satisfaction includes browsing satisfaction and service satisfaction; loyalty includes action loyalty and attitude loyalty; the number of questions amounted to 28. See Table 1 for detailed project contents and sources.

**3.3. Adequacy and Reliability of Measurement Variables.** Adequacy refers to the degree to which the measured variable is faithful and the degree to which the theory is interpreted and supported according to the suitability of the inspection purpose and tools. In this study, exploratory

factor analysis was used to verify the feasibility of the project, and principal component analysis was used to extract factors; the factor load standard reflecting the relationship between variables and factors was above 0.4. Using KMO and Bartlett's spherical test, generally, the KMO value above 0.9 is more suitable for factor analysis, and the KMO value below 0.5 is not suitable for factor analysis.

Reliability focuses on the accuracy of measurement and consistency of results. In order to improve the reliability, Cronbach's  $\alpha$  is usually used for verification. Cronbach's  $\alpha$  coefficient is 0~1; if the measurement result is above 0.6, the reliability is high.

**3.3.1. Validity and Reliability Test of Participation Motivation.** There are two main components in the validity and reliability test of participation motivation; see Table 2 for the specific contents. Bartlett's spherical test results  $\chi^2 = 1647.656$  ( $df = 21$ ;  $P = 0.000$ ). The KMO value is 0.924. The factor load of internal motivation was 0.755~0.830, the intrinsic value was 3.067, and the variance was 43.820%. The factor load of external motivation was 0.568~0.896, the intrinsic value was 2.111, and the variance was 30.155%. The cumulative variance of the two principal components was 73.975%. Cronbach's  $\alpha$  of the internal motivation is 0.883, and Cronbach's  $\alpha$  of the external motivation is 0.815. Both principal components show high reliability.

**3.3.2. Validity and Reliability Test of Satisfaction.** There are two main components in the validity and reliability test of satisfaction; see Table 3 for the specific contents. Bartlett's spherical test results  $\chi^2 = 3230.239$  ( $df = 36$ ;  $P = 0.000$ ); KMO value is 0.939. The factor load of browsing satisfaction was 0.668~0.818, the intrinsic value was 3.963, and the variance was 44.032%. The factor load of service satisfaction was 0.765~0.834, the intrinsic value was 3.123, and the variance was 34.695%. The cumulative variance of the two principal components was 78.727%. Cronbach's  $\alpha$  of the browsing satisfaction is 0.938, and Cronbach's  $\alpha$  of the service satisfaction is 0.819. Both principal components show high reliability.

**3.3.3. Validity and Reliability Test of Loyalty.** There are two main components in the validity and reliability test of loyalty; see Table 4 for the specific contents. Bartlett's spherical test results  $\chi^2 = 2471.672$  ( $df = 28$ ;  $P = 0.000$ ); KMO value is 0.914. The factor load of action loyalty was 0.644~0.887, the intrinsic value was 3.354, and the variance was 41.930%. The factor load of attitude loyalty was 0.596~0.883, the intrinsic value was 2.873, and the variance was 35.908%. The cumulative variance of the two principal components was 77.838%. Cronbach's  $\alpha$  of the action loyalty is 0.925, and Cronbach's  $\alpha$  of the attitude loyalty is 0.836. Both principal components show high reliability.

**3.4. Research Ideas.** Research contents include the following: (1) carry out technical statistical analysis on the data of the

TABLE 1: The composition of the questionnaire.

Measured variables	Factors	Problem of content	Question number	Source
Participation motivation	Internal motivation	Happiness, technology, a sense of accomplishment, and new experiences	4	Seong, B.H.; Choi, Y.S. (2019); Moradi, J. (2017)
	External motivation	Physical state, improved health, and social interaction	3	
Satisfaction	Browsing satisfaction	Happy mood, happiness, choice, educational satisfaction, spiritual satisfaction, and physical satisfaction	6	Yi, X. et al. (2018); Michalovic, E. (2019)
	Service satisfaction	Experience the process, experience the results, and function	3	
Loyalty	Action loyalty	Positive advice, recommendation, loyalty, trust, and best choice	5	Tanford, S.; Jung, S. (2017); Nguyen, H.T. et al.(2018)
	Attitude loyalty	Buy again (2); buy again	3	
General population	Statistical properties	Sex, age, education, and occupation	4	
Total			28	

TABLE 2: Appropriateness and trustworthiness of participation motivation were tested.

Problems	Composition	
	Internal motivation	External motivation
1. Browsing the sports cloud can improve your skills	0.830	0.244
2. Browsing the sports cloud platform brings me happiness	0.777	0.365
3. Bring a sense of achievement through learning on the sports cloud platform	0.764	0.408
4. The sports cloud platform brings new experience	0.755	0.361
7. Sports apps build social networks	0.253	0.896
5. Sports apps can cultivate interest in learning	0.485	0.705
6. Sports apps can promote health	0.566	0.568
Intrinsic value	3.067	2.111
Variance (%)	43.820	30.155
Cumulative variation (%)	43.820	73.975
Reliability	0.883	0.815

KMO = 0.924; Bartlett's test  $\chi^2 = 1647.656$  ( $df = 21$ ;  $P = 0.000$ ).

TABLE 3: Appropriateness and trust test of satisfaction.

Problems	Composition	
	Browsing satisfaction	Service satisfaction
2. Browsing the sports cloud platform makes me happy	0.818	0.375
4. The sports cloud platform can produce educational satisfaction	0.810	0.329
3. Satisfied with the choice of sports cloud platform	0.768	0.468
5. The sports cloud platform produces spiritual satisfaction	0.750	0.456
1. Browsing the sports cloud platform makes me happy	0.714	0.498
6. The sports cloud platform generates physical satisfaction	0.668	0.522
9. I am satisfied with the functions of the sports cloud platform	0.371	0.834
7. The experience of the sports cloud platform makes me feel satisfied	0.435	0.804
8. I am satisfied with the experience results of the sports cloud platform	0.449	0.765
Intrinsic value	3.963	3.123
Variance (%)	44.032	34.695
Cumulative variation (%)	44.032	78.727
Reliability	0.938	0.819

KMO = 0.939; Bartlett's test  $\chi^2 = 3230.239$  ( $df = 36$ ;  $P = 0.000$ ).

TABLE 4: Appropriateness and trustworthiness test of loyalty.

Problems	Composition	
	Action loyalty	Attitude loyalty
1. Talk to others about the sports cloud platform I use	0.887	0.246
2. I will recommend the sports cloud platform I use to others	0.874	0.274
3. Very loyal to the sports cloud platform used	0.724	0.492
4. I have great trust in the functionality of the sports cloud platform	0.662	0.552
5. The sports cloud platform I use is my best choice	0.644	0.601
6. Will not consider other sports cloud platforms	0.218	0.883
7. The sports cloud platform is the best used	0.352	0.833
8. Reuse after interruption	0.505	0.596
Intrinsic value	3.354	2.873
Variance (%)	41.930	35.908
Cumulative variation (%)	41.930	77.838
Reliability	0.925	0.836

KMO = 0.914; Bartlett's test  $\chi^2 = 2471.672$  ( $df = 28$ ;  $P = 0.000$ ).

research object; (2) exploratory factor analysis and confirmatory factor analysis were conducted to verify the validity and reliability of the measured variables, and Cronbach's  $\alpha$  coefficient was calculated; (3) the differences of the measured variables were analyzed by independent sample  $t$ -test and one-way ANOVA and Duncan's test was used for post-identification; (4) the correlation between measured variables was determined by correlation analysis; (5) the interaction between variables was measured by multiple regression analysis. The specific process is shown in Figure 2.

## 4. Analyze the Results

**4.1. Analysis of Demographic Characteristics.** According to the demographic characteristics of sports apps users, there are 174 males (43.5%) and 226 females (56.5%), and the number of female users is significantly higher than that of male users; 259 users (64.75%) were from 18 to 23 years old, accounting for the highest proportion, 56 users (14%) were from 24 to 30 years old, and 64 users (16%) were from 31 to 50 years old; 12 users (3%) were over 50 years old, and 9 users (2.25%) were under 18 years old; 317 students (79.25%) had bachelor's degree, 45 students (11.25%) had high school education or below, 23 students (5.75%) had master's education, and 15 students (3.75%) had doctor's education. There are 278 students (69.5%), 20 freelancers (5%), 36 employees (9%), 39 civil servants (9.75%), and 27 (6.75%) who use sports apps. See Table 5 for specific contents.

### 4.2. Technical Statistical Analysis

**4.2.1. The Difference of Participation Motivation in Demographic Characteristics.** In the gender group, there was a significant difference in internal motivation ( $P < 0.05$ ), but there was no significant difference in external motivation ( $P > 0.05$ ). There was no significant difference between internal motivation and external motivation in age group ( $P > 0.05$ ). There was no significant difference between internal motivation and external motivation in the education group ( $P > 0.05$ ), and there was no significant difference between internal motivation and external motivation in the

occupational group ( $P > 0.05$ ). See Table 6 for specific contents. The test results of reliability and validity of participation motivation show that both internal motivation and external motivation show high reliability and validity. The research results of Im show that there are significant differences in internal motivation between genders, and male motivation is higher than female motivation, and there is no significant difference between internal motivation and external motivation in age and educational background, which is consistent with the research results [47]. In addition, Lee research shows that there is no difference in external motivation between sexes [48]. The research results of Choi show that there is no gender difference in participation motivation [49]. The research results of Kim show that there is no difference in career participation motivation, which is consistent with the research results [50].

**4.2.2. The Difference of Satisfaction in Demographic Characteristics.** In the gender group, there was a significant difference in browsing satisfaction ( $P < 0.05$ ); the mean value of males ( $M = 3.87$ ) was higher than that of females ( $M = 3.85$ ), but there was no significant difference in service satisfaction ( $P > 0.05$ ). Among age groups, there was no significant difference in browsing satisfaction ( $P > 0.05$ ), but there was a significant difference in service satisfaction ( $P < 0.05$ ), mean ( $M = 4.28$ ) for people over 50 years old, and mean ( $M = 4.07$ ) for people between 24 and 30 years old. The mean values for those under 18 years ( $M = 4.07$ ) and those between 31 and 50 years ( $M = 4.02$ ) were higher than those between 18 and 23 years ( $M = 3.80$ ). There was no significant difference between browsing satisfaction and service satisfaction in the educational background group ( $P > 0.05$ ). There was no significant difference between browsing satisfaction and service satisfaction among occupational groups ( $P > 0.05$ ). See Table 7 for specific contents. The test results of reliability and validity of satisfaction show that both browsing satisfaction and using satisfaction show high reliability and validity. The research results of Choi show that there is no difference in gender, but there is a difference in age, which is partially consistent with the research results [49]. The research results of Kang show that there is no

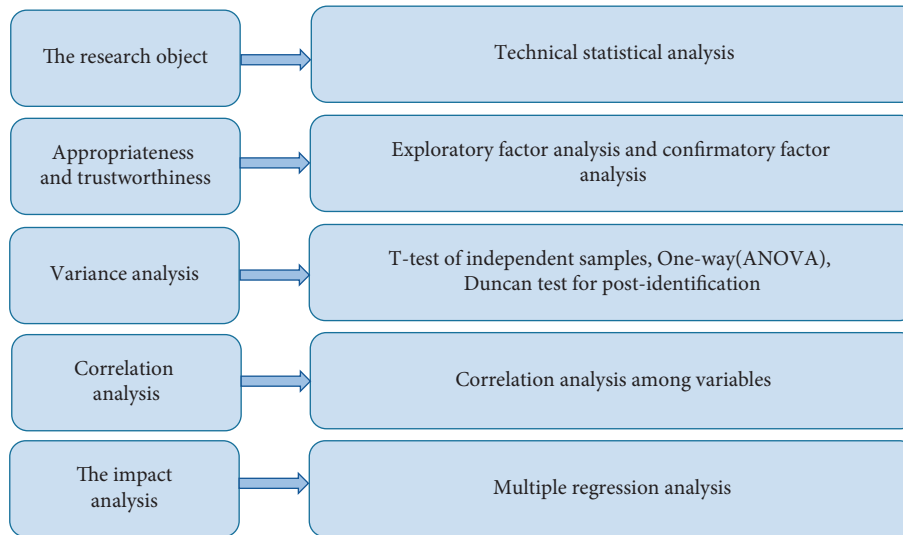


FIGURE 2: The research process.

TABLE 5: Demographic characteristics.

Variable	Problem	Frequency	Ratio (%)
Gender	Male	174	43.50
	Female	226	56.50
Age	Under the age of 18	9	2.25
	18 to 23 years old	259	64.75
	24 to 30 years old	56	14.00
	31 to 50 years old	64	16.00
	Age more than 50 years	12	3.00
Education background	Senior high school and below	45	11.25
	Undergraduate course	317	79.25
	Master's degree	23	5.75
	Doctor	15	3.75
Professional	Students	278	69.50
	Freelance	20	5.00
	Enterprise staff	36	9.00
	Civil servants	39	9.75
	Others	27	6.75
Total		400	100

difference in satisfaction in educational background [51]. The research results of Jin show that there are gender differences in satisfaction, which is consistent with the research results [52].

**4.2.3. The Difference of Loyalty in Demographic Characteristics.** In the gender group, the difference of action loyalty was significant ( $P < 0.01$ ); the mean value of females ( $M = 3.76$ ) was higher than that of males ( $M = 3.73$ ), but the difference of attitude loyalty was not significant ( $P > 0.05$ ). In the age group, the difference of action loyalty was significant ( $P < 0.05$ ); the mean value of 24 to 30 years old ( $M = 3.94$ ) was higher than that of 18 to 23 years old ( $M = 3.66$ ), but the difference of attitude loyalty was not significant ( $P > 0.05$ ). In the educational background group, the operational loyalty showed significant difference ( $P < 0.05$ ); the mean value of

master ( $M = 3.97$ ) and high school and below ( $M = 3.97$ ) was higher than the mean value of doctor ( $M = 3.39$ ); the attitude loyalty showed significant difference ( $P < 0.01$ ); the mean value of high school and below ( $M = 3.75$ ) and the mean values for masters ( $M = 3.54$ ) and undergraduates ( $M = 3.51$ ) were higher than those for doctor ( $M = 2.98$ ). There was no significant difference between action loyalty and attitude loyalty among occupational groups ( $P > 0.05$ ). See Table 8 for specific contents. The reliability and validity test results show that both action loyalty and attitude loyalty show high reliability and validity. The research results of Yoon show that loyalty has significant differences in gender and educational background, which is consistent with the research results [53]. The research results of Roh show that there is no significant difference in loyalty in career [54]. The research results of Kim show that loyalty is different in gender and age, which is consistent with the research results [50].



TABLE 6: Differences in the demographic characteristics of participation motivation.

Content	Participation motivation				
	Internal motivation		External motivation		
	M	SD	M	SD	
Gender	Male	3.90	0.820	4.03	0.754
	Female	3.90	0.645	4.03	0.616
	<i>t</i> -value ( <i>p</i> )	0.965* (0.031)		0.992 (0.064)	
Age	Under the age of 18	4.00	0.515	3.96	0.655
	18 to 23 years old	3.83	0.751	3.97	0.697
	24 to 30 years old	4.05	0.746	4.12	0.689
	31 to 50 years old	4.05	0.625	4.15	0.611
	Age more than 50 years	4.00	0.489	4.17	0.522
		<i>F</i> -value ( <i>p</i> )	2.094 (0.081)		1.333 (0.257)
Education background	Senior high school and below	4.09	0.552	4.22	0.640
	Undergraduate course	3.87	0.753	4.00	0.695
	Master's degree	4.14	0.563	4.14	0.501
	Doctor	3.67	0.673	3.84	0.589
		<i>F</i> -value ( <i>p</i> )	2.608 (0.051)		2.002 (0.113)
Professional	Students	3.87	0.698	3.99	0.674
	Freelance	3.89	0.999	4.25	0.648
	Enterprise staff	3.83	0.834	4.05	0.777
	Civil servants	4.16	0.715	4.15	0.741
	Others	4.00	0.565	4.15	0.465
		<i>F</i> -value ( <i>p</i> )	1.532 (0.192)		1.429 (0.223)

Duncan: a &lt; b.

TABLE 7: Differences in satisfaction in demographic characteristics.

Content	Satisfaction				
	Browsing satisfaction		Service satisfaction		
	M	SD	M	SD	
Gender	Male	3.87	0.819	3.92	0.795
	Female	3.85	0.683	3.87	0.716
	<i>t</i> -value ( <i>p</i> )	0.799* (0.048)		0.588 (0.227)	
Age	Under the age of 18	4.00	0.726	4.07 <sup>b</sup>	0.547
	18 to 23 years old	3.79	0.771	3.80 <sup>a</sup>	0.779
	24 to 30 years old	4.03	0.626	4.07 <sup>b</sup>	0.687
	31 to 50 years old	3.95	0.749	4.02 <sup>b</sup>	0.705
	Age more than 50 years	4.03	0.481	4.28 <sup>b</sup>	0.372
		<i>F</i> -value ( <i>p</i> )	1.760 (0.136)		3.286* (0.011)
Education background	Senior high school and below	3.95	0.716	4.02	0.747
	Undergraduate course	3.85	0.745	3.86	0.767
	Master's degree	4.09	0.613	4.12	0.565
	Doctor	3.57	0.930	3.78	0.600
		<i>F</i> -value ( <i>p</i> )	1.736 (0.159)		1.408 (0.240)
Professional	Students	3.81	0.747	3.83	0.735
	Freelance	4.07	0.866	4.10	0.999
	Enterprise staff	3.88	0.744	3.94	0.876
	Civil servants	4.02	0.767	4.09	0.696
	Others	3.96	0.546	4.02	0.514
		<i>F</i> -value ( <i>p</i> )	1.285 (0.275)		1.727 (0.143)

Duncan: a &lt; b.

4.3. Correlation Analysis of Participation Motivation, Satisfaction, and Loyalty. The internal motivation ( $r=0.764$ ;  $P<0.01$ ) was positively correlated with browsing satisfaction, the external motivation ( $r=0.769$ ;  $P<0.01$ ) was positively correlated with browsing satisfaction, the

internal motivation ( $r=0.732$ ;  $P<0.01$ ) was positively correlated with service satisfaction, and the external motivation ( $r=0.743$ ;  $P<0.01$ ) was positively correlated with service satisfaction. Internal motivation ( $r=0.723$ ;  $P<0.01$ ) showed a positive correlation with action loyalty,

TABLE 8: Loyalty differences in demographic characteristics.

Content		Loyalty			
		Action loyalty		Attitude loyalty	
		M	SD	M	SD
Gender	Male	3.73	0.875	3.58	.821
	Female	3.76	0.704	3.46	.714
	<i>t</i> -value ( <i>p</i> )	0.766** (0.003)		00.122 (0.055)	
Age	Under the age of 18	3.96 <sup>ab</sup>	0.639	3.56	.471
	18 to 23 years old	3.66 <sup>a</sup>	0.802	3.44	.790
	24 to 30 years old	3.94 <sup>b</sup>	0.697	3.66	.683
	31 to 50 years old	3.86 <sup>ab</sup>	0.775	3.64	.754
	Age more than 50 years	4.00 <sup>ab</sup>	0.609	3.69	.627
	<i>F</i> -value ( <i>p</i> )	2.529* (0.040)		10.707 (0.147)	
Education background	Senior high school and below	3.97 <sup>b</sup>	0.783	3.75 <sup>b</sup>	.686
	Undergraduate course	3.72 <sup>ab</sup>	0.783	3.51 <sup>b</sup>	.773
	Master's degree	3.97 <sup>b</sup>	0.599	3.54 <sup>b</sup>	.723
	Doctor	3.39 <sup>a</sup>	0.837	2.98 <sup>a</sup>	.597
	<i>F</i> -value ( <i>p</i> )	3.072* (0.028)		30.983** (00.008)	
Professional	Students	3.68	0.770	3.46	0.757
	Freelance	4.02	0.956	3.93	0.799
	Enterprise staff	3.78	0.864	3.62	0.809
	Civil servants	3.93	0.753	3.57	0.798
	Others	3.91	0.621	3.59	0.602
	<i>F</i> -value ( <i>p</i> )	1.942 (0.103)		20.246 (0.064)	

Duncan: a < b.

external motivation ( $r = 0.724$ ;  $P < 0.01$ ) showed a positive correlation with action loyalty, internal motivation ( $r = 0.625$ ;  $P < 0.01$ ) showed a positive correlation with attitude loyalty, and external motivation ( $r = 0.633$ ;  $P < 0.01$ ) was positively correlated with attitude loyalty. In the satisfaction degree, browsing satisfaction ( $r = 0.787$ ;  $P < 0.01$ ) showed a positive correlation with action loyalty, service satisfaction ( $r = 0.807$ ;  $P < 0.01$ ) showed a positive correlation with action loyalty, browsing satisfaction ( $r = 0.635$ ;  $P < 0.01$ ) showed a positive correlation with attitude loyalty, and service satisfaction ( $r = 0.633$ ;  $P < 0.01$ ) was positively correlated with attitude loyalty. See Table 9 for specific contents. The research results of Shin show that participation motivation has a positive correlation with satisfaction [55]. The research results of Yoon show that satisfaction has a positive correlation with loyalty [53]. The results of Kim show that there is a positive correlation with participation motivation, satisfaction, and loyalty, which is consistent with the results of this study [50].

#### 4.4. Hypothesis Testing

H1: Participation motivation has a significant impact on satisfaction.

H1-1. Participation motivation has a significant positive impact on browsing satisfaction.

In terms of independent variables, internal motivation ( $\beta = 0.417$ ;  $p < 0.001$ ) and external motivation ( $\beta = 0.443$ ;  $p < 0.001$ ) had a positive effect of 65.8% on browsing satisfaction, and multiple regression analysis showed high

research significance ( $F = 310.307$ ;  $p < 0.001$ ). See Table 10 for specific contents.

H1-2. Participation motivation has a significant positive impact on service satisfaction.

In terms of independent variables, internal motivation ( $\beta = 0.388$ ;  $p < 0.001$ ) and external motivation ( $\beta = 0.439$ ;  $p < 0.001$ ) had a positive effect of 60.8% on service satisfaction, and multiple regression analysis showed high research significance ( $F = 383.988$ ;  $p < 0.001$ ). See Table 11 for specific contents.

Studies by Kim and Shin show that participation motivation has a significant positive impact on satisfaction, which is consistent with the results of this study [50, 55].

H2: Participation motivation has a significant impact on loyalty.

H2-1. Participation motivation has a significant positive effect on action loyalty.

In terms of independent variables, internal motivation ( $\beta = 0.402$ ;  $p < 0.001$ ) and external motivation ( $\beta = 0.410$ ;  $p < 0.001$ ) had a positive effect of 58.5% on action loyalty, and multiple regression analysis showed high research significance ( $F = 282.607$ ;  $p < 0.001$ ). See Table 12 for specific contents.

H2-2. Participation motivation has a significant positive effect on attitude loyalty.

In terms of independent variables, internal motivation ( $\beta = 0.335$ ;  $p < 0.001$ ) and external motivation ( $\beta = 0.370$ ;  $p < 0.001$ ) had a positive effect of 44.1% on attitude loyalty, and multiple regression analysis showed high research significance ( $F = 158.379$ ;  $p < 0.001$ ). See Table 13 for details.

TABLE 9: Involvement motivation, satisfaction, and loyalty were examined.

Composition	Participation motivation		Satisfaction		Loyalty	
	Internal motivation	External motivation	Browsing satisfaction	Service satisfaction	Action loyalty	Attitude loyalty
Participation motivation	Internal motivation	1				
	External motivation	0.783**	1			
Satisfaction	Browsing satisfaction	0.764**	0.769**	1		
	Service satisfaction	0.732**	0.743**	0.841**	1	
Loyalty	Action loyalty	0.723**	0.724**	0.787**	0.807**	1
	Attitude loyalty	0.625**	0.633**	0.635**	0.633**	0.769**

\*\* $p < 0.01$ .

TABLE 10: The influence of participation motivation on browsing satisfaction.

Independent variable	Dependent variable: browsing satisfaction				
	B	SE	$\beta$	t	p
(Constant)	0.237	0.134		1.771	0.077
Internal motivation	0.428	0.048	0.417	8.866***	0.000
External motivation	0.485	0.052	0.443	9.405***	0.000
$R^2 = 0.659$ ; Adj. $R^2 = 0.658$ ; $F$ -value = 310.307***; $p = 0.000$					

\*\*\* $p < 0.001$ .

TABLE 11: The influence of participation motivation on user satisfaction.

Independent variable	Dependent variable: service satisfaction				
	B	SE	$\beta$	t	p
(Constant)	0.370	0.144		2.562*	0.011
Internal motivation	0.402	0.052	0.388	7.710***	0.000
External motivation	0.485	0.056	0.439	8.712***	0.000
$R^2 = 0.610$ ; Adj. $R^2 = 0.608$ ; $F$ -value = 383.988***; $p = 0.000$					

\* $p < 0.05$ ; \*\*\* $p < 0.001$ .

The results of Kim and Lee show that participation motivation has a significant positive impact on loyalty, which is consistent with the results of this study [50, 56].

H3: Satisfaction has a significant impact on loyalty.

H3-1. Satisfaction has a significant positive influence on action loyalty.

In terms of independent variables, browsing satisfaction ( $\beta = 0.368$ ;  $p < 0.001$ ) and service satisfaction ( $\beta = 0.498$ ;  $p < 0.001$ ) had a 69.0% positive effect on action loyalty, and multiple regression analysis showed a high research significance ( $F = 444.301$ ;  $p < 0.001$ ). See Table 14 for details.

H3-2. Satisfaction has a significant positive influence on attitude loyalty.

In terms of independent variables, browsing satisfaction ( $\beta = 0.352$ ;  $p < 0.001$ ) and service satisfaction ( $\beta = 0.337$ ;  $p < 0.001$ ) had a 43.4% positive effect on attitude loyalty, and multiple regression analysis showed high research significance ( $F = 153.897$ ;  $p < 0.001$ ). See Table 15 for details.

TABLE 12: The influence of participation motivation on action loyalty.

Independent variable	Dependent variable: action loyalty				
	B	SE	$\beta$	t	p
(Constant)	0.153	0.155		0.992	0.322
Internal motivation	0.433	0.056	0.402	7.756***	0.000
External motivation	0.472	0.060	0.410	7.919***	0.000
$R^2 = 0.587$ ; Adj. $R^2 = 0.585$ ; $F$ -value = 282.607***; $p = 0.000$					

\*\*\* $p < 0.001$ .

TABLE 13: The influence of participation motivation on attitudinal loyalty.

Independent variable	Dependent variable: attitude loyalty				
	B	SE	$\beta$	t	p
(Constant)	0.460	0.175		2.625**	0.009
Internal motivation	0.353	0.063	0.335	5.579***	0.000
External motivation	0.416	0.068	0.370	6.154***	0.000
$R^2 = 0.444$ ; Adj. $R^2 = 0.441$ ; $F$ -value = 158.379***; $p = 0.000$					

\*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

TABLE 14: The effect of satisfaction on loyalty to action.

Independent variable	Dependent variable: action loyalty				
	B	SE	$\beta$	t	p
(Constant)	0.235	0.120		1.959	0.051
Browsing satisfaction	0.387	0.054	0.368	7.139***	0.000
Service satisfaction	0.519	0.054	0.498	9.658***	0.000
$R^2 = 0.691$ ; Adj. $R^2 = 0.690$ ; $F$ -value = 444.301***; $p = 0.000$					

\*\*\* $p < 0.001$ .

TABLE 15: The effect of satisfaction on attitudinal loyalty.

Independent variable	Dependent variable: attitude loyalty				
	B	SE	$\beta$	t	p
(Constant)	0.787	0.158		4.974***	0.000
Browsing satisfaction	0.361	0.071	0.352	5.056***	0.000
Service satisfaction	0.343	0.071	0.337	4.839***	0.000
$R^2 = 0.437$ ; Adj. $R^2 = 0.434$ ; $F$ -value = 153.897***; $p = 0.000$					

\*\*\* $p < 0.001$ .

The results of Kim and Yoon show that satisfaction has a significant positive impact on loyalty, which is consistent with the results of this study [50, 53].

## 5. Result, Conclusion, and Suggestion

*5.1. Result.* This research takes participation motivation, satisfaction, and loyalty as the basic research contents and provides basic data for the development of sports apps for the research purpose. It uses the econometric research method to analyze user behavior, and the research results are as follows:

- (1) Technical statistical analysis of participation motivation: there is a significant difference in internal motivation in gender, there is no significant difference in external motivation in gender, there is no significant difference between internal motivation and external motivation in age, education level, and occupation, and the internal motivation of sports apps users is related to gender. Technical statistical analysis of satisfaction degree: there is a significant difference in browsing satisfaction in gender and a significant difference in service satisfaction in age, Male's browsing satisfaction is higher than females, and 18–23 years old's service satisfaction is the lowest. Technical statistical analysis of loyalty: there are significant differences in action loyalty in gender, age, and education background and significant differences in attitude loyalty in education background, the action loyalty of women is higher than that of men, the attitude loyalty of people aged 24–30 is higher, and the people with master's education background show higher loyalty in both action and attitude.
- (2) Correlation analysis of participation motivation, satisfaction, and loyalty: participation motivation of internal motivation and external motivation is positively related to accessing performance, internal motivation and external motivation showed a positive correlation to service satisfy, internal motivation and external motivation are loyal to the action showed positive correlation, internal motivation and external motivation showed a positive correlation to the attitude loyalty, browsing satisfaction and service satisfaction are loyal to the action showed positive correlation, and both browsing satisfaction and service satisfaction are positively correlated with attitude loyalty.
- (3) Hypothesis testing: the results show that the internal motivation ( $p < 0.001$ ) has a positive effect on browsing satisfaction, external motivation ( $p < 0.001$ ) had a positive influence on browsing satisfaction, and the influence was 65.8%. Internal motivation ( $p < 0.001$ ) had a positive impact on service satisfaction, and external motivation ( $p < 0.001$ ) had a positive impact on service satisfaction, and the influence was 60.8%. Internal motivation ( $p < 0.001$ ) had a positive influence on

action loyalty, external motivation ( $p < 0.001$ ) had a positive influence on action loyalty, and the influence was 58.5%. Internal motivation ( $p < 0.001$ ) had a positive influence on attitude loyalty, external motivation ( $p < 0.001$ ) had a positive influence on attitude loyalty, and the influence was 44.1%. Browsing satisfaction ( $p < 0.001$ ) had a positive effect on action loyalty, service satisfaction ( $p < 0.001$ ) had a positive influence on the action loyalty, and the influence was 69.0%. Browsing satisfaction ( $p < 0.001$ ) had a positive effect on attitude loyalty, service satisfaction ( $p < 0.001$ ) had a positive influence on attitude loyalty, and the influence was 43.3%.

*5.2. Conclusion.* The results of [47]'s research show that there are significant differences in internal motivation in gender, showing that men are higher than women, but women and men in this study have the same values, and there is no significant difference in age and educational background in [47]'s research. In the study of [49, 52], there were differences in satisfaction in gender and age, respectively. In the research of [50, 53], there are differences in loyalty in gender, educational background, and age. The research results of [50] show that there is a positive correlation between participation motivation, satisfaction, and loyalty. The research of [50, 55] shows that participation motivation has a significant positive effect on satisfaction. The research results of [50, 56] show that participation motivation has a significant positive impact on loyalty. The research results of [50, 53] show that satisfaction has a significant positive impact on loyalty, and all the above studies support this research result.

Limitations of the study: this study takes specific sports app users as the research object, and the scope of application becomes smaller. In the study, the characteristics other than setting variables were not considered.

Development prospect: from the promulgation of "Internet + Sports" policy in 2014, the number of netizens in China will reach 1.011 billion by 2021; with the increase of sports enthusiasts, the scale of sports app users will continue to expand; in the future, accurate market positioning, professional service content, and good experience will be important factors for the development of sports app. For the development line of research, in addition to participation motivation, satisfaction, and loyalty, future research can also add marketing factors of sports apps, customer's action intention, and other arguments that can reflect user behavior, enrich the research of user behavior analysis of sports app, and provide more reference and reference for related research of sports app.

### 5.3. Suggestions

- (1) On the policy side, with the support of national sports policy and the increase of app users, the sports industry has been transformed into Internet sports, and online sports has become a new trend of sports development and an inevitable choice for the

sustainable development of the sports industry; although sports app users are concentrated in the age group of 20~40 years old, the proportion of the aging population in China is high; it is suggested that sports app should pay attention to the needs and preferences of people over 40 years old in customer orientation, expand the sports app users, and actively promote the development of mass sports.

- (2) On the management side, the participation motivation of users has a significant positive impact on satisfaction and loyalty, and there is a positive correlation among them. First, in order to improve users' motivation to participate, managers should divide the market well, accurately locate user groups, and accurately put products on the market according to the preferences of user groups to attract target users. Second, in order to increase the satisfaction of users, it is necessary to divert the target users when they enter the sports app. Users can select information such as age, gender, education background, and occupation, then, the users enter the browsing page, and the browsing page pushes information according to the characteristics of customers, pushing information that conforms to their own characteristics to improve customer satisfaction. Third, in order to improve customer loyalty, it is more abundant to add online sports courses, sports records, slimming guides, fat-reducing punch cards, and peripheral products; in addition, it is necessary to conduct regular surveys on users' feelings of use, even if users' needs are known, and constantly enrich and improve sports app.

## Data Availability

No data were used to support this study.

## Conflicts of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

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