

# Correlation Between Gaming Duration in School and Family Environments and Depression Levels in Adolescents using the Apriori Method

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## Abstract

This study examines the relationship between depression levels in adolescents (aged 14-18 years) and the duration of their online gaming, using the Apriori data analysis method. The main results show a strong correlation between the length of time spent gaming and depression levels. Specifically, it was found that gaming duration is a key factor influencing emotional health. Adolescents who play games (particularly MOBA and Battle Royale genres) in moderation, i.e., 1–2 hours per day, actually exhibit a lower risk of depression and more stable emotional well-being. The aim of this study is to raise awareness among parents, educators, and policymakers about the importance of regulating adolescents' online gaming time to maintain their mental health.

**Keywords:** *Online Games, Play Duration, School Environment, Family Environment, Apriori, Depression Level.*

## 1. Introduction

In today's modern era, teenagers are very attached to the use of electronic devices such as smartphones, computers, and tablets for leisure activities such as playing games[1].

Easy internet access and the use of smart devices have made online games increasingly popular among teenagers. However, the increase in the amount of time teenagers spend playing online games has become a serious concern because it can distract them from social, academic, and family activities due to addiction.

One of the mental disorders that can occur in people who are addicted to online games is depression. Depression can be one of the risk factors for someone becoming addicted to online games, but it can also be a result of online game addiction. People who are depressed often feel hopeless in life[2].

Online gaming addiction is a serious problem that can hinder the social development of teenagers, trigger behavioral changes, and negatively impact their quality of life. Spending too much time staring at a monitor while playing games makes teenagers forget the importance of socializing. As a result, their behavior becomes strange and their relationships with friends become strained. This addiction can lead to several negative effects, such as students finding it difficult to disconnect from the game and feeling anxious or stressed if they cannot play. Additionally, due to staying up late to play online games, students often feel sleepy in class and spend more time playing online games[3][4].

## 2. Literature Review

### 2.1. Online Games

Online games are games played through a network that can be played individually or in groups with an unlimited number of players. In the Big Indonesian Dictionary, a game can be defined as a play. Thus, a game is an activity that is a form of entertainment with more than one player[5].

### 2.2. School Environment

The school setting is a space where educational activities occur and where students familiarize themselves with the principles of school regulations and the values of learning across different subjects, including: instructional techniques, curriculum, teacher-student interactions, school discipline, educational resources, school timings, elevated learning standards, facilities, learning strategies, and assignments. The school atmosphere is the context in which students engage in a learning experience, and this atmosphere greatly

impacts the growth of a child's character. A supportive school setting encourages the positive growth of students' character and establishes a welcoming educational atmosphere that enhances academic focus and school order[6][7].

**2.3. Family Environment**

The family environment is a condition within a small social group consisting of parents, children, and other family members who have social relationships. The family environment lays the foundation for the growth and development of the personalities of the people within that family. It is within the family environment that the formation of a child's personality begins. A child within a particular family environment will undoubtedly have their personality influenced by the personalities of their parents within that family environment[8].

**2.4. Depression**

Depression is a mental disorder that involves emotional disturbances that often occur in adolescents, including in Indonesia. Depression causes a person to feel sad, tired, and angry, lose interest in daily activities, and become suicidal[9]. Depression is a serious medical problem and it involves symptoms related to mood, physical and cognitive symptoms. Symptoms include feeling depressed, sad or irritable mood; frequent feelings of guilt and uselessness; inability to feel pleasure; suicidal ideation and thoughts of death; and loss of interest in daily activities[10].

**2.5. Data mining**

Data mining is the process of mining important information from data. This important information is obtained from a very complicated process such as using artificial intelligence, statistical techniques, mathematics, machine learning, and so on. These complex techniques will identify and extract useful information from a large database. [11].

**2.6. Apriori algorithm**

Apriori algorithm is a basic algorithm proposed by Agrawal & Skrikant in 1994 to determine Frequent itemsets for Boolean association rules. Apriori algorithm is a type of association rule in data mining. Rules that express associations between several attributes are often called affinity analysis or market basket analysis. Association analysis or association rule data mining is a data mining technique to find the rules of a combination of items. One of the stages of association analysis that attracts the attention of many researchers to produce efficient algorithms is frequent pattern mining[12].

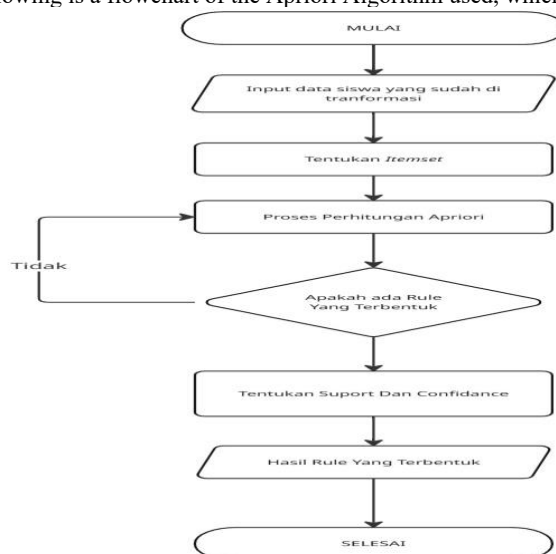
**3. Literature Review**

**3.1. Research Methodology**

This study used a quantitative approach with a correlational design to analyze the relationship between the duration of playing online games in the school and family environment with the level of depression in adolescents. Data were collected through a structured questionnaire completed by respondents, who were students at the secondary education level. The questionnaire measured two main variables: duration of online gaming and adolescents' depression level. The duration of online gaming was measured by dividing the environment into two (school and family) and measuring the average hours played per day. Meanwhile, the level of depression was measured using a standardized instrument that has been validated.

**3.2. Model Implementation.**

The following is a flowchart of the Apriori Algorithm used, which can be seen in the figure below.



**Fig. 1:** Flowchart

#### Apriori Process Steps

1. Start: The process begins as the initial stage in data analysis using the Apriori algorithm.
  2. Input Transformed Student Data: Enter student data that has been converted into binary or transaction form, ready for analysis.
  3. Itemset Formation Process: Form itemset combinations starting from 1-itemset, 2-itemset, and so on based on the available transaction data.
  4. Calculation Process with the Apriori Algorithm: Calculate the support value for each itemset and eliminate itemsets that do not meet the specified minimum support.
  5. Check Association Rules: If no rules are formed, return to the process of forming smaller itemsets or repeat the process. If rules are formed, proceed to the next process.
  6. Determine Support and Confidence Values for Formed Rules
  7. Calculate the support and confidence values of each association rule to measure its strength and reliability.
  8. Formed Rule Results
- Display the valid association rules based on the minimum support and confidence thresholds.

9. Complete

The analysis process using the Apriori algorithm has ended.

### 3.3. Research Data

To analyze data in a study, supporting data is needed so that the study can proceed as expected. Based on research conducted on adolescents, data was obtained that will be used to analyze the correlation between adolescent depression levels, duration of gaming at school, duration of gaming at home, and types of games played. The data is as follows.

**Table 1:** Game genre

NO	DESCRIPTION	CODE
1	MOBA	JG0
2	BATTLE ROYAL	JG1
3	RPG	JG2
4	STRATEGI	JG3
5	FPS	JG4

**Table 2:** Duration of Playing Games at School

NO	DESCRIPTION	CODE
1	1 – 2 HOURS/DAY	MS1
2	2 – 3 HOURS/DAY	MS2
3	3 – 4 HOURS/DAY	MS3
4	4 – 5 HOURS/DAY	MS4
5	>5 HOURS/DAY	MS5

**Table 3:** Duration of Playing Games at Home

NO	DESCRIPTION	CODE
1	1 – 2 HOURS/DAY	DR1
2	2 – 3 HOURS/DAY	DR2
3	3 – 4 HOURS/DAY	DR3
4	4 – 5 HOURS/DAY	DR4
5	>5 HOURS/DAY	DR5

**Table 4:** Level of Depression

NO	DESCRIPTION	CODE
1	NOT EXPERIENCING DEPRESSION	TD1
2	LOW LEVEL	TD2
3	MODERATE LEVEL	TD3
4	HIGH LEVEL	TD4
5	VERY HIGH LEVEL	TD6

### 3.4. Software Interface

Waikato Environment for Knowledge Analysis is a practical machine learning toolkit abbreviated as WEKA. This application was created at the University of Waikato, New Zealand for reviews, expertise, and various applications. The advantages of using WEKA include its classification capabilities, which are based on highly effective approaches for solving real-world data mining problems. Additionally, WEKA is very easy to apply across different stages, and it provides tools for data preprocessing, classification, regression, clustering, association rules, and visualization[13]



Fig 1. WEKA software

## 4. Discussion and Implementation

### 4.1. Experimental Results

The results of the Apriori Analysis test from this experiment show a correlation between the duration of playing games at home and at school and the level of depression in adolescents, where the test results show a positive correlation between the duration of playing games and the level of depression. The test results can be seen below.

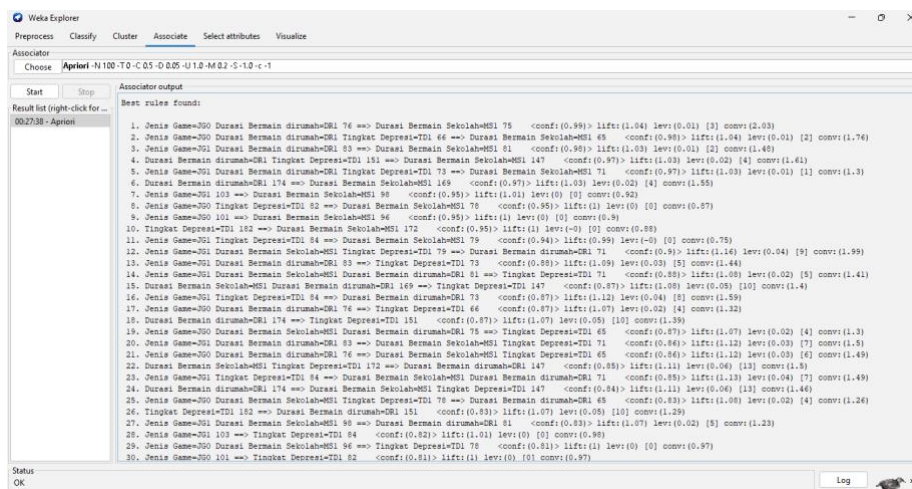


Fig 2: Result

Tabel 5. 2 Itemset Best Rule

No	Rule	Confidence
1	Jika seorang remaja bermain game selama 1-2 jam per hari di rumah, maka sangat mungkin mereka juga akan bermain game 1-2 jam per hari di sekolah.	99%

Tabel 6. 3 Itemset Best Rule

No	Rule	Confidence
1	Jika remaja bermain game MOBA dan 1-2 jam/hari di rumah, maka mereka akan bermain 1-2 jam/hari di sekolah.	99%

Tabel 7. 4 Itemset Best Rule

No	Rule	Confidence
1	Jika remaja bermain game Battle Royale dan 1-2 jam/hari di sekolah dan di rumah, maka mereka cenderung tidak mengalami gejala depresi.	88%

Based on these testing results, datasets with smaller volumes and lower Random Forest specifications have shorter execution times, but with a slight compromise in accuracy. Considering the urgency of the analysis results, accuracy is deemed more important than execution time. Although execution time varies depending on the dataset size, it is still significantly faster compared to manual analysis.

### 4.2. Implementation

The questionnaire data that had been processed beforehand was converted into Excel format, then imported into WEKA. Before the analysis process began, each attribute in the dataset was set. In this case, the variables used were the duration of gaming in the school environment, the duration of gaming in the family environment, the type of game played, and the symptoms experienced. Next, the Apriori method was used to explore association patterns between variables. Through this analysis, a deeper understanding was gained regarding the relationship between gaming duration and the psychological condition of adolescents, particularly depression levels.

## 5. Conclusiona and Recommendations

### 5.1. Conclusion

1.The duration of gaming has a significant correlation with the level of depression in adolescents. This study found a significant correlation between the duration of gaming and the level of depression in adolescents. The most common and consistent pattern shows that adolescents who play games moderately, i.e., 1-2 hours per day, tend not to experience symptoms of depression. Conversely, excessive increases in gaming duration can lead to addiction and mental health issues such as depression.

2.Playing MOBA and Battle Royale Games for 1-2 Hours a Day Does Not Typically Lead to Depression. From the analyzed data, it was found that adolescents who play MOBA and Battle Royale games for 1-2 hours per day, both at school and at home, tend not to experience depression. The association rule with the highest confidence level indicates a strong correlation between moderate gaming duration and stable emotional conditions in teenagers.

3.The Apriori Algorithm is Effective in Identifying Association Patterns Between Variables. This study successfully applied the Apriori algorithm to find association patterns between gaming duration, game type, and depression levels in adolescents. The use of this method, aided by WEKA software, enabled the identification of significant relationships and provided deep insights into the influence of gaming duration on adolescents' psychological conditions.

### 5.2. Recommendations

The following suggestions can be used as input for improving the writing of this thesis, as well as being useful for future research:

1. For future researchers, it is recommended to increase the number of respondents, develop other relevant variables such as social environment and learning motivation, and compare the Apriori method with other data mining algorithms such as FP-Growth or classification.
2. The author acknowledges that there are still many limitations in this research, but it is hoped that it can serve as an initial reference for further studies on the relationship between online games and the psychological condition of adolescents.

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