

# ***Statistical Analysis of Consumption Expenditures on Games Across Different Age Groups***

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**Abstract:** In the contemporary social context, the phenomenon of game recharge has burgeoned, emerging as a prevalent consumption channel for a vast number of individuals. People from various walks of life, especially those with different age characteristics, show marked disparities in their game recharge expenditures. This article undertakes an in-depth exploration. By applying sophisticated probability and statistical methods, such as large-scale data sampling and meticulous data analysis, it firmly establishes that there are indeed specific and distinguishable differences in game recharge behaviors among different age brackets. Subsequently, the article elaborates on these differences, taking into account aspects like income levels, gaming preferences, and the psychological needs of different age groups. Comprehending these differences is of utmost importance for the sustainable development and accurate market positioning of the game industry, allowing it to better satisfy the diverse needs of consumers. This study can provide objective data for related research and help different gamers to understand their consumption behavior more deeply.

**Keywords:** Different age groups, Game recharges, Consumption behaviors, Age differences, Game industry.

## **1. Introduction**

Modern science and technology are surging forward at an unprecedented pace. Simultaneously, the network industry is continuously growing and strengthening. Online games, as a crucial part of emerging industries, are emerging as a significant factor in driving economic development[1]. As the game market continues to flourish and progress, understanding the game recharge patterns of different age groups holds extremely crucial practical significance. For instance, the majority of domestic mobile games have adopted the "free + in-app purchase" model, where the game has no entry fee but charges for advanced content. The principal challenge for game publishers lies in generating the demand for virtual commodities to generate income through the sale of in-game items, namely, enticing players to engage in in-game purchases[2]. Most games have similar kryptonite models: for shallow-level play, one can choose not to consume or consume lightly; for medium-level play, moderate consumption is required; for deep-level play, heavy consumption is necessary. The amount of kryptonite will directly affect the degree of participation and peak experience of game players[3]. Currently, although some progress has been made in the research on game recharges, there remains a distinct lack of comprehensive and in-depth analyses specifically aimed at different age groups. This paper employs methods such as linear regression in statistics for calculation. This research can assist game companies in gaining a deeper understanding of player profiles. For players, it can help

them gain a more in- depth understanding of their own consumption behaviors. Moreover, this research can help players understand their own consumption behaviors more deeply.

## 2. Methodology

### 2.1. Data Collection

After collating the viewpoints of various scholars, this paper defines "kryptonite" as the act of recharging by spending extra money to purchase game equipment, skins, and props in downloaded online games[4]. Game recharge expenditure data of people in different age groups were collected through online questionnaires. The questionnaire covered basic personal information (such as age and gender), game type preferences, game recharge frequency and amount, and other issues. To ensure the representativeness and reliability of the data, the following measures were taken during the questionnaire design and distribution process:

The questionnaire is designed scientifically and rationally, with concise and clear questions that avoid being leading or ambiguous. At the same time, adjustments should also be made according to the actual situation, so as to improve the "reliability" and "validity" of the survey results[5].

The random sampling method is employed to distribute questionnaires on different social platforms and game forums to cover people of different ages, genders, and regions.

The collected questionnaires are strictly screened to eliminate invalid ones and ensure data quality.

### 2.2. Data Analysis Methods

Descriptive statistical analysis: Compute statistical quantities such as mean, median, and standard deviation of game recharge expenditures for people in different age groups to understand the basic characteristics of the data.

Analysis of variance: Compare whether the differences in game recharge expenses among people of different age brackets are statistically significant.

Correlation analysis: Analyze the correlation between age and game recharge spending.

Regression analysis: Establish a regression model between age and game recharge expense to further explore the relationship between the two.

## 3. Results and Analysis

### 3.1. Data Processing

The mean and median values of game recharge expenses for people in different age groups are shown in Table 1.

Table 1: Mean differences and medium differences among different age groups

| Age          | Mean(Chinese Yuan) | Medium(Chinese Yuan) | Variance |
|--------------|--------------------|----------------------|----------|
| 10 - 18      | 92.5               | 85                   | 56.25    |
| 19 - 25      | 290                | 280                  | 100      |
| 26 - 35      | 282.5              | 225                  | 3456.25  |
| 36 and above | 112.5              | 100                  | 156.25   |

As can be seen from Table 1, there are definite disparities in the game recharge expenditures among people of different age groups. Specifically, the mean and median game recharge expenditures of people in the age ranges of 19-25 years old and 26-35 years old are relatively high, whereas those of people in the age groups of 10-18 years old and 36 years old and above are comparatively low.

Upon further analysis, it is found that people in the 19-25 age group are likely to be in college or just entering society. They possess a certain degree of disposable income and simultaneously have a high level of interest in and dedication to games. People in the 10-18 age group are mainly students with limited economic sources. Their game recharges are subject to more restrictions from parents. People in the age group of 36 years old and above may have relatively less attention and investment in games due to family and work pressures.

Standard deviation reflects the degree of dispersion of data.

As can be seen from the Table 2, the standard deviation of game recharge expenditures among people in the 26 - 35 age group is relatively large, indicating that there are relatively significant differences in game recharge spending among individuals within this age range. In contrast, the standard deviations of game recharge expenditures for people in the 10 - 18 and 36 and above age groups are relatively small, indicating that the game recharge expenditures of people in these two age groups are relatively concentrated.

This might be due to the fact that the consumption concepts and behaviors of people in the 26 - 35 age group are more diverse. Simultaneously, they are affected by multiple factors like social interaction and entertainment, resulting in a relatively large variation in game recharge expenditures. On the other hand, the consumption behaviors of people in the 10 - 18 and 36 and above age groups are relatively conservative and stable.

#### 4. Regression Analysis

Table 2: Mean differences and significance levels among different age groups

| Age Comparison          | Mean Difference (Chinese Yuan) | Significance Level     |
|-------------------------|--------------------------------|------------------------|
| 19 - 25 vs 10 - 18      | 197.5                          | Moderately significant |
| 26 - 35 vs 10 - 18      | 190                            | Moderately significant |
| 36 and above vs 10 - 18 | 20                             | Slightly significant   |
| 26 - 35 vs 19 - 25      | -7.5                           | Not significant        |
| 36 and above vs 19 - 25 | -177.5                         | Highly significant     |
| 36 and above vs 26 - 35 | -170                           | Highly significant     |

Table 2 showcases the mean differences in game recharge expenditures among different age groups along with their corresponding significance levels. The mean difference reflects the average disparity in game recharge amounts between different age brackets, while the significance level indicates the statistical importance of these differences.

##### 4.1. Comparison between 19 - 25 Years Old and 10 - 18 Years Old

The mean difference amounts to 197.5 yuan and is moderately significant. This implies that people in the 19 - 25 age group, on average, spend 197.5 yuan more on game recharges than those in the 10 - 18 age group. This difference holds a certain degree of statistical reliability but is not extremely pronounced. Perhaps it is because individuals in the 19 - 25 age range are either in college or just entering society, possessing a certain amount of disposable income and having a relatively high level of interest and investment in games. In contrast, people in the 10 - 18 age group are mainly students with limited economic resources, and their game recharges are more tightly restricted by parents.

##### 4.2. Comparison between 26 - 35 Years Old and 10 - 18 Years Old

The mean difference is 190 yuan and also exhibits moderate significance. Similar to the previous comparison, people in the 26 - 35 age group spend an average of 190 yuan more on game recharges

than those in the 10 - 18 age group. People within this age bracket typically have been working for some time and have relatively stable incomes, so they may also have a relatively higher investment in games.

#### 4.3. Comparison between 36 Years Old and above and 10 - 18 Years Old

The mean difference is 20 yuan and has slight significance. This indicates that the gap in game recharge expenditures between people in the 36 years old and above age group and those in the 10 - 18 age group is relatively small, and the statistical importance of this difference is relatively low. Perhaps it is because people in the age group of 36 years old and above pay relatively less attention to games and invest less in them due to family and work pressures. Meanwhile, although people in the 10 - 18 age group have their recharges restricted, they may still have a certain level of game consumption under some circumstances..

#### 4.4. Comparison between 26 - 35 Years Old and 19 - 25 Years Old

The mean difference is -7.5 yuan and is not significant. This means that the average spending on game recharges between these two age groups is not significantly different, and statistically, it can be regarded as a result of random fluctuations.

#### 4.5. Comparison between 36 Years Old and above and 19 - 25 Years Old

The mean difference is -177.5 yuan and is highly significant. This shows that people in the 36 years old and above age group spend an average of 177.5 yuan less on game recharges than those in the 19 - 25 age group, and this difference is very reliable statistically. This is in line with the reasons analyzed earlier. As people grow older, their enthusiasm and investment time in games may gradually diminish.

#### 4.6. Comparison between 36 Years Old and above and 26 - 35 Years Old

The mean difference is -170 yuan and is highly significant. Similar to the previous comparison, people in the 36-years-old and above age group spend an average of 170 yuan less on game recharges than those in the 26 - 35 age group, and the difference is very significant statistically.

In general, this table reveals that there are certain differences in game recharge expenditures among people of different age groups. People in the 19 - 25 and 26 - 35 age groups have relatively higher game recharge expenditures, and the difference between these two age groups is not significant. People in the 10 - 18 age group have relatively lower recharge amounts due to factors such as limited economic sources and parental restrictions. People in the 36 years old and above age group have relatively less investment in game recharges due to family and work pressures. At the same time, the differences in significance levels also reflect the statistical reliability of these differences.

Calculating the relationship between recharge amount and age. (Suppose a simple linear regression model  $y=a+bx$  is employed. Here,  $y$  represents the recharge amount and  $x$  represents the age. The age groups are simplified and calculated using the group midpoints. The midpoint for the age group of 10 - 18 years is taken as 14, for the age group of 19 - 25 years as 22, for the age group of 26 - 35 years as 30.5, and for the age group of 36 years and above as 36.)

First, calculate the means of  $X$  and  $Y$  :

Let  $x_1 = 14, y_1 = 92.5$ (the mean for the 10-18 age group);  $x_2 = 22, y_2 = 290$ (the mean for the 19-25 age group);  $x_3 = 30.5, y_3 = 282.5$ (the mean for the 26-35 age group);  $x_4 = 36, y_4 = 112.5$ (the mean for the 36 and above age group).

$$\bar{x} = \frac{14+22+30.5+36}{4} = 25.625$$

$$\bar{y} = \frac{92.5+290+282.5+112.5}{4} = 194.375$$

Then, calculate the value of b (the regression coefficient):

$$l_{xx} = \sum_{i=1}^4 (x_i - \bar{x})^2 = (14 - 25.625)^2 + (22 - 25.625)^2 + (30.5 - 25.625)^2 + (36 - 25.625)^2 = (-11.625)^2 + (-3.625)^2 + 4.875^2 + 10.375^2 = 279.6875$$

$$l_{xy} = \sum_{i=1}^4 (x_i - \bar{x})(y_i - \bar{y}) = (14-25.625)(92.5-194.375) + (22-25.625)(290-194.375) = 417.96875$$

$$B = \frac{l_{xy}}{l_{xx}} = \frac{417.96875}{279.6875} \approx 1.494$$

Finally, calculate the value of a (the intercept):

$$a = \bar{y} - b\bar{x} = 194.375 - 194 \times 25.625 = 156.085$$

Obtaining the regression equation  $y = 156.085 + 1.494x$ . This equation represents an approximate linear relationship between age and the mean game recharge amount under this simplified calculation. However, it should be noted that this relationship is only a simple analysis based on the given data. The actual situation may be more complex, and due to reasons such as relatively coarse data grouping, there are certain limitations.

## 5. Exploration of Influencing Factors

### 5.1. Consumption Capacity and Economic Sources

People in different age brackets exhibit disparities in consumption capacity and sources of income. Taking the in-game pass (a recharge item shared by most games) as an example, due to its generally low price, most players will choose to purchase it with real money. As for other types of recharge items, the choices vary among players of different ages[6]. Those in the 19 - 25 age range are usually in college or just beginning their careers, and they have a certain amount of disposable income. College student netizen groups are pioneers and an important force on the Internet. They are an important force that cannot be ignored in the network society[4]. The characteristics of this group are mainly reflected in the following aspects: They were born between 1995 and 2000. In terms of age, they are generally young people between 18 and 25 years old. Some studies also believe that they are in the later stage of adolescence. They live in schools, and have little social experience and relatively little social practice. Their thinking is active. They actively accept the emergence and development of new things, adapt to and lead the trend of the times, and often "surf the Internet". The attributes of electronic games match the needs of college students[7]. Additionally, they might receive financial support from their families. On the other hand, individuals in the 10 - 18 age group are mainly students with limited economic resources, and their game recharges are more tightly regulated by their parents. People aged 36 and above may be more rational in their consumption because of family and work pressures, thus having a relatively lower investment in games.

### 5.2. Game Interests and Demands

Some researches suggest that there is a positive correlation between the "grinding" level of games and the willingness to make in - game purchases[8]. The types of games players are interested in vary according to their ages. People of various age groups also have distinct interests and requirements for games. They are more inclined to invest money in games so as to obtain a better gaming experience and social status. They are more likely to invest money in games to attain a better gaming experience and social status. People in the 10 - 18 age group also show a high interest in games, but due to their younger age, they may place greater emphasis on the fun and entertainment aspects of games. People

aged 36 and above have a relatively lower interest in games and may focus more on the leisure and relaxation functions that games offer.

### 5.3. Social Influences and Cultural Backgrounds

Individuals have different life experiences and growth trajectories, as well as varying starting points and pursuits in their careers. These differences bestow upon them distinct development foundations and conditions, which consequently lead to diverse values of life and behavioral patterns[9]. People in the 19 - 25 age group are often more susceptible to the influence of their social circles. They may recharge in games due to friends' recommendations or social pressures. At the same time, this age group has grown up in the digital era and has a higher acceptance of games and virtual consumption. People in the 10 - 18 age group are also easily influenced by classmates and friends, but their consumption behaviors are more closely monitored by their parents. People aged 36 and above have relatively smaller social circles, and their need for game recharges may stem more from personal interests and leisure requirements. Additionally, for those who have already engaged in "kryptonite", the interval between the first and second instances of "kryptonite" is often extremely short. Moreover, within a relatively short period of time following this, they will engage in "kryptonite" multiple times[10].

## 6. Conclusion

Overall, there is an approximately linear relationship between age and the average amount of game recharges, and it is closely related to the following three aspects: Consumption Capacity and Economic Sources, Game Interests and Demands, Social Influences and Cultural Backgrounds.

The data in this research is derived from an online questionnaire survey, which may give rise to sample biases. For instance, the surveyed population may be more inclined toward game players, while the coverage of non-gaming individuals may be insufficient. Moreover, the responses to the questionnaire may be affected by subjective factors, thereby having a certain degree of impact on the accuracy of the data.

The questions in the questionnaire may be subjective and affect the accuracy of the data. For instance, the definition of game recharge expenses may differ from one person to another, and distinct individuals may have diverse understandings and calculation methods regarding game recharges.

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