WEEKLY EMOTIONAL CHANGES AMIDST COVID-19: TURKISH EXPERIENCE

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Abstract

COVID-19 is a highly infectious and detrimental illness and is accepted as one of the most pervasive health crises of the last decades. The pandemic maintains its full effect and has continued longer than initially expected. The pandemic has affected many people in Turkey as well, irritating and making them anxious. In this study, the reaction of the society to the epidemic has been examined in the period from March month, when the first case has been announced, to June, when the normalization process began (18 March- 28 May). In order to understand these reactions, a total of 567,018 texts using the hashtag #StayHome on the Twitter platform have been fetched and analyzed. In this period, when the pandemic first appeared, it has been tried to make sense of what society has talked about by using text mining. Sensitivity analysis has been used to see the weekly reactions of individuals that differentiate their positive/negative moods and hope levels. As a result, some differences have been observed in the emotions analyzed in two-week periods.

Keywords: *Covid-19, Optimism, Pessimism, Sentiment Analyze, Text Mining.*

Jel Classification: *I1, I13, I31*

COVID-19 SALGININDA YAŞANAN HAFTALIK DUYGUSAL DEĞİŞİMLER: TÜRKİYE ÖRNEĞİ

Özet

Covid-19, oldukça bulaşıcı ve zararlı bir hastalıktır ve son yılların en yaygın sağlık krizlerinden biri olarak kabul edilmektedir. Pandemi, etkisini tüm dünyada hala sürdürmekte ve başlangıçta beklenenden daha uzun süredir devam etmektedir. Türkiye'de de pandemi insanları etkilemekte ve endişelendirmektedir. Bu çalışmada ilk vakanın açıklandığı mart ayından normalleşme sürecinin başladığı haziran ayı (18 Mart- 28 Mayıs) arasındaki dönemde toplumun salgına olan tepkileri incelenmiştir. Bu tepkileri anlamak için Twitter platformunda #Evdekal hashtagini kullanan toplam 567.018 metin elde edilerek analiz edilmiştir. Pandeminin ilk ortaya çıktığı bu dönemde, metin madenciliği kullanılarak toplumun konuştukları anlamlandırılmaya çalışılmıştır. Duyarlılık analizi, bireylerin olumlu / olumsuz duygu durumlarını ve umut düzeylerini farklılaştıran haftalık tepkilerini görmek için kullanılmıştır. İki haftalık süreçler halinde analiz edilen duygularda bazı farklılıklar olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: *Covid-19, İyimserlik, Kötümserlik, Duygu Analizi, Metin Madenciliği*

Jel Sınıflandırması: *I1, I13, I31*

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1. Introduction

The rapid spread of Covid-19 has created a sense of fear and anxiety among people. Individuals felt great panic with the fear of getting sick. Thus, the illness created many psychological burdens (Van Bavel et al., 2020) like embracing social distance, greater hygiene and quarantine, making it more difficult for individuals to maintain their daily life. Thus, individuals have embraced myriad preventive measures (Jovančević and Milićević, 2020). In fact, this unpredictable process has made individuals run out of tolerance (Nicola et al., 2020). Fears and anxieties that are seen during infectious illnesses are quiet-common since anyone can be infected easily (Ho et al., 2020:1). As Peteet (2020) indicates during Covid-19 individuals suffer from excessive anxiety and grief and they become vulnerable to many mental problems (Trzebiński, Cabański and Czarnecka, 2020:1). Thus, devising a way of life allowing them to stay with the positive feelings has gained greater importance for maintaining one's mental health (Yamaguchi et al., 2020). Studies conducted after Covid-19 revealed various negative results of the pandemic on mental healths of people like depression and anxiety (Wang et al. 2020), suicide (Mamun and Griffiths 2020), burnout syndrome among health care employees (Chen et al. 2020), loneliness (Zandifar and Badrfam 2020), sleep disorders (Huand and Zhao, 2020).

Discussions, recommendations and minute-by-minute updates on Covid-19 (Torales et al., 2020) and accumulation of data regarding pandemic's history, effects, symptoms and results create individuals' ever updating perceptions about Covid-19 process (Corman et al., 2020). However, possible long term outcomes of these pandemic are quiete unpredictable, that is why in the long term, perceptions of people may be affected by convinctions or even worse than that, irrational or exaggerated perceptions (Trzebiński, Cabański and Czarnecka, 2020:2). Actually, during crises like Covid-19 when individuals feel anxious regarding the illness they tend to behave more precautiously lowering the their risk of getting sick (Park et al., 2020). But, distress, boredom, and frustration, related to confinement, decreases the level of social connectedness, and changes individuals usual habits making them more depressive (Serafini et al., 2020:529). Moreover, economic uncertainty resulting from the epidemic has also negative effects on individuals' mental health (Godinic, Obrenovic and Khudaykulov, 2020:61), since individuals having financial problems are more prone to live mental health problems (Yang et al., 2017).

In Turkey, the first Covid-19 case was seen on March 11, and as of October 18, we had 345.678 diagnosed cases, 9224 deaths (Turkish Ministry of Health 2020). In this study, we wanted to see the weekly differences in psychological responses, especially we examined the optimistic/pessimistic and hopeful attitudes of Turkish citizens by tracing the differences in weekly tweets posted from Turkey. For this purpose, text mining, emoji analysis, and sensitivity analysis have been performed with the Tweets posted with the hashtag #StayHome between 18 March and 28 May. The most frequently used words, word groups, and emojis in this period have been analyzed. Finally, analyzes have been made to understand the differences and similarities between general emotional states and 15-day (2-week) mood states.

2. Covid and Effects on Mental Health

Negative emotions like fear, anxiety, and psychological distress cause increase our susceptibility to illnesses and have many adverse effect on our immune systems, in contrast, positive emotions are important in nourishing our immune system (Koenig, 2020: 2) and give way to greater well-being (Baykal, 2019b: 246). In times of crises like Covid-19, a more positive mindset support positive adaptation of individuals. Without doubt, during these kind of crises fear is quiet common since anyone can be infected (Ho et al., 2020:1). After the outbreak of the pandemic, disproportionate public risk perceptions and emotion-driven behaviours led to a panicky atmosphere and many people have faced an ongoing sense of loss: loss of loved ones; health and jobs (Walsh 2020:2). Furthermore,

over exposure to information and too much social media exposure also effect people's mental health. Supporting this view, Gao et al., (2020) conducted a study in China and revealed that high prevalence of mental health problems are related to frequent social media exposure and leads to depression and anxiety.

Actually, negative emotions amidst Covid-19 are natural reactions of human mind. The theory of Behavioral Immune System (BIS) indicates that people tend to adopt negative emotions such as avoidant behaviors, anxiety and fear more frequently and they tend to obey social norms sincerely when they face up with risky situations (Li et al., 2020). In this point, Tan et al. (2020) examined the immediate psychological effects amidst Covid-19 pandemic. Results revealed that 10.8% of the respondents had post-traumatic stress disorder, 3.8% anxiety, 3.7% depression, 1.5% severe stress. Similarly, among eighteen thousand Weibo users Li et al. (2020) conducted a study and revealed that after Covid-19 outbreak negative emotions like anxiety, depression and indignation increased, whereas positive emotions and life satisfaction decreased. In another study conducted in Singapore by Ho et al. (2020), it is revealed that 53.8% of the participants reported severe psychological problems; 16.5% reported depressive symptoms; 28.8% anxiety, and 8.1%severe stress. Similarly, in the study conducted by Roy et al. (2020) in India, it was revealed that about 80 % of the participants were obsessed with COVİD-19 related negative thoughts and 12.5 %, sleep disorders, 37.8 %, had paranoia and 36.4 % lived stress. Moreover, in USA, another study showed that more than 25% of the sample reported moderate to severe anxiety symptoms. However, this was a period we need to be more resilient, optimistic and hopeful to combat with the pandemic.

2.1. Optimism/Pessimism and Covid-19

Quality of life that give birth to well-being and satisfaction from life mostly occurs as a a function of experiences in life and what one perceives of these experiences (Baykal, 2020: 62). In fact, well-being, feeling happy and satisfied with one's life, should be considered as a function of all feelings, perceptions, attitudes and responses one embraces regarding his/her life, making one build various different scenarios that creates either a perception of Paradise or Hell (Zehir and Narcikara, 2016; Michalos, 2017). This also applies to potential targets of illnesses. Related research reveals that, positive emotions including optimism are significant in the recovery process of people that experienced intense stress or health problems (Yamaguchi et al., 2020:49).

On the one hand, perceived risk theory suggest that individuals who experience the risks of a pandemic frequently tend to experience negative emotions more often (Slovic, 1987). Even so, in the case of Covid-19 people tend to underestimate the coronavirus risk (Raude et al., 2020). That is to say, their panic has not been so severe. Anyway, during the last decades, a great number of psychological studies have shown that risk perceptions of individuals are generally subject to an optimistic bias. According to the optimistic bias people are inclined to underestimate the probability of experiencing negative things and many people think they are less vulnerable to dangers and less likely to live bad events compared to other people (Raude et al., 2020). For instance; Kuper-Smith et al., (2020) tested individuals' beliefs about Covid-19 in UK, USA and Germany and revealed that people having optimistic bias, mostly underestimate getting sick.

Theoretically, Carver et al. (2010) explained optimism as a personal asset that describes the extent to which individuals have generalized positive expectations regarding their future. Optimism and pessimism levels of individuals can be considered as significant powers in coping with uncontrollable stress like pandemics (Arslan et al., 2020:2). In the extant literature it is revealed that optimism is related to adaptive individual results and subjective well-being (Peterson and Chang 2003; Scheier et al. 2001), whereas pessimism is related to maladaptive outcomes like depression or PTSD (Kwok and Gu 2017). Walsch (2020) also emphasized that shared believes among individuals, meaning-making and a positive, optimistic and hopeful attitude are important factors in recovery and positive growth during Covid-19. Supporting this views, In their study, applied in USA among 293 individuals Park

et al. (2020) assumed that optimistically biased individuals will perceive the risk of COVİD-19 to be lower when compared to unbiased individuals and they tend to feel less anxious and fearful about the disease but unfortunately this makes them less cautious about the preventive measures. Aslan et al. (2020) also examined the relationships among optimism/pessimism, inflexibility and psychological disorders among Turkish individuals amidst Covid-19. The study showed that optimism-pessimism and psychological inflexibility mediated the effect of stress related to Covid-19 on psychological disorders. Results also revealed that higher optimism and lower pessimism reduce negative effects of psychological inflexibility.

2.2. Pessimism and Covid 19

Pessimistic people have a stong convinction that negative experiences will be seen in the future (Baykal, 2018; Zuckerman et al. 2001). According to Affleck et al. (2001) when people are anxious and pessimistic they tend to more angry and depressed. Related research has revealed that certain charachteristics of individuals can change over time and stress is one of the most important factors changing neural dynamics shaping personality traits encompassing negative affectivity (Shields et al., 2016:61). In this point, Shields et al. (2016) examined the interaction of stress and pessimism levels of 332 individuals in a longitudinal model, which revealed that changes in stress were positively related to changes in pessimism. In other words, the personality trait of pessimism can be changed by stress. Aschwanden et al., (2020) also studied the effects of personality on psychological responses to Covid-19 and they found that higher neuroticism is strongly associated to more pessimistic expectations regarding Covid-19.

However, sometimes pessimism may lead to a more positive attitude and lead to better performance and growth (Norem and Chang, 2002:993). Defensive pessimism wherein people set unrealistic low expectations before they experience a situation with the aim of preparing themselves for potential unsuccesful results and motivate themselves to prepare to avoid this possible failure is an evidence for the possible positive results of pessimism. Related research regarding defensive pessimism suggest that individuals can harness their anxiety as motivation (Norem and Cantor, 1986: 1209). In the case of Covid-19 pandemic people either conciously or unconciously preferred to feel more pessimistically in order to prepare themselves for possible tragic ends including getting sick or losing a beloved one because of the pandemic. In this point, in their study DiClemente et al., (2020) examined U.S. adults from March 20-30, 2020. According to their results, 47% of respondents was pessimistic about the COVİD-19 and did not believe that it will be resolved in the next 3 months. Similarly, in their study among Turkish adults, Arslan and Yıldırım (2020) revealed that contrary to the assumptions of defensive pessimism, the more pessimistic are the individuals and the more they tend to live psychological problems.

2.3. Hope

With the help of positive emotions, individuals can end up with more relaxed, expansive, positive and hopeful attitudes and behaviours (Fredrikson 2013; Narcıkara, 2017b). Lopez (2010) claims that generally, hopeful individuals are more energetic, less stressful and anxious, and more excited about their own future. Moreover, they they do not afraid of challenges, tend to generate alternative plans and do not hesitate to gather support when needed, and tend to anticipitate success in return for their efforts.

Actually, hope is something that can be developed. Being hopeful is about setting goals, calculating how to reach these goals and motivating themselves to achieve those goals (Narcikara, 2017:17). Snyder explains hopefulness as a cognitive process helping individuals to reach their goals and make them aware of the ways to reach these goals (Snyder and Richard., 2002:249). In other words, it is a positive motivational emotion fed by an interactive sense of success consisting of target-oriented energy and ways planned to achieve goals. It is normal and necessary to have a certain degree of uncertainty about the hoped-out targets. Actually, hope is characterized by imagined results that are

significant and requires mental attention (Snyder et al., 2000: 750). According to hope theory, hope serves to drive positive emotions of individuals and increase their well-being (Snyder et al., 2002:274). That is why, being hopeful amidst crisis is helpful for recognizing the realities of the situation and surviving despite difficulties (Mostafanezhad, 2020:641).

According to Bernando and Mendoza (2020), during crises like COVİD-19 pandemic, when people's goal-related thoughts are known, namely their hopes and how these thoughts change should be known for better adapting to new social and physical situations are important in combatting with difficulties. That is why, during treatment of illnesses instilling hope to patients is very important (Cooper, Darmody, and Dolan, 2003). Supporting this view, Makarem's (2016) study revealed that the positive emotions including hope can be considered as a motivator for positive health behaviors. This study also indicated that treatment of illnesses is more comfortable when patients take control of their health and have a more hopeful attitude. Actually, for long term relief hope is useful in times of all kinds of adversities including illnesses and natural disasters as well. For instance; Hirono and Blake (2017) examined previous hurricanes in United States and the 2011 earthquake in Japan. In the aftermath of these terrible natural disasters, especially after 2 to 3 weeks, most of the survivors needed mental health assistance rather than material support. Restoring and maintaining hope were important for long-term relief and for combatting posttraumatic stress disorder. Unfortunately, we could not experience the same positive effect during Covid-19. During the pandemic, most of these media messages have been shown in quiete emotional manners, increasing negative feelings and creating hopelesness (Trnka and Lorencova, 2020: 548).

3. Text Mining in Social Networks

In our study understanding, text mining is vital for meaning-making. Text mining is a technology that works for extracting meaningful information from unstructured text data. The purpose of text mining is to automatically identify hidden patterns or trends in data (Tsantis & Castellani, 2001) and to create models that describe exciting patterns and trends in texts (Guo, Xu, Xiao & Gong, 2012). Text mining also includes information extraction (text summarization), clustering, and link analysis applications (Hung, 2012; Ingvaldsen & Gulla, 2012; Wetzsteina, Leitnerb, Rosenbergc, Dustdarb, & Leymann, 2011).

In recent years, researchers have been working to classify, cluster, and develop recommendations based on social data. Information from social networks is highly valuable because the millions of opinions posted on a topic are unlikely to be biased. Such opinions play an essential role in marketing research, stock market prediction, political elections, influencing or truly understand these behaviours (Bai, 2011; Eirinaki, Pisal, & Singh, 2012).

Twitter is a micro-blogging platform (Ravindran & Garg, 2015) that is evaluated by researchers as a result of useful applications. Twitter data may be used for comprehensive practices such as predicting a political process, investigating the effectiveness of a product, monitoring health, nutrition, and hygiene-related events (Jahanbin, Rahmanian, etc. 2019). For this reason, most researchers have focused on Twitter or news sites to understand or predict the changes in community dynamics. Research of countries with the highest number of Twitter users in October 2020 announced by Statista, it stated that the United States reached 68.7 million users. Japan and India ranked second and third with 51.9 and 18.9 million users, respectively. Turkey is ranked sixth with 12.7 million Twitter users Clement, 2020).

Text mining has recently been an effective and efficient approach in a wide range of research areas. To edit and understand documents, text mining reveals hidden semantic patterns in a complex corpus. Text mining is first used by state intelligence and security agencies to detect threats. These methods were then adapted to other areas, especially the health area (Meystre and others, 2008). Following technological advances and the development of natural language techniques, the number

of publications using text mining has more than doubled in 10 years (Zhu and others, 2013). Nowadays, text mining algorithms are employed for health (Korhonen et al., 2012; Silahtaroglu and Canbolat, 2018), intelligence (Reategui, et al., 2011; Romero & Ventura, 2007), marketing (Netzer, Feldman, Goldenberg and Fresko, 2012; Nassirtoussi, et al. 2014; Canbolat and Pinarbasi, 2020) and telecommunications contexts. Text mining studies can help to make sense of the feelings and thoughts of people and societies in unpredictable or debatable situations and periods such as economic crises, social upheavals, wars, or epidemics. In this way, governments can develop strategies to manage these situations or crises in society better. For example, Twitter has proven to be a useful communication platform during disasters and other crises (Zou, Cai and Qiang, 2018; Alam, Ofli, Imran and Aupetit, 2018).

The current COVİD-19 pandemic creates an atmosphere of uncertainty where people cannot be sure how to react and cope with emerging issues related not only to health but also employment, way of doing business, and social life. To better explore people and societies in an environment of uncertainty, researchers have turned to text mining studies. Analyzing Twitter content is a way for the public to identify concerns about the things threatening individual or public health. (Sanawi and Sarawak, 2017). It also helps to keep the pulse of a rapidly changing public opinion in situations like the COVİD-19 outbreak. Some recent studies have provided insights into treatment options and drug use for Covid-19 (Sanders et a., 2020; Lu, 2020; Gao, Tian and Yang, 2020). Tekumalla et al. (2020) analyze a large Twitter dataset of 424 million COVİD-19 conversations to identify potential treatments for the Covid-19 virus (Tekumalla and Banda, 2020). One of the most effective ways to prevent and control outbreaks is to monitor and track news and social networks about the spread of infectious diseases. Glowacki et al. (2020) analyze tweets containing #addiction and #covid hashtags using text mining tools to capture conversations about addiction in many countries during the COVİD-19 outbreak. As a result, they have stated that with the increasing (Lu, 2020; Gao et al., 2020) online accessibility during the Covid 19 period, the risk of gambling addiction has become a common health threat (Glowacki, Wilcox and Glowacki, 2020).

The objective of the study refers to the investigation of online conversation regarding Covid-19 in Turkey context and evaluation of similarities/differences included in the psychological reactions (optimistic/pessimistic attitudes) of society. For this aim, text mining methodology is employed to assess the conversations during Covid-19, especially in the first peak of the pandemic.

4. Data and Methodology

Aim of the Study: Microblog websites have become rich data sources for idea mining and sentiment analysis. In our study, Twitter, the most popular microblogging platform, is used for text mining and sensitivity analysis. Analyzing Twitter content will enable the public to identify their concerns, positive and negative moods about this epidemic. In this context, by tracing the differences in the tweets, it was aimed to see the weekly differences or similarities in the psychological reactions of the society, especially the optimistic /pessimistic and hopeful attitudes. The first official Covid19 case in Turkey has announced on March 11. And the authorities have started to make warnings not to leave the house except in necessary cases. After these warnings, people have started to send messages to each other to stay at home via social media. The sample of the study refers to the tweets in the #Stayhome (#evdekal in Turkish) hashtag on the March 18 – May 28, 2020, period. Consistent with to aim of the study, text mining was employed for the extraction of sentiments that society talks about during the Covid-19 period.

Data and Program Used: In the scope of this study, tweets with the hashtag #StayHome on the Twitter platform were retrieved. A total of 567.018 tweets sent between 10 weeks (in the period of 18 March- 28 May were fetched with the KNIME software. Pre-processing steps are employed for unstructured data to analyze. Analyzes including text cleaning, frequently used emoji analysis,

keyword extraction, 2 and 3 n-grams, and sentiment analysis were carried out. Throughout these analyzes, the R programming language (Version 1.3.1056) was used. For these analyzes, "dplyr", "tm", "syuzhet", "wordcloud" R packages were used (Wickham, et al., 2020; Feinerer and Hornik, 2019; Jockers, 2015; Fellows, 2018). Figure 1 shows the framework including the processes and analyzes for the tweet content.

**Figure 1:** Framework of data collection and analysis for the study.
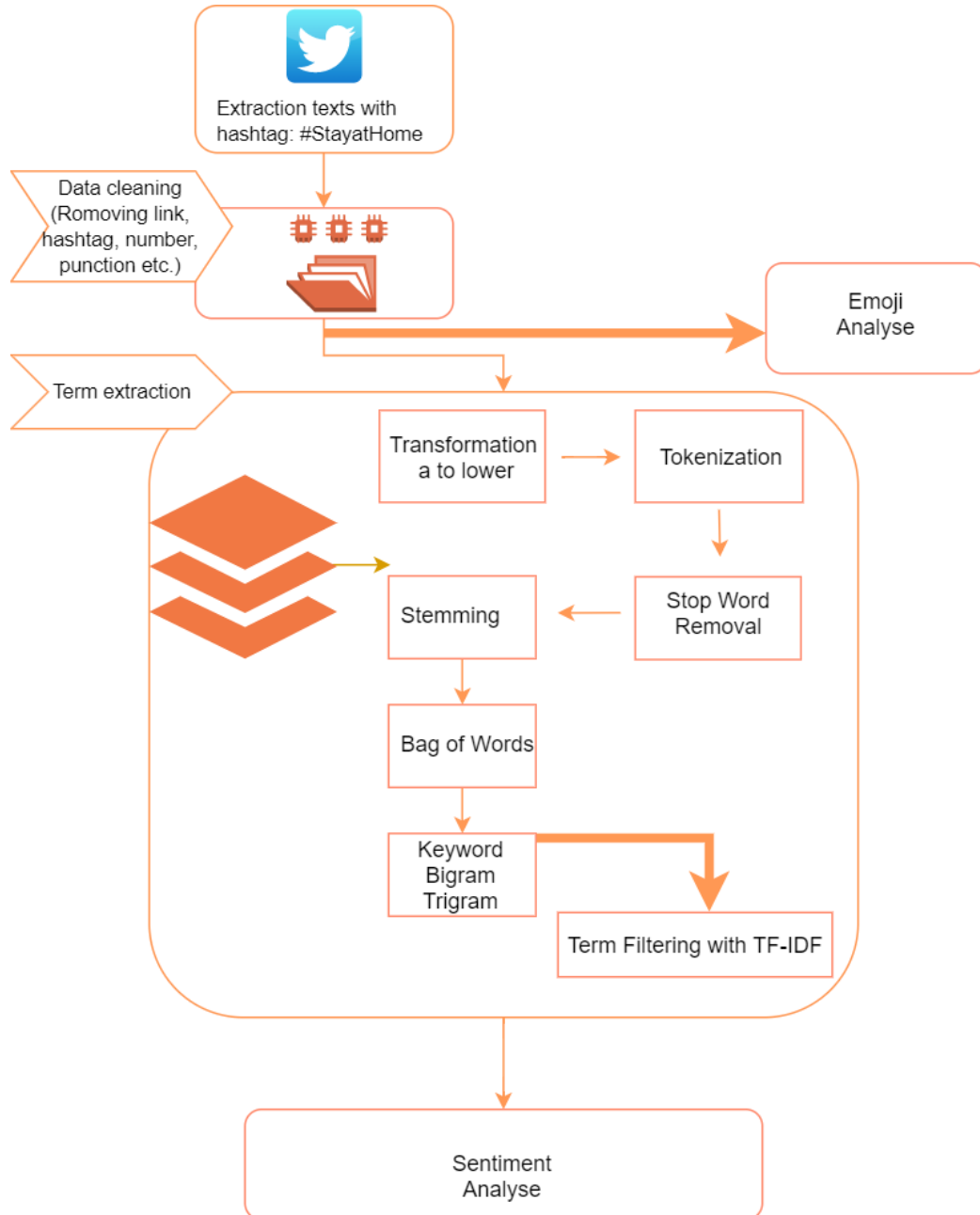
5. Findings

Timeline of Covid-19 stage has crucial breakpoints for the country-based events and their impacts on society. The first official coronavirus-induced cases in Turkey were announced on March 11, 2020 (Türkiye'de Covid-19 pandemisi, 2020). After this date;

- March 12: Schools are closed.
- March 13: Public events are restricted.
- March 15: Extensive travel and transport restrictions were imposed.
- March 16: The Friday prayer was suspended in the congregation. It was decided to postpone non-urgent surgeries and dental practices.
- 19 March: Football, basketball, handball and volleyball leagues are postponed.
- March 21: The number of centers performing Covid-19 tests increased to 73 in 44 provinces.
- March 22: Flexible work in the public sector started. Curfews were imposed on individuals aged 65 and over.
- March 24: The capacity of public transportation vehicles was reduced to 50 percent.
- April 4: Curfew restrictions were imposed on those under the age of 20. Entry and exit ban has started in 30 metropolitan cities. It was prohibited to be unmasked in places where collective work, markets and markets are.
- April 10: Curfew has been decided in 30 metropolitan cities for the weekend.
- 10 May: Hourly street leave application for people over 65 years old.
- 11 May: Hairdressers and shopping malls open:
- 13 May: Hourly street leave started for children up to the age of 14.
- 15 May: Hourly street leave application started for 15-20 age group.

In this period, restricting the mobility of people has been one of the most effective measures. For this reason, #StayHome messages have constantly featured in social media tools. Figure 2 shows the number of cases in the process and the line chart containing the Tweets posted with the #Evdekal hashtag. It can be said that the precautions described above and the increase in the number of cases caused an increase in the number of Tweets.

Figure 2. Weekly Number of Cases and Tweets (for #StayHome hashtag)
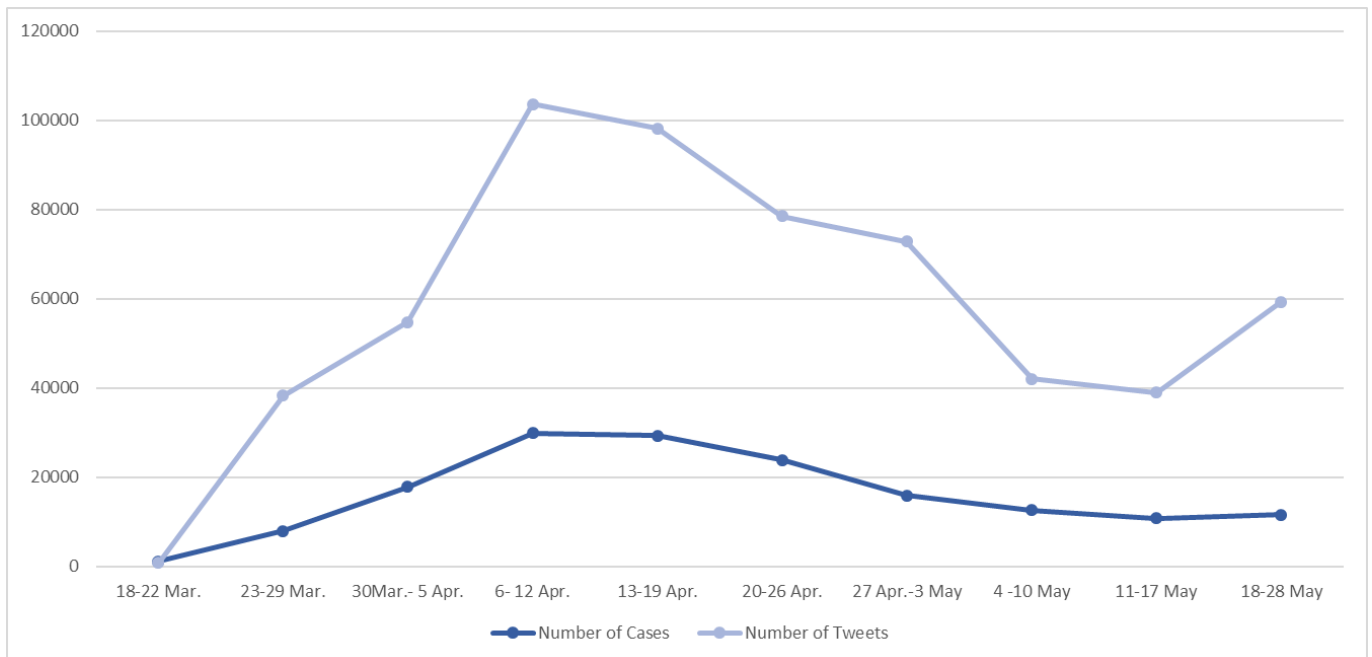
According to Figure 2, with #StayHome hashtag, the most Tweets (n = 103.587) have posted in the week of April 6-12. This may be due to the official announcement that the first large-scale curfew would begin on April 11-12

Table 1. Top Used hashtags

#hashtag	n
#EvdeHayatVar	10426
#HayatEveSığar	8301
#Covid19	6192
##SokagaCikmaYasagi	4426
#BirlikteBaşaracağız	2962

Top used in this period hashtags in Turkey are shown in Tables 1 (Except #StayHome). Excluding #StayHome from the analysis, it was seen that the second most hashtag was #ThereisLifeAtHome (EvdeHayatVar in turkish). It is seen that people constantly send messages to each other to stay at home and encourage them to stay at home. In addition, the curfews imposed by the state as a precaution caused more stay at home messages.

5.1. Text Mining

For text mining applications, data cleaning operations were carried out first. For these operations dplyr (Wickham et al. 2020), tm package (Feinerer et al., 2019) and tidytext (Silge and Robinson, 2016) packages are used. The Tm package is used for a methodology for the main text cleanup tasks shown in Figure 3;

Figure 3. Data Pre-processing
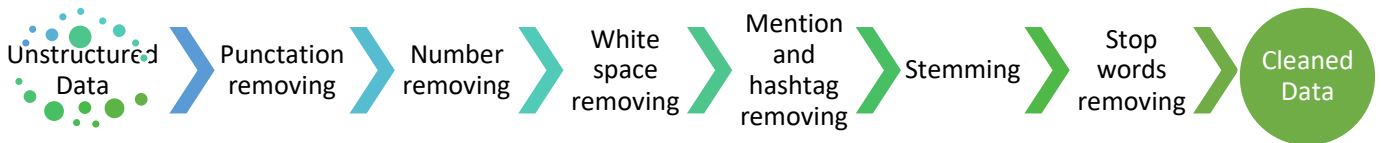
Punctuation marks, numbers, hashtags and double spaces are removed from unstructured text data. Stemming process is implemented after the removing process. The stemming refers to the process of deleting suffixes to extract word stems. It reduces complexity (especially for the word sack) without any serious information loss. One of the best-known derivation algorithms is based on Porter (1980) who describes an algorithm that separates common morphological and gravitational endings. The tm function stemDoc() provides an interface to the root determination algorithm. The subsequent word bag treats each word - or groups of words called n-grams - as a unique feature (Kwartler, 2017). The most used keywords were determined by evaluating the word frequencies.

Figure 3. Most Frequently Used Words and Their Frequencies
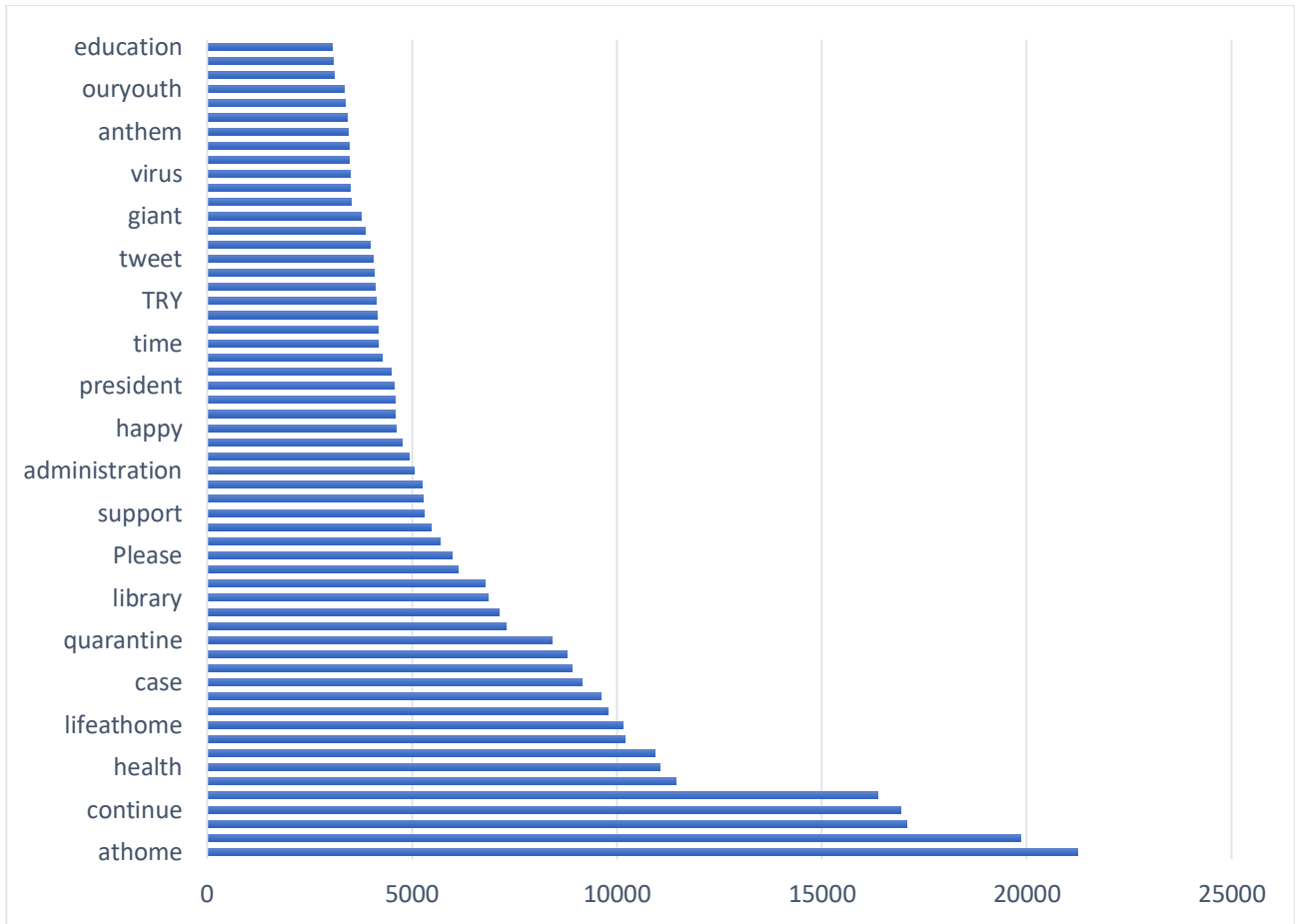
In Figure 3, the top used words and their frequencies in the hashtag #StayHome in this period are included. Accordingly, it was observed that people constantly emphasized staying at home during this period and frequently included words such as quarantine, health, incident, support, curfew, nationalism in their texts. In Turkey, as in Italy and other countries frequency of these hashtags also increased during this period of national unity and people's feelings ahead (Italians belt out national anthem during virus lockdown, 2020). In order to support each other and stay strong, the national anthem was sung together on some evenings. This result is also understood by the reflection of the word anthem in the word cloud.

After extracting the most frequently used keywords, n-grams were analyzed. It is a popular feature definition and analysis approach used in N-gram modelling, language modelling and Natural language processing. N-gram is a contiguous array of elements of length n. The most widely used n-gram models in text classification are word-based and character-based n-grams (Ahmed, Traore, & Saad, 2017). In a study, the gender of the people who wrote the text and image gender classification was estimated using the N-gram model (Nieuwenhuis, Ninth, & 2018). In another study, an n gram-based classifier was developed to distinguish between fake and honest news articles (Ahmed et al., 2017). In this study, word-based N-grams known as n = 2 (bigrams) and n = 3 (trigrams) word bags are used. Our study mostly consists of Turkish Tweets. However, the entire study has been translated into English. So, the n-gram lengths due to translation vary.

Table 2. The Top Used 2N-grams and 3N-grams for #StayHome hashtag

2N-gram	Frequency	3N-gram	Frequency
dont go out	6757	no going out	6391
bad times	6391	stay home healthy	6391
stay home	6288	power that applies knowledge	4256
board directors	6391	our quarantine offer is forbidden	3793
book gift	6391	virus struggle continue	3744
video conference	6097	please stay home	3352
small contest	4453	from beginning of the forbidden	2886
no exit	4280	implementing power crisis	2886
coronavirus measures	4258	conference board	2886
hours from start	4228	coronavirus measures video	2886
beat together	3915	measures video conferencing	2886
social distance	3795	district's coronavirus measures	2886
power crisis	3595	audi luxury price	2886
quarantine offer	2971	price million turkish	2886
power that implements	2886	rize governor authority	2885
information to citizens	2886	book gift is nice	2492
social support	2886	independence anthem staystrong	2492
book gift	2886	anthem staystrong staysafe	2492
nice book	2886	cannot pay debt	2492
Turkish lira	2886	home in quarantine days	2492
god bless	2496	see good days	2492
nice days	2493	police gendarme on the street	2418
number of cases	2492	police in Istanbul at night	2417
quarantine days	2492	social support groups	2389
continue to struggle	2492	raised a mug house	2388
independence anthem	2490	home Sweet Home	2385
staystrong staysafe	2472	see good days	2373
check debt	2418	power crisis quarantine	2161
economic crisis	2389	quarantine days ebatv	2161
dont be bored home	2164	should be careful together	2110

As seen in Table 2, it has been determined that the most frequently used 2 and 3 n-grams include expressions about virus precaution, togetherness, staying strong, and spending time at home by reading a book. In addition to these, it is seen that statements regarding the economic crisis, debts, and Turkish Lira are frequently used. Despite the ever-increasing number of cases and the uncertainty process, people have used social media to use positive statements about staying strong, struggle, and hope for the future.

5.2. Emoji Analysis

Understanding the emotional meaning of emojis is essential when trying to understand the context of the emoji given in a tweet or post. In the study called Emotion of Emojis, the frequency, sensitivity

and distribution of emojis were analyzed over a data set of 1.6 million tweets in 13 European languages. In this analysis, an emotion word map consisting of 751 different emoji was developed and each emoji was given an emotion score between -1 and 1; -1 means negative, 0 means neutral and 1 means positive. From this map it can be understood how emojis are used averagely in the context of a tweet. However, the way an emoji is interpreted can differ from one person to another. Different studies on emoji use can also be done using emoji analysis. For example, while fake accounts detection is not possible with just a set of emoji features when combined with other techniques such as pre-existing features and word cloud, these new features can add an extra layer of validity. It can also help detect tweets from hacked users by detecting tweets that deviate from known characteristics of a particular user based on Subject Model. In elections with different political parties, such as Democrats and Republicans in the United States, certain colors are used to distinguish different parties. Certain political emojis with colors to represent a particular political party may have a similar result to the analysis of those who mention specific candidates in tweets.

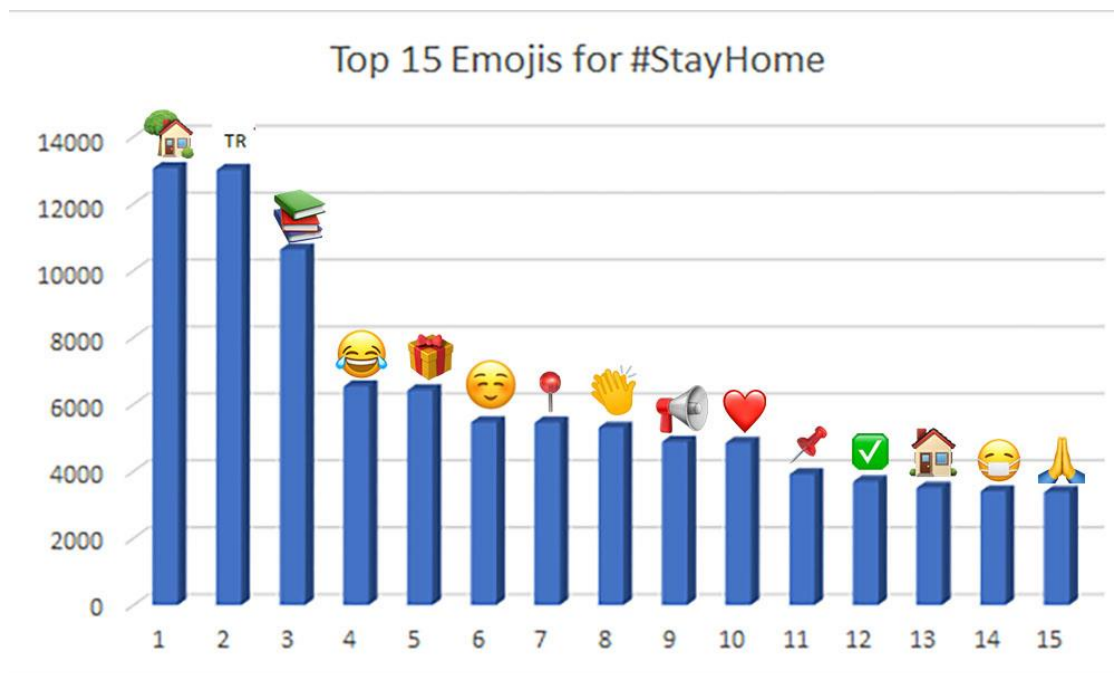**Figure 4.** Top 15 Emojis for #StayHome Hashtag

Figure 4 shows the most used 15 emoji in this process. Accordingly, it is seen that the first three most used emojis are home, TR symbol or abbreviation, and book. Here, it is understood that people give messages about spending time at home and reading books. Also, it is seen that in this period, people used to draw books and encourage each other to read books, as well as emojis. As with the 2-n-grams, it has been determined that prayer and supplication to God are also present in emoji analysis.

5.3.Sentiment Analysis

Sentiment analysis (SA) is a computational study of people's ideas, feelings, emotions, evaluations, and attitudes towards entities such as products, services, organizations, individuals, problems, events, issues, and their characteristics (Liu, 2015). Web-generated insights in blogs and social networks have recently become a valuable resource for mining user sentiment for customer relationship management, opinion tracking, and text filtering (Zhang, Zeng, Li, Wang, & Zuo, 2009). Online insights are now analyzed using sentiment analysis. This analysis is a natural language processing (NLP) application that uses computational linguistics and text mining to describe text sensitivity as positive, neutral, or negative in general. Therefore, SA can be regarded as an automated knowledge discovery technique aimed at finding hidden patterns in numerous reviews, blogs, or tweets (Mostafa, 2013). In this study, "syuzhet" package was used for emotion analysis (Jockers, 2015). "Syuzhet"

uses the NRC Emotion dictionary. The NRC dictionary of emotions is a list of words and their relationships with eight emotions (anger, fear, anticipation, trust, surprise, sadness, joy, and disgust) and two emotions (negative and positive).

Figure 5. Sentiment Type for Hashtag: StayHome
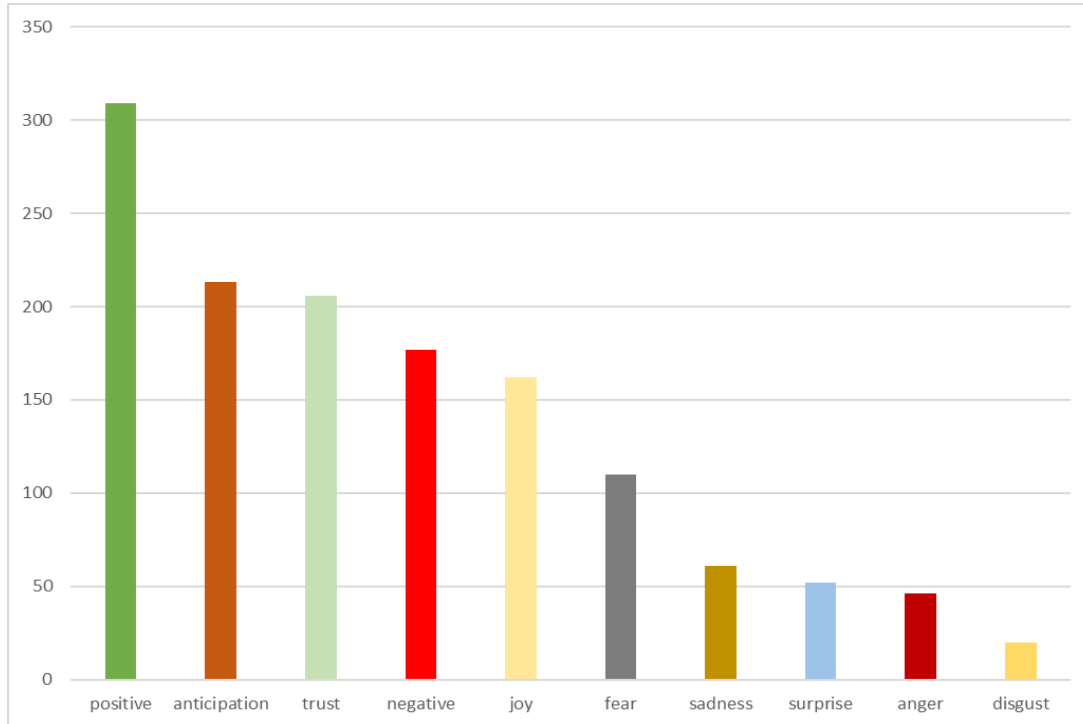
In Figure 5, the general mood for 10 weeks extracted from the texts is expressed. Accordingly, it is seen that positive emotions are in the foreground in general. In this period, people tried to give positive messages to support each other and shared the activities that can be done at home with each other. During this period, the number of live broadcasts increased, concerts, interviews, training, and even TV series continued online. Other emotions seen in the research were determined to be anticipations and trust.

In this period of uncertainty, curfews, restrictions, increase in cases and deaths have affected people psychologically and economically. This situation has reflected in both the words used (Table 2) and the emotions experienced. People have taken refuge in a sense of anticipation, hope, and trust for the good.

In Table 3, emotional changes of people are explained by analyzing these 10 weeks, in two-week intervals. Accordingly, except for the period covering the 3rd and 4th weeks, the general mood of people is positive (30 March-12 April). The feeling prominent in the weeks is negative. The reason for this is thought to be that the first curfews started in these weeks, restrictions were imposed, the depreciation of the TL, the cessation of production, the economic impact of the citizens and the increased concern. Intense emotional states have experienced between weeks change as positively, anticipation, trust and negative.

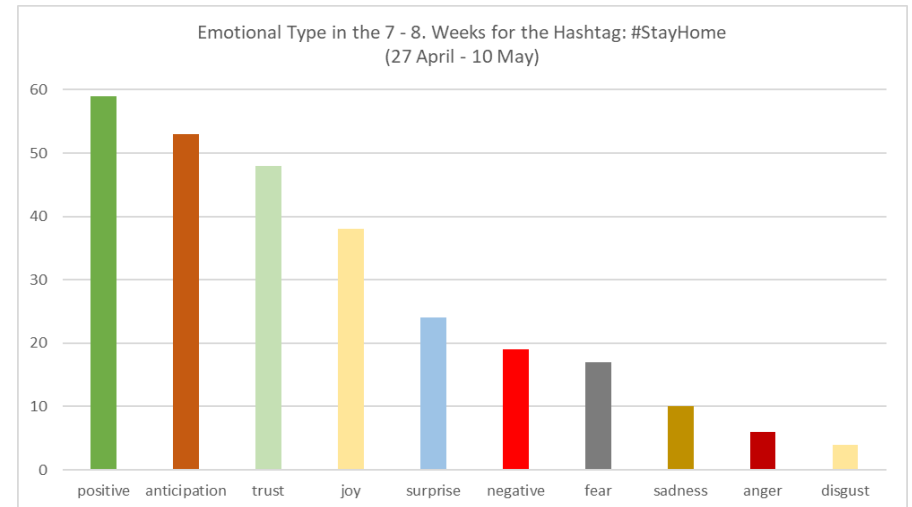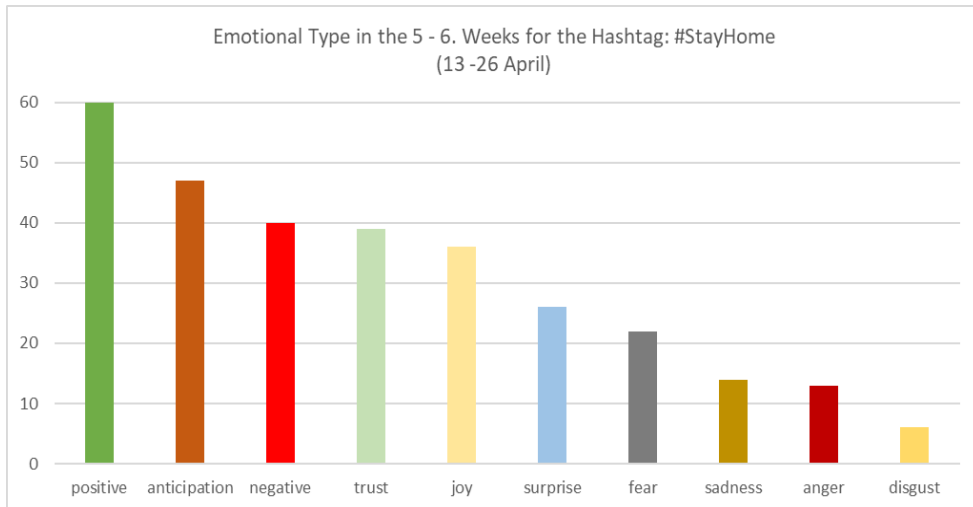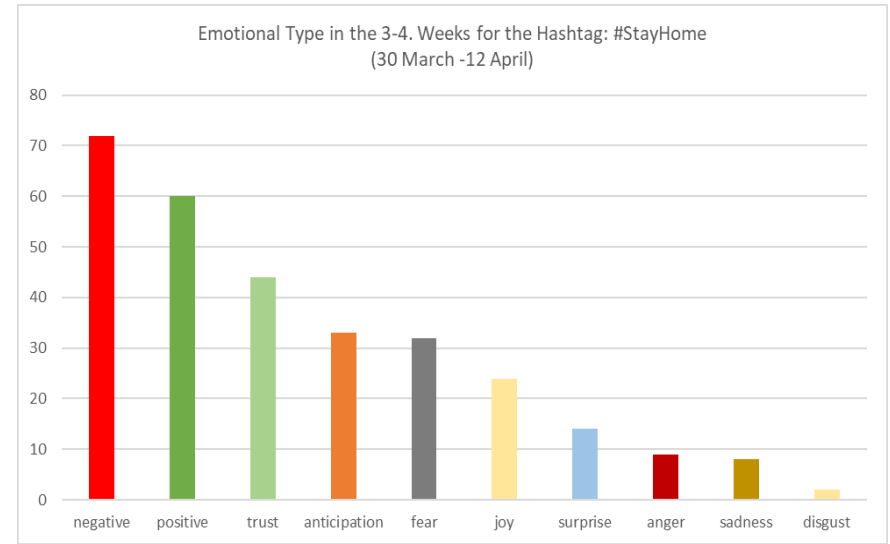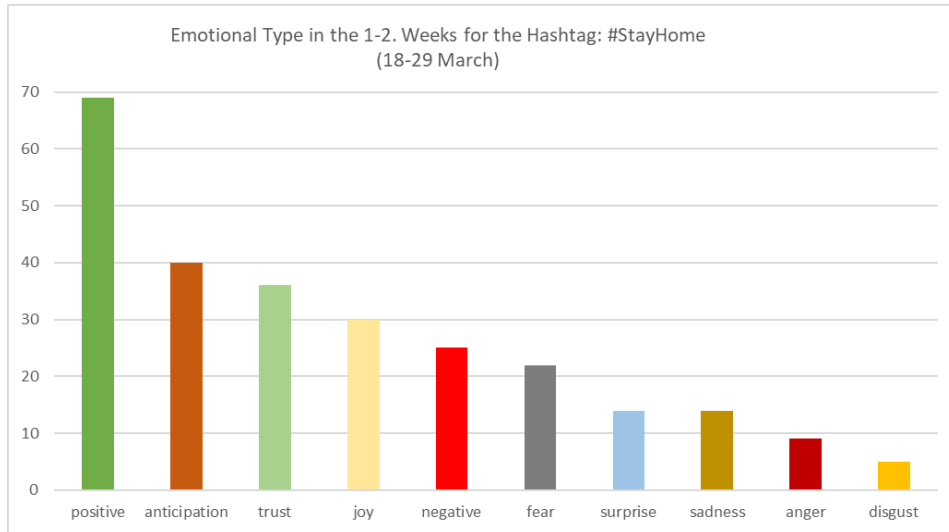**Table 3:** Emotional Changes Between Weeks

Table 3 (continued): Emotional Changes Between Weeks

Sentiment Type in the 9-10. Weeks for the Hashtag: #StayHome
(11 - 28 May)
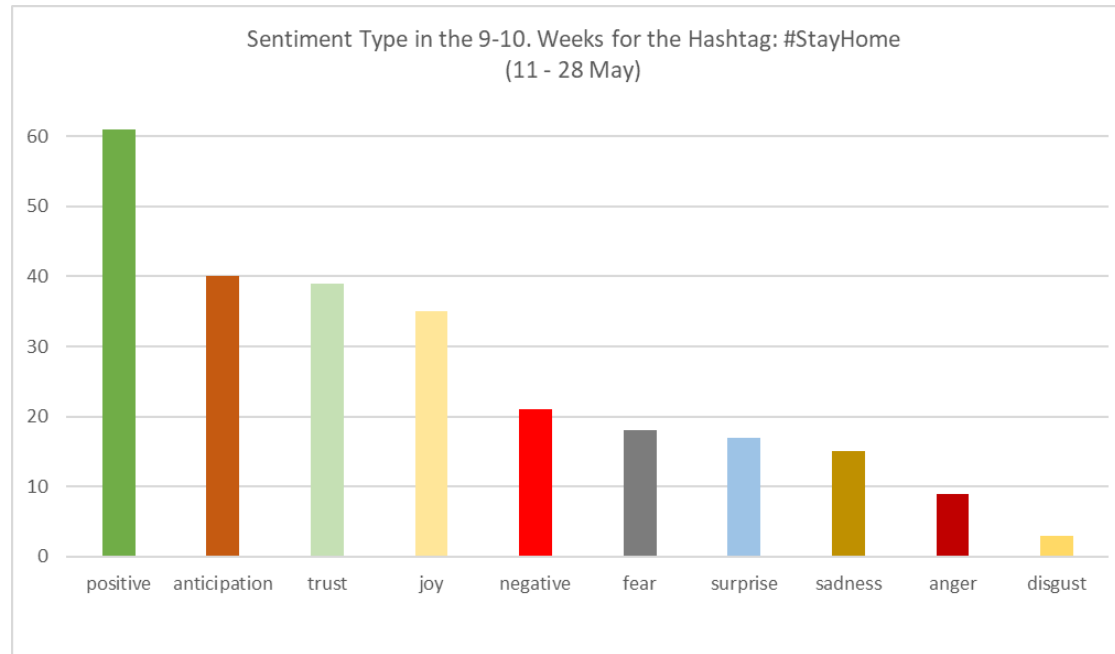
6. Conclusion

Uncertainty does not necessarily create despair (Keinst and Jansen, 2016: 376). Supporting this view, Marx and Engels talked about a strong sense of uncertainty in Modern World in their Communist Manifesto, by saying, "all that is solid melts into air" quoted in Keinst and Jansen, 2016: 376). In fact, they suggest that this is a reason for hope: they claimed that rapid change and extreme uncertainty in the modern World would eventually make individuals face the realities of life with sober senses. In our era, Covid-19 created this kind of an uncertainty wherein people are not sure how to react and struggle. Without doubt, in some cases, a deadly illness may give way to a 'dangerous opportunity' to enrich and develop one's life (Post et al., 2020, p. 6). Actually, in the case of Covid-19, the uncertainty atmosphere and panic created by the illness led to a greater need for optimism and hope. Related research has already shown that optimism and hopeful thinking can have positive effects on both physical and psychological health (Cheavens, Michael, & Snyder, 2005; Naseem and Khalid, 2010; Baykal and Zehir, 2018). Actually, an optimal balance between optimism and pessimism is the best strategy for survival. As in the case with most traits, optimism and pessimism are also distributed normally and outliers within the population help to create a balance in group decision making (Zuckerman et al., 2001:170).

In the study, posts posted with the hashtag #StayHome have been examined. The other most frequently used hashtags in this period consist of expressions that instil hope and will improve optimism in people such as #EvdeHayatVar, #HayatEveSığar, #SokagaCikmaYasagi, #BirlikteBaşaracağız (Table 1). As the number of cases increased, it has been observed that the number of tweets posted with the hashtag #StayHome also increased (Figure 2.). Especially in the week when the first curfew has been announced, there has a severe increase in the number of tweets. Among the 567,018 lines of text analyzed for text mining, the used words and the most frequently used two and three-word groups have been determined. The most commonly used words have been founded "home", "quarantine", "health", "case", "TL", "education", "prayer", "anthem", "time", "virus" et.al. (Figure 3.). Here, it can be said that there are positive, supportive and helpful expressions in general. Although there are negative expressions in the most frequently used 2-word and 3-word groups, positive, motivating and hopeful statements have generally used ("bad times", "economic crisis", "cannot pay the debt", "power crisis", "police gendarme on the street") (Table 2.). Besides, it has been observed that individuals used expressions arousing social commitment, positivism and hope. For example: "continue to struggle", "anthem staystrong staysafe", "stay home healthy".

In the sensitivity analysis conducted in the study, both the general sensitivity analysis (Figure 5.) has been performed, and weekly sensitivity analysis has been committed to understanding whether there was any change in the two-week processes. Accordingly, it has been concluded that positive emotions and hopeful feelings about expectation came to the fore in general. As a result, some differences have been observed in the emotions analyzed in two-week periods (Table 3.).

It has been determined that in the period between March 30 and April 12, negative emotions came to the fore. This situation is thought to stem from the first curfew being declared (April 10) due to the epidemic. Besides, it is understood that the increase in cases, the uncertainty during the pandemic and economic difficulties caused the development of negative emotions in society.

7. Discussion

According to the conservation of resources theory, health should be considered as a precious asset culminating overall psychological well-being (Godinic, Obrenovic and Khudaykulov, 2020: 63). On the one hand, a good job, financial and non-financial work benefits, good social relationships and financial stability should be viewed as significant assets giving way to one's growth, well-being and sense of identity thus building one' social identity (Godinic, Obrenovic and Khudaykulov, 2020: 63). In the case of Covid-19 individuals experienced both social identity risk and the risk of losing their resources in both material and non-material sense. During Covid-19, the most essential emotional

outcomes of the pandemic was financial and health-related fears resulting from pessimistic communications (Trnka and Lorencova, 2020: 546). In fact, during Covid-19, prevention methods such as social isolation and remote working have already deprived many employees of their key psychological capitals like self-esteem, self-efficacy and social support that are usually used as tools for reducing stress (Jesus et al., 2016). During Covid-19, although people sometimes underestimate their risk for disease, a phenomenon known as optimistic bias (Park et al., 2020: 1), in most cases, rapid changes regarding business life increased the panic created by uncertainty, possible job loss and loss of social contact caused stress-induced psychological problems (Godinic, Obrenovic and Khudaykulov, 2020:62). On the one hand, when the Covid-19 patients have been examined, it was seen that individuals' acceptance levels regarding their illnesses are affected by their psychological capital including self-confidence, optimism, and socio-demographic realities (Rzońca et al., 2018: 1).

In the related Covid-19 literature, we can come across studies on psychological responses of individuals. Still, most of them do not trace the weekly differences as in the case with our research. For instance; Li et al.'s study (2020) applied on 17865 Weibo users revealed that Covid-19 triggered unpleasant feelings like anxiety, and depressive symptoms increased, whereas positive emotions and satisfaction from life decreased. In another research conducted on 3480 Spanish adults after Covid-19 outbreak, it has been revealed that 18.7% of the participants showed depressive symptoms, 21.6% were anxious, and 15.8% had PTSD (González-Sanguino et al., 2020, p. 172). Similarly, Tan et al. (2020) also studied the immediate results of Covid-19 for employees returning to their works amidst Covid-19. From 673 participants, 10.8% has post raumatic stress disorder. 3.8% had anxiety, 3.7% showed depressive symptoms and 1.5% was really stressful. In contrast to what is expected in the research, research results did not confirm the expectations about severe negative psychological reactions about going back to work during the pandemic. González-Sanguino et al., (2020) also conducted a cross-sectional study in Spain on 3480 people after 14 March and Covid-19-related data has revealed that 18.7% of the participants were depressive, 21.6% had anxiety, and 15.8% had post-traumatic stress disorder symptoms. Similarly, another cross-sectional study conducted by Liang et al. (2020) in Chinese context two weeks after the outbreak showed that 14.4% of the participants had Post-traumatic stress disorder (PTSD) symptoms whereas 40.4% of the participants had a tendency to have psychological problems. Zhong et al.'s (2020) study in China examined people's attitudes about Covid-19. Most of the participants (97.1%) were optimistic about China's possibility of quick recovery, and higher knowledge was linked with lower negativity and embracement of higher preventive practices. Hernández-Sánchez et al. (2020). analyzed the effect of

-19 on perceptions and psychological of university students. They found that psychological factors like optimism and proactiveness have the potential to improve individuals' mental health and well-being.

Wang et al.'s (2020) study resembled our study in the point that they conducted a longitudinal study during Covid -19's initial outbreak, and the following four weeks and examined psychological effects of Covid-19. The study showed that initially, moderate-to-high level stress, anxiety and depression were seen in 8.1%, 28.8% and 16.5%, respectively and there were no significant longitudinal changes in stress, anxiety and depression levels in the fourth week. By using Google Trends data, Goldman (2020) traced some words searched in Google during Covid-19. For instance; they found that the change in the rate of searching for "boredom" was obvious. Searches fluctuated over time, but increased around March 14 and coincided with the increase for the searches of "anxiety". The search terms such as cooking, baking, sourdough, and restaurant also increased in this specific time period. Cellini et al. (2020) also examined the use of digital media before going to bed, sleep patterns and subjective experience of time during Covid-19 in Italy. Results revealed that sleep difficulties were stronger with depressive individuals that spend longer time with digital media. In addition to these, people's homes, country, book, and prayer emojis draw attention in emoji analysis. Weekly support applause to healthcare professionals and the masked man emoji are the other most used emojis. At

the end of the study, both text analysis, emoji analysis, and sensitivity analysis have been given us similar results. Citizens, in general, have supported each other in Turkey with positive messages. The emojis used, as well as the words used, are positive, optimistic emojis. As a result, except for the first two weeks of April, the general mood is positive, and the anticipations contain positive emotions.

REFERENCES

Affleck, G., Tennen, H., & Apter, A. (2001). Optimism, pessimism, and daily life with chronic illness.In E. C. Chang (Ed.), Optimism and pessimism: Implications for theory, research, and practice (pp. 147-168). Washington, DC: American Psychological Association.

Ahmed, H., Traore, I., & Saad, S. (2017). Detection of Online Fake News Using N-Gram Analysis and Machine Learning Techniques. In Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics) (Vol. 10618 LNCS, pp. 127–138). Springer Verlag. https://doi.org/10.1007/978-3-319-69155-8_9

Alam, F., Ofli, F., Imran, M., & Aupetit, M. (2018). A twitter tale of three hurricanes: Harvey, Irma, and Maria. In Proceedings of the International ISCRAM Conference (Vol. 2018-May, pp. 553–572). Information Systems for Crisis Response and Management, ISCRAM. Retrieved from https://www.unocha.org/legacy/what-we-do/coordination-tools/cluster-coordination

Arslan, G., & Yildirim, M. (2020). Coronavirus stress, meaningful living, optimism, and depressive symptoms: A study of moderated mediation model.

Arslan, G., Yıldırım, M., Tanhan, A., Buluş, M., & Allen, K. A. (2020). Coronavirus stress, optimism-pessimism, psychological inflexibility, and psychological health: Psychometric properties of the Coronavirus Stress Measure. International Journal of Mental Health and Addiction, 1.

Aschwanden, D., Strickhouser, J. E., Sesker, A. A., Lee, J. H., Luchetti, M., Stephan, Y., ... & Terracciano, A. (2020). Psychological and behavioural responses to coronavirus disease 2019: The role of personality. European Journal of Personality.

Bai, X. (2011). Predicting consumer sentiments from online text. Decision Support Systems, 50(4), 732–742. https://doi.org/10.1016/j.dss.2010.08.024

Baykal, E. (2018). Promoting Resilience Through Positive Leadership During Turmoil. International Journal of Management and Administration, 2(3), 34-48.

Baykal, E. (2019a). A Comparison About Eudaimonic Wellbeing in Authentic and Spiritual Leadership. Uluslararası Hukuk ve Sosyal Bilim Araştırmaları Dergisi, 2(1), 61-73.

Baykal, (2019b). Innovating Through Reflective Learning in Mindful Organizations: Effects of Authentic Leadership. In Handbook of Research on Managerial Thinking in Global Business Economics (pp. 246-261). IGI Global.

Bernardo, A. B., & Mendoza, N. B. (2020). Measuring hope during the COVID-19 outbreak in the Philippines: development and validation of the state locus-of-Hope scale short form in Filipino. Current Psychology, 1-10.

Bujang Sanawi, J., & Malaysia Sarawak Malia Taibi, U. (2017). #VACCINATION: IDENTIFYING INFLUENCERS IN THE VACCINATION DISCUSSION ON TWITTER THROUGH SOCIAL NETWORK VISUALISATION Mus Chairil Samani. International Journal of Business and Society (Vol. 18). Retrieved from http://www.ijbs.unimas.my/images/repository/pdf/Vol18-s4-paper9.pdf

Canbolat, Z. N., & Pinarbasi, F. (2020). Augmented Reality and Mobile Consumers: Mining Reviews of AR Applications for Consumer Perceptions. In In Managerial Challenges and Social Impacts of Virtual and Augmented Reality (pp. 76–94). IGI Global.

Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. Clinical Psychology Review, 30(7), 879– 889. https://doi.org/10.1016/j.cpr.2010.01.006.

Cellini, N., Canale, N., Mioni, G., & Costa, S. (2020). Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. Journal of Sleep Research, e13074.

Cheavens, J. S., Michael, S. T., & Snyder, C. R. (2005). The correlates of hope: Psychological and physiological benefits. In J. Eliott (Ed.), Interdisciplinary perspectives on hope (pp. 119–132). New York: Nova Science.

Chen, Q., Liang, M., Li, Y., Guo, J., Fei, D., Wang, L., He, L., Sheng, C., Cai, Y., Li, X., Wang, J., & Zhang, Z. (2020). Mental health care for medical staff in China during the COVID-19 outbreak. The Lancet Psychiatry, 7(4), e15–e16. https://doi.org/10.1016/S2215-0366(20)30078-X.

Clement, J., Leading countries based on number of Twitter users as of October 2020, https://www.statista.com/statistics/242606/number-of-active-twitter-users-in-selected-countries/ , [30.10.2020]

Cooper, S., Darmody, M., & Dolan, Y. (2003). Impressions of hope and its influence in the process of change: An international e-mail trialogue. Journal of Systemic Therapies, 22, 67–78.

DiClemente, R. J., Capasso, A., Ali, S. H., Jones, A. M., Foreman, J., & Tozan, Y. (2020). Knowledge, beliefs, mental health, substance use, and behaviors related to the COVID-19 pandemic among US adults: A national online survey.

Eirinaki, M., Pisal, S., & Singh, J. (2012). Feature-based opinion mining and ranking. Journal of Computer and System Sciences, 78(4), 1175–1184. https://doi.org/10.1016/j.jcss.2011.10.007

Feinerer, I. and Hornik, K. (2019). tm: Text Mining Package. R package version 0.7-7. https://CRAN.R-project.org/package=tm

Fellows, I. (2018). wordcloud: Word Clouds, https://CRAN.R-project.org/package=wordcloud

Fredrikson, B. L. (2013). Positive emotions broaden and build. Advances in Experimental Social Psychology, 47, 1–53. https://doi.org/10.1016/B978-0-12-407236-7.00001-2.

Fritze, J. G., Blashki, G. A., Burke, S., & Wiseman, J. (2008). Hope, despair and transformation: climate change and the promotion of mental health and wellbeing. International journal of mental health systems, 2(1), 1-10.

Gao, J., Tian, Z., & Yang, X. (2020). Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. BioScience Trends. International Advancement Center for Medicine and Health Research Co., Ltd. https://doi.org/10.5582/BST.2020.01047

Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., ... & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. Plos one, 15(4), e0231924.

Glowacki, E. M., Wilcox, G. B., & Glowacki, J. B. (2020). Identifying #addiction concerns on twitter during the COVID-19 pandemic: A text mining analysis. Substance Abuse, 1–8. https://doi.org/10.1080/08897077.2020.1822489

Godinic, D., Obrenovic, B., & Khudaykulov, A. (2020). Effects of Economic Uncertainty on Mental Health in the COVID-19 Pandemic Context: Social Identity Disturbance, Job Uncertainty and Psychological Well-Being Model. International Journal of Management Science and Business Administration, 6(1), 61-74.

Goldman, D. S. (2020). Initial observations of psychological and behavioral effects of COVID-19 in the United States, using Google trends data.

González-Sanguino, C., Ausín, B., Castellanos, M. Á., Saiz, J., López-Gómez, A., Ugidos, C., & Muñoz, M. (2020). Mental health consequences during the initial stage of the 2020 Coronavirus pandemic (COVID-19) in Spain. Brain, Behavior, and Immunity. https://doi.org/10.1016/j.bbi.2020.05.040

Guo, J., Xu, L. Da, Xiao, G., on, Z. G.-I. T., & 2012, undefined. (n.d.). Improving multilingual semantic interoperation in cross-organizational enterprise systems through concept disambiguation. Ieeexplore.Ieee.Org. Retrieved from https://ieeexplore.ieee.org/abstract/document/6159080/

Hernández-Sánchez, B. R., Cardella, G. M., & Sánchez-García, J. C. (2020). Psychological Factors that Lessen the Impact of COVID-19 on the Self-Employment Intention of Business Administration and Economics' Students from Latin America. International Journal of Environmental Research and Public Health, 17(15), 5293.

Hirono, T., & Blake, M. E. (2017). The role of religious leaders in the restoration of hope following natural disasters. Sage open, 7(2), 2158244017707003.

Ho, C. S., Chee, C. Y., & Ho, R. C. (2020). Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. Ann Acad Med Singapore, 49(1), 1-3.

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry research, 112954.

Hung, J. (2012). Trends of e-learning research from 2000 to 2008: Use of text mining and bibliometrics. British Journal of Educational Technology, 43(1), 5–16. https://doi.org/10.1111/j.1467-8535.2010.01144.x

Ingvaldsen, J. E., & Gulla, J. A. (2012). Industrial application of semantic process mining. Enterprise Information Systems, 6(2), 139–163. https://doi.org/10.1080/17517575.2011.593103

Italians belt out national anthem during virus lockdown (2020), https://www.wtoc.com/2020/03/13/italians-belt-out-national-anthem-during-virus-lockdown/ , [18.10.2020]

Jahanbin, K., Rahmanian, F., … V. R.-G. H. and, & 2019, undefined. (n.d.). Application of Twitter and web news mining in infectious disease surveillance systems and prospects for public health. Ncbi.Nlm.Nih.Gov. Retrieved from, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6997800/

Jesus, S. N., Leal, A. R., Viseu, J. N., Valle, P., Matavelli, R. D., Pereira, J., & Greenglass, E. (2016). Coping as a moderator of the influence of economic stressors on psychological health. Análise Psicológica, 34(4), 365-376.

Jovančević, A., & Milićević, N. (2020). Optimism-pessimism, conspiracy theories and general trust as factors contributing to COVID-19 related behavior–A cross-cultural study. Personality and Individual Differences, 110216.

Khadjeh Nassirtoussi, A., Aghabozorgi, S., Ying Wah, T., & Ngo, D. C. L. (2014, November 15). Text mining for market prediction: A systematic review. Expert Systems with Applications. Elsevier Ltd. https://doi.org/10.1016/j.eswa.2014.06.009

Kleist, N., & Jansen, S. (2016). Introduction: Hope over time—Crisis, immobility and future-making. History and Anthropology, 27(4), 373-392.

Koenig, H. G. (2020). Maintaining Health and Well-Being by Putting Faith into Action During the COVID-19 Pandemic. Journal of Religion and Health. https://doi.org/10.1007/s10943-020-01035-2

Korhonen, A., Ó Séaghdha, D., Silins, I., Sun, L., Högberg, J., & Stenius, U. (2012). Text Mining for Literature Review and Knowledge Discovery in Cancer Risk Assessment and Research. PLoS ONE, 7(4), e33427. https://doi.org/10.1371/journal.pone.0033427

Kuper-Smith, B. J., Doppelhofer, L. M., Oganian, Y., Rosenblau, G., & Korn, C. (2020). Optimistic beliefs about the personal impact of COVID-19,1-4.

Kwartler, T. (2017). Text Mining in Practice with R. Text Mining in Practice with R. https://doi.org/10.1002/9781119282105

Kwok, S. Y., & Gu, M. (2017). The role of emotional competence in the association between optimism and depression among Chinese adolescents. Child Indicators Research, 10(1), 171–185.

Li, S., Wang, Y., Xue, J., Zhao, N., & Zhu, T. (2020). The impact of COVID-19 epidemic declaration on psychological consequences: a study on active Weibo users. International journal of environmental research and public health, 17(6), 2032.

Liang, L., Ren, H., Cao, R., Hu, Y., Qin, Z., Li, C., & Mei, S. (2020). The effect of COVID-19 on youth mental health. Psychiatric Quarterly, 1-12.

Liu, B. (2015). Sentiment analysis: Mining opinions, sentiments, and emotions. The Cambridge University Press.

Liu, Y., Wang, Z. H., & Li, Z. G. (2012). Affective mediators of the influence of neuroticism and resilience on life satisfaction. Personality and individual differences, 52(7), 833-838.

Lopez, S. J. (2010). Making ripples: How principals and teachers can spread hope throughout our schools. Phi Delta Kappan, 92(2), 40-44.

Lu, H. (2020). Drug treatment options for the 2019-new coronavirus (2019-nCoV). BioScience Trends, 14(1), 69–71. https://doi.org/10.5582/bst.2020.01020

Makarem, S. C. (2016). Emotions and cognitions in consumer health behaviors: insights from chronically ill patients into the effects of hope and control perceptions. Journal of Consumer Behaviour, 15(3), 208-215.

Matthew L. Jockers. (2015). Syuzhet: Extract Sentiment and Plot Arcs from Text. Retrieved from https://github.com/mjockers/syuzhet

Mamun, M. A., & Griffiths, M. D. (2020). First COVID-19 suicide case in Bangladesh due to fear of COVID-19 and xenophobia: possible suicide prevention strategies. Asian Journal of Psychiatry, 51, 102073. https://doi. org/10.1016/j.ajp.2020.102073.

Michalos, A. C. (2017). Education, happiness and wellbeing. In Connecting the quality of life theory to health, well-being and education (pp. 277-299). Springer, Cham.

Mostafa, M. M. (2013). More than words: Social networksâ€™ text mining for consumer brand sentiments. Expert Systems With Applications, 40, 4241–4251. https://doi.org/10.1016/j.eswa.2013.01.019

Mostafanezhad, M. (2020). Covid-19 is an unnatural disaster: Hope in revelatory moments of crisis. Tourism Geographies, 1-7.

Narcıkara, E. (2017). Spiritüel liderlik davranışının algılanan performans üzerine etkisi. Yayınlanmış Doktora Tezi, Yıldız Teknik Üniversitesi, İstanbul.

Narcıkara, E. B. (2017b). Örgüt Ortamında Artarak Yükselen Olumluluk: Pozitif Örgüt Okulu Bakış Perpektifi. İş'te Davranış Dergisi, 2(1), 20-33.

Naseem, Z., & Khalid, R. (2010). Positive Thinking in Coping with Stress and Health outcomes: Literature Review. Journal of Research & Reflections in Education (JRRE), 4(1).

Netzer, O., Feldman, R., Goldenberg, J., & Fresko, M. (2012). Mine your own business: Market-structure surveillance through text mining. Marketing Science, 31(3), 521–543. https://doi.org/10.1287/mksc.1120.0713

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., ... & Agha, R. (2020). The socio-economic implications of the coronavirus and COVID-19 pandemic: a review. International Journal of Surgery. 78(1), 185-193.

Nieuwenhuis, M., Ninth, J. W.-P. of the, & 2018, undefined. (n.d.). Twitter text and image gender classification with a logistic regression n-gram model. Pdfs.Semanticscholar.Org. Retrieved from https://pdfs.semanticscholar.org/07ae/f685296f299b4c27a058ff18b19fb5c7592c.pdf

Norem, J. K., & Chang, E. C. (2002). Tholohe positive psychology of negative thinking. Journal of clinical psychology, 58(9), 993-1001.

Novak, P. K., Smailović, J., Sluban, B., & Mozetič, I. (2015). Sentiment of Emojis. https://doi.org/10.1371/journal.pone.0144296

Park, T., Ju, I., Ohs, J. E., & Hinsley, A. (2020). Optimistic bias and preventive behavioral engagement in the context of COVID-19. Research in Social and Administrative Pharmacy.1-8.

Peteet, J. R. (2020). COVID-19 Anxiety. Journal of Religion and Health, 1.

Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., ... & Abel, K. M. (2020). Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. The Lancet Psychiatry.

Post, L., Ganzevoort, R. R., & Verdonck-De Leeuw, I. M. (2020). Transcending the suffering in cancer: Impact of a spiritual life review intervention on spiritual re-evaluation, spiritual growth and psycho-spiritual wellbeing. Religions, 11(3).

Raude, J., Debin, M., Souty, C., Guerrisi, C., Turbelin, C., Falchi, A., ... & Duggan, J. (2020). Are people excessively pessimistic about the risk of coronavirus infection?.

Ravindran, S., & Garg, V. (2015). Mastering social media mining with R. Retrieved from https://books.google.com/books?hl=en&lr=&id=0tlOCwAAQBAJ&oi=fnd&pg=PP1&dq=+Ravindran+SK,+Garg+V.+Mastering+social+media+mining+with+R.+Mumbai:+Packt+Publishing+Ltd%3B+2015.&ots=UnlJnXJqI-&sig=BJex6WfVEKR3O2kAqhAwmlZSlJ0

Reategui, E., Epstein, D., Lorenzatti, A., & Klemann, M. (2011). Sobek: a Text Mining Tool for Educational Applications. In Proceedings International Conference on Data Mining (DMIN) (pp. 59–64). Retrieved from https://search.proquest.com/openview/760d9954b5290142a8a5e6b20eb06a19/1?pq-origsite=gscholar&cbl=1976357

Romero, C., & Ventura, S. (2007). Educational data mining: A survey from 1995 to 2005. Expert Systems with Applications, 33(1), 135–146. https://doi.org/10.1016/j.eswa.2006.04.005

Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. Asian Journal of Psychiatry, 102083.

Rzońca, E., Iwanowicz-Palus, G., Bień, A., Wdowiak, A., Szymański, R., & Chołubek, G. (2018). Generalized self-efficacy, dispositional optimism, and illness acceptance in women with polycystic ovary syndrome. International journal of environmental research and public health, 15(11), 2484.

Sanders, J. M., Monogue, M. L., Jodlowski, T. Z., & Cutrell, J. B. (2020, May 12). Pharmacologic Treatments for Coronavirus Disease 2019 (COVID-19): A Review. JAMA - Journal of the American Medical Association. American Medical Association. https://doi.org/10.1001/jama.2020.6019

Serafini, G., Parmigiani, B., Amerio, A., Aguglia, A., Sher, L., & Amore, M. (2020). The psychological impact of COVID-19 on the mental health in the general population. Int. J. Med. 2020. 529-535.

Shanafelt, T., Ripp, J., & Trockel, M. (2020). Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. Jama, 323(21), 2133-2134.

Shields, G. S., Toussaint, L. L., & Slavich, G. M. (2016). Stress-related changes in personality: A longitudinal study of perceived stress and trait pessimism. Journal of research in personality, 64, 61-68.

Silahtaroglu, G. & Canbolat. Z. N. (2018). Sosyal Medyanın Veri Sermayesi Olarak Kullanımı: Sağlık Sektörü Örneği. Yönetim Bilişim Sistemlerinde Gündem (pp. 87–98). Çağlayan.

Tekumalla, R., & Banda, J. M. (2020). (2020). Characterization of Potential Drug Treatments for COVID-19 using Social Media Data and Machine Learning. ArXiv Preprint ArXiv:2007.10276.

Snyder, C. R. (1995). Conceptualizing, measuring and nurturing hope. Journal of Counseling & Development, 73, 355-360.

Snyder, C. R., Ilardi, S. S., Cheavens, J., Michael, S. T., Yamhure, L., & Sympson, S. (2000). The role of hope in cognitive-behavior therapies. Cognitive therapy and Research, 24(6), 747-762.

Steinbrecher, E., Jordan, S. S., & Turns, B. (2020). Providing Immediate Hope to Survivors of Natural Disasters: A Miracle Question Intervention. The American Journal of Family Therapy, 1-16.

Silge, J.; Robinson, D. (2016). tidytext: Text Mining and Analysis Using Tidy Data Principles in R, http://dx.doi.org/10.21105/joss.00037

Tan, W., Hao, F., McIntyre, R. S., Jiang, L., Jiang, X., Zhang, L., ... & Zhang, Z. (2020). Is returning to work during the COVID-19 pandemic stressful? A study on immediate mental health status and psychoneuroimmunity prevention measures of Chinese workforce. Brain, behavior, and immunity. 0889-1591 https://doi.org/10.1016/j.bbi.2020.04.055

Torales, J., O'Higgins, M., Castaldelli-Maia, J. M., & Ventriglio, A. (2020). The outbreak of COVID-19 coronavirus and its impact on global mental health. In International Journal of Social Psychiatry (Vol. 66, Issue 4, pp. 317–320). SAGE Publications Ltd. https://doi.org/10.1177/0020764020915212.

Trnka, R., & Lorencova, R. (2020). Fear, anger, and media-induced trauma during the outbreak of COVID-19 in the Czech Republic. Psychological trauma: theory, research, practice, and policy, 12(5), 546.

Trzebiński, J., Cabański, M., & Czarnecka, J. Z. (2020). Reaction to the COVID-19 pandemic: the influence of meaning in life, life satisfaction, and assumptions on world orderliness and positivity. Journal of Loss and Trauma, 1-14.

Tsantis, L., & Castellani, J. (n.d.). Enhancing Learning Environments Through Solution-based Knowledge Discovery Tools: Forecasting for Self-perpetuating Systemic Reform. journals.sagepub.com. Retrieved from https://journals.sagepub.com/doi/abs/10.1177/016264340101600406

Türkiye'de COVID-19 pandemisi, https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_COVID-19_pandemisi#Nisan_2020, [22.10.2020]

Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., ... & Drury, J. (2020). Using social and behavioural science to support COVID-19 pandemic response. Nature Human Behaviour, 1-12.

Walsh, F. (2020). Loss and Resilience in the Time of COVID-19: Meaning Making, Hope, and Transcendence. Family process.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., ... & Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. Brain, behavior, and immunity.

Wetzsteina, B., Leitnerb, P., Rosenbergc, F., Dustdarb, S., & Leymann, F. (2011). Identifying influential factors of business process performance using dependency analysis. Enterprise Information Systems, 5(1), 79–98. https://doi.org/10.1080/17517575.2010.493956

Wickham, H., François, R., Henry, L. and Müller, K. (2020). dplyr: A Grammar of Data Manipulation. R package version 1.0.2. https://CRAN.R-project.org/package=dplyr

Yamaguchi, K., Takebayashi, Y., Miyamae, M., Komazawa, A., Yokoyama, C., & Ito, M. (2020). Role of focusing on the positive side during COVID-19 outbreak: Mental health perspective from positive psychology. Psychological Trauma: Theory, Research, Practice, and Policy, 12(S1), S49.

Yang T., Jiang S., Yu L., Cottrell R. R., Si Q. (2017). Life stress, uncertainty stress and self- reported illness: a representative nationwide study of Chinese students. J. Public Health 26 205–209. 10.1007/s10389-017-0837-9

Zandifar, A., & Badrfam, R. (2020). Iranian mental health during the COVID-19 epidemic. Asian Journal of Psychiatry, 51, 101990. https://doi.org/10.1016/j.ajp.2020.101990.

Zehir, C., & Narcıkara, E. (2016). Effects of resilience on productivity under authentic leadership. Procedia-Social and Behavioral Sciences, 235, 250-258.

Zhang, C., Zeng, D., Li, J., Wang, F. Y., & Zuo, W. (2009). Sentiment analysis of chinese documents: From sentence to document level. Journal of the American Society for Information Science and Technology, 60(12), 2474–2487. https://doi.org/10.1002/asi.21206

Zhong, B. L., Luo, W., Li, H. M., Zhang, Q. Q., Liu, X. G., Li, W. T., & Li, Y. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. International journal of biological sciences, 16(10), 1745.

Zou, L., Cai, H., & Qiang, Y. (2018). Mining Twitter Data for Improved Understanding of Disaster Resilience Surface-Adjusted Terrain Analysis View project Using Remote Sensing to map slums inner characteristics View project. Taylor & Francis, 108(5), 1422–1441. https://doi.org/10.1080/24694452.2017.1421897