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Early Childhood Children in COVID-19 Quarantine Days and Multiple Correspondence Analysis

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Abstract

Multiple correspondence analysis is an extension of correspondence analysis that consent one to examine the stencil of intercourses of several categorical dependent variables. The aim of this study is to analyze the cognitions, feelings, and thoughts of early childhood children who stayed at home during the quarantine process due to coronavirus with multiple correspondence analysis. The theory and commentary of multiple correspondence analysis in the case of two and more than two variables are provided through an example. The result from multiple correspondence analysis is a graphical monitor of the rows and columns of a contingency table that is conceived to permission visualization of the prominent correlations among the variable responses in a low-dimensional space. Such a presentment discloses a more global picture of the correlations among row-column pairs.

1. Introduction

From time to time, the world is faced with natural or human-induced disasters. Various political, economic, health and social consequences of these disasters affect people over different periods of time. Sawada and Takasaki [1] state that the most important damage caused by disasters is the loss of life as well as the serious blows to the economies of the states. These disasters affect humans, then animals and plants, relatively the most from living groups. However, people and countries can be affected by disasters not only economically but also in different ways. *OECD* [2] has collected the effects of natural disasters under four main headings: individual impact, physical impact, sociological impact, public health, and mental health effects.

Children are one of the disadvantaged groups regarding public health and mental health. The effects of natural disasters can be seen more prominently, especially in children in early childhood, where development is faster than in other periods. In this case, mental health disorders and developmental retardation can be seen in children.

Especially children may face troubling situations due to the prolongation of epidemic diseases, therefore quarantine and these measures limit people. Ericson [3] mentioned the importance of the environment in his developmental theory and stated that the lack of opportunities to prepare children for developmental tasks may cause dysfunctional behaviors. In some cases, people, especially children, are subject to some restrictions because they are in quarantine, even if they are not physically harmed. While the child will be able to play in different environments, due to the quarantine, he will only have limited experience within the scope of his home. However, play is extremely important in the development of the child. While making his moment enjoyable, it also plays a role in affecting his whole life. In this context, Topac, Bardak, and Ünal [4] stated that play improves the quality of a child's life, affects his career and private life to a great extent, and children whose right to play is denied will become unhappy individuals in the coming years because of they cannot live their childhood sufficiently.

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Open perceptions and readiness of children about new information in the learning process affect their learning speed. The stimuli that are exposed during the pandemic process direct the perception of children to this issue. In this case, it can be said that children will pay more attention to the pandemic, quarantine, and related stimuli. With these effects, children may show introversion, communication, and speech disorders, anxious, obsessive, or compulsive behaviors.

Topac and Bardak [5] stated that school is an important factor in gaining the habit of cleaning in early childhood. In this context, children who stay away from school may not acquire the ideal cleaning habit due to disruption or dropping out. In addition, exaggeration behaviors related to cleaning can be seen through stimuli in the environment. Different tools have been developed in order to protect the mental health of various layers of people during times of disaster. One of them, Public Child and Family Disaster Communication, has been defined as a public health tool that can be used to cope with the post-disaster situation / encourage resilience and improve incompatible child responses. It has also been stated that schools are an important (promising) system for child and family disaster communication [6]. In this context, Dadds, Holland, Laurens, Mullins, Barrett, and Spence [7] found that a school-based intervention shows a permanent and effective result in reducing children's anxiety in a study they conducted to prevent anxiety in children.

The purpose of this study is to reveal the cognitions, feelings, and thoughts of early childhood children during the Covid-19 quarantine process with the method of multiple correspondence analysis.

2. Method

2.1. Multiple correspondence analysis

Multiple correspondence analysis (MCA) is an extension of correspondence analysis (CA) which allows one to analyze the pattern of relationships of several categorical dependent variables. As such, it can also be seen as a generalization of principal component analysis when the variables to be analyzed are categorical instead of quantitative.

MCA is obtained by using a standard correspondence analysis on an indicator matrix (i.e., a matrix whose entries are 0 or 1). The percentages of explained variance need to be corrected, and the correspondence analysis interpretation of interpoint distances needs to be adapted.

MCA is used to analyze a set of observations described by a set of nominal variables. Each nominal variable comprises several levels, and each of these levels is coded as a binary variable.

CA is a categorical data analysis method that takes place within the optimal scaling techniques. Simple CA is used in the analysis of two-way contingency tables. MCA or homogeneity analysis (Homogeneity Analysis by Alternating Least Squares-HOMALS) is used in the analysis of multi-directional contingency tables.MCA is similar to the Principal Component Analysis (PCA) in terms of the application purpose of the analysis method. However, all variables are categorical in MCA. The purpose of this analysis method is to reveal which categories of categorical variables are compatible with each other. Thus, relations that are difficult to interpret with the analysis of chi-square and contingency tables can be easily interpreted through graphs, and relations between categories can be revealed [8], [9], [10]. MCA also shows similarities with multidimensional scaling. However, since it shows the relationship between categories in the same space, it differs from multidimensional scaling [11]. In MCA, the difference between variables is defined by a loss function. The loss function is minimized using the alternating least squares method, and object scores and quantifications that achieve maximum homogeneity between variables are achieved. Another important point in the MCA is the explained variance value. The variance explained as in the PCA is expressed by eigenvalues. Eigenvalues express the value of inertia in MCA. The most important point in MCA is the interpretation of the graph obtained. In the graphic, the distance of the category point to the origin shows the importance of the category. If the direction of one point is opposite to the direction of other points, there is a negative correlation between them. If the direction is the same, the correlation is positive. In addition, if the angle between the lines showing the distance of the two category points to the origin is small, that is, if the points are close to each other, the correlation between them is high, if the angle is large, the correlation is low.

In the literature, there are studies in many different areas related to MCA. In the work of Parchomenko [12], the method of MCA was used to assess 63 Circular Economy metrics and 24 features relevant to Circular Economy, such as recycling efficiency, longevity, and stock availability.

2.2. Model

In this study, the survey model was used. The survey was prepared in the Likert type and the opinions of the participants were determined. In this study, a Likert questionnaire suitable for development levels was prepared.

The linguistic terms and their numeric labels are: Questions asked to children: Yes (1), maybe/some (2), no (3). The survey included the following questions:

- Do you know Corona-virus?
- Are you afraid of Corona-virus?
- Does Corona-virus harm people?
- Does Corona-virus harm animals?
- Can Corona-virus be prevented?
- Do you think it's nice not to go to school?
- Are you upset that you can't go to school?
- Is the obligation to stay home boring?

- Can we be protected from Corona-virus by staying at home?
- Do you think you can go to school from now on?

In this study, from Turkey, 201 children ages 5-6 units were the participants.

3. Results

In the study, the data of the children were divided into two groups and multiple compliance analysis was performed. Chi-square analysis was applied to determine the variable groups and the variables that were related to each other were determined. In the first analysis, do you know the Coronavirus? (Q1) Are you afraid of coronavirus? (Q2) Does Coronavirus harm people? (Q3) Does Coronavirus harm animals? (Q4) Can coronavirus be prevented? (Q5).

When Figure 3.1 is analyzed, those who answer yes for all questions form a group.So

- 1. knowing coronavirus,
- 2. afraid,
- 3. who thinks they can be prevented
- 4. that it harms people and animals

thinking children constitute a group.

Another group is

- 1. Are you afraid of corona virus,
- 2. Does coronavirus harm animals?
- 3. Corona virus can be prevented?

he/she evaluates his/her questions as maybe/some answer.

When an assessment is made in terms of those who answered no,

- 1. coronavirus does not harm animals
- 2. cororavirus cannot be prevented

the children who are saying are located close to each other.

In the second analysis, do you think it's good not to go to school? (Q6) Are you upset that you can't go to school? (Q7) Is the obligation to stay at home boring? (Q8), can we get rid of the coronavirus by staying at home? (Q9), do you think you can go to school from now on? (Q10) variables were used and Figure 3.2 was created as a result of MCA.

When Figure 3.2 is examined, it is clearly seen that the children who gave maybe/some answers for all questions are together. It is observed that children who do not feel sorry for not going to school and who do not find it boring to stay at home are also a group. In addition, those who say yes to the question of not going to school and children who say no to the question of whether you can go to school from now on are a group. Another group shows that there are children who say no to the question of not going to school and say yes to all other questions.

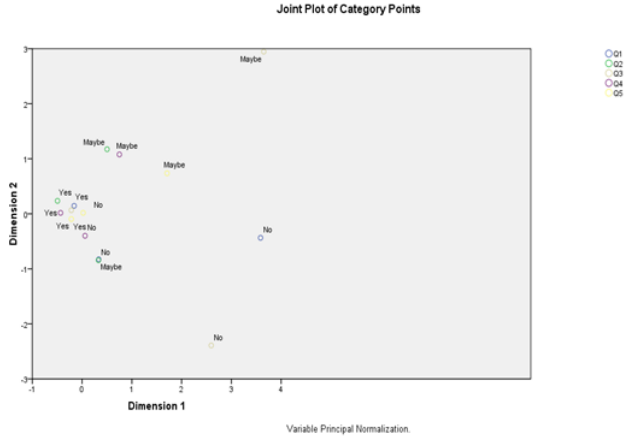

Figure 3.1: Joint Plot for first analysis

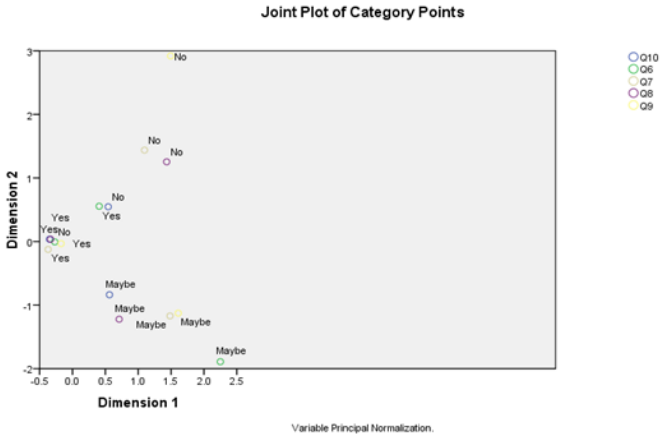

Figure 3.2: Joint Plot for second analysis

4. Discussion

Awareness and cognition about disaster and emergency planning should be developed in all parts and levels of the health system, regardless of physical or mental health. As can be understood from here, both adults and children can exhibit wrong behaviors by having wrong cognitions during epidemic times. Even in quarantine, people can develop false cognitions and act accordingly.

Every new experience means new knowledge and is a situation that needs to be learned. In particular, children should learn from natural disasters such as epidemics with correct experiences. The information must be coded correctly and transformed into behavior. For this, it is important for the administrators to inform the public with correct information and thinking about their psychology. It is important to take precautions and inform the public in a timely manner so that the public does not panic. It should not be forgotten that people can cause the spread of the disease with panic and wrong information, and they may behave in ways that can harm themselves and the society they live in. In this context, it can be said that children's cognition and behavior may also be affected by the negative aspects of the process.

In this study, we examined how the quarantine affects the cognitive and behavioral states of early childhood children with the multiple correspondence analysis methods within the scope of the measures taken to prevent the spread of the epidemic caused by the coronavirus. Questions directed to children were analyzed in two groups. As a result of the analysis, subgroups different from the answers given by the participants emerged in the group with the first five questions. Different groups of children were formed in the part where the other five questions were found. It can be said that this diversity coincides with the characteristics of the early childhood period where individual differences are high. However, the stimuli interacted with are also an important factor. The density of clusters formed as a result of the analysis can be explained by the level of interaction of the children in the relevant group with these factors.

Children in the first group, which consists of the answers given to the first five questions, are children who have knowledge about the epidemic, fear the virus, think that the disease can be prevented, and think that this virus harms people and animals. In other words, the children in this group answered yes to all questions. Children of this age can develop their cognition in line with the information they receive from the stimuli around them. However, these cognitions may not turn into healthy feelings and behaviors. In the second group, there are those who give maybe/a little answers to the questions of whether the are you afraid of coronavirus, does the corona virus harm animals and can the coronavirus be prevented. As a third group, children who say that coronavirus does not harm animals and coronavirus cannot be prevented are seen. Finally, those who know a little about coronavirus, and those who are not afraid of the virus are also a group. These situations can also be associated with the information that children acquire from different stimuli in the environment. In this context, Pearson and Degotardi [13] emphasized that the interaction of a child with his environment at an early age is extremely important in terms of observing the environment, establishing a cause-effect relationship, and reaching the competence to continue a discussion about a problem. In this way, the child can be in both an influencing and affected state while performing these skills. However, according to the ecological theory put forward by Bronfenbrenner [14], the family and home environment are the first circles around the child. Therefore, it can be said that the answers given by the children within the scope of this study are not independent of parental influence.

The first group consisting of the answers given to the second five questions is the children who give maybe/a little answer to all questions. In another group, there are children who are not upset about not being able to go to school and who do not find the obligation to stay home boring. It can be concluded that children in this group do not like school. In another group, there are those who say yes to the question of whether it is good to not go to school and children who say no to the question of whether you can go to school from now on. Again, it can be said that these children responded in this direction because they did not want to go to school and hoped not to. Finally, the children who said no to the question of whether it is good to not go to school and said yes to all other questions formed a group. It can be interpreted that these children love school and want to go to school. In addition, it can be said that the attitudes, behaviors, and discourses of the parents may have guided the cognition, feelings, and thoughts of the children in this period. Learning as Bandura [15] stated in his Social Learning Theory is the product of the dynamic relationship of the triangle of environment, behavior, and personal factors. Children's responses can be explained by the learning experiences that are the product of this relationship.

As seen in the findings, most of the participating children stated that they were afraid of coronavirus. Some of them think that the coronavirus cannot be prevented. There can be many factors that affect this condition. One of these factors, as mentioned earlier, is the likelihood that one or more family members may present a negative profile. According to the National Academies of Sciences, Engineering and Medicine [16], having a parent with untreated mental illness or addiction has genetic risks, epigenetic changes, negative behavioral modeling, negative social learning and It can lead to a difficult negative childhood experience involving many mechanisms that can also lead to relational skills. Therefore, the underlying cause of some of these cognitions of children can be fed from different sources, but the effect of the current period should also be taken into account as a trigger.

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