

## Research Article

# The Relationship between the VUCA Environment and Managers' Decision-Making Styles

*VUCA Ortamı ile Yöneticilerin Karar Verme Tarzları Arasındaki İlişki\**

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## ABSTRACT

*The acronym VUCA, which summarizes turbulent times, represents a volatility, uncertainty, complexity and ambiguity business world. Although it contains many opportunities, many researchers consider VUCA a significant threat to decision-making processes for managers. The purpose of this study is to determine the relationship between the decision-making styles of managers and the VUCA environment created by the global health crisis. In this context, a survey was conducted on 90 mid-level managers with decision-making authority in a state hospital with a capacity of 700 beds operating in Eskişehir/Türkiye. The study has a cross-sectional research design. Statistical analyses revealed that managers most preferred "rational decision-making" and least preferred "avoidant decision-making" styles. The correlation analysis showed a significant and positive relationship between complexity in VUCA environments and rational decision-making. Furthermore, it was observed that complexity significantly differs based on the duration of working as a manager.*

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## MAKALE BİLGİSİ

**Anahtar Kelimeler:**  
KOMB (VUCA),  
Karar Verme Tarzları,  
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## ÖZ

*Yaşanan çalkantılı zamanları özetleyen bir kısaltma olan KOMB (VUCA), karmaşık, oynak, muğlak ve belirsiz bir iş dünyasını temsil etmektedir. Her ne kadar içerisinde birçok fırsatı barındırırsa da pek çok araştırmacıya göre KOMB, yöneticilerin karar verme süreçleri açısından ciddi bir tehdit unsurudur. Çalışmanın amacı, yaşanan küresel sağlık krizinin yarattığı VUCA ortamının yöneticilerin karar verme tarzları ile ilişkisinin belirlenmesidir. Bu doğrultuda 700 yatak kapasiteli, Eskişehir/Türkiye'de faaliyet gösteren bir devlet hastanesinde karar verme yetkisine sahip 90 orta düzey yöneticiye anket uygulaması gerçekleştirilmiştir. Çalışma kesitsel bir araştırma tasarımına sahiptir. İstatistiksel analizler sonucunda yöneticilerin kararlarında en çok "rasyonel karar verme" en az da "kaçınma karar verme" tarzlarını tercih ettilerini bulunmuştur. Korelasyon analizi sonucunda KOMB ortamlarından karmaşıklık ile rasyonel karar verme arasında anlamlı ve pozitif bir ilişki tespit edilmiştir. Aynı zamanda karmaşıklığın, yönetici olarak çalışma sürelerine göre anlamlı bir farklılık gösterdiği görülmüştür.*

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## 1. INTRODUCTION

The management processes of businesses consist of making numerous decisions and implementing these decisions (strategies), which should enhance their economic and financial performance. Today's managers must maintain their businesses' competitiveness in a volatility, uncertainty, complexity ve ambiguity (VUCA) world. This world is a dynamic environment encompassing various negative situations, such as technological changes, temporary advantages, fragmented markets, multifaceted competitors, global economic conditions, unstable governments, political turmoil, volatile financial markets, and unpredictable consumers. It would not be incorrect to characterize the COVID-19 pandemic as a VUCA situation due to its impact on political, economic, and socio-cultural dimensions. This period, particularly for employees in decision-making positions, has brought about an extremely radical mental transformation. In a business environment where conditions have fundamentally changed, old methods, techniques, beliefs, and experiences are no longer sufficient.

The COVID-19 pandemic has led to a classic example of VUCA (volatility, uncertainty, complexity ve ambiguity) in healthcare institutions, just as in all other sectors (Sherman, 2020). However, the pandemic has created more intense and urgent demands in healthcare institutions compared to other sectors. During this period, a sudden increase in the number of patients and critical situations had to be managed. Since the beginning of the pandemic, hospitals have undergone significant operational changes. Innovative solutions, such as increasing the capacity of intensive care units and emergency services, conducting a high number of COVID-19 tests, and fostering cooperation among hospitals, have been developed. Additionally, digital health solutions such as telemedicine and remote health services have had to be rapidly adopted. Meanwhile, healthcare workers, dealing with the high stress, trauma, and emotional burden brought by COVID-19, have made employee mental health an important concern for hospital managers. During this period, long working hours, high risk, and moral deterioration have become some of the biggest challenges in the healthcare sector. Furthermore, the uncertainties about the accuracy of information and the predicted outcomes of the pandemic have led to confusion and difficulties in decision-making due to the numerous variables and unknowns (Ranney, Griffeth & Jha, 2020; Smith et al., 2020; Schwartz et al., 2020; Sherman, 2020). This crisis situation, with constantly changing parameters and the burden it has placed on hospitals, has also affected the decision-making styles of managers. It has created significant pressure on mid-level managers who bridge the

information gap between top management and frontline clinicians (Urquhart, et al., 2018).

The Occupational Handbook of the Bureau of Labor Statistics (2016) defines the primary responsibilities of mid-level managers as planning, directing, and coordinating health services. Mid-level managers can manage an entire facility or a specific clinical area or department, or they can oversee a group of physicians' practices. Typically, they are responsible for enhancing efficiency and quality in the delivery of healthcare services, tracking new laws and regulations for compliance, supervising assistant managers in large facilities, and managing financial operations such as patient fees and billing. Mid-level managers also create and monitor work schedules, keep track of bed usage, maintain records, and communicate with medical staff and department heads (Belasen & Belasen, 2016). During the COVID-19 pandemic, as hospital staff faced unprecedented challenges such as inadequate equipment, capacity issues against the patient load, excessive work, and emotional exhaustion combined with the fear of exposure to the virus, mid-level managers were at the center of the connection between top management and employees. For these reasons, mid-level managers, who are considered key points in hospitals, form the subject of this study.

In a turbulent environment filled with numerous challenges and changes, institutions must adapt their management systems to maintain or even increase their efficiency and sustain a competitive advantage. All activities carried out within an organization are based on a series of interdependent managerial decisions, and methods are determined to transform these decisions into goals and actions, thereby ensuring economic and financial balance. Frequently, activities conducted within organizations change, as the conditions and characteristics of today's business environment are undergoing more transformations, necessitating the updating of decision-making processes. Employees must be prepared to organize their activities in this volatility, uncertainty, complexity ve ambiguity environment defined as VUCA. There are various indirect and direct effects (interdependent variables, constraints, and limiting situations or crisis situations accepted as VUCA here) that affect the outcomes of decisions made at different management levels within organizations (Minciu, Berar, Dobrea, 2020).

Upon examining the national and international literature, it has been observed that there are very few studies that address the VUCA environment and decision-making styles during the COVID-19 process. In the studies reviewed, it was found that the relationship between different management practices and the VUCA environment during the COVID-19

process was mostly established. For instance, Tarsuslu (2023), in his study conducted with 387 employees at Erzincan Research and Practice Hospital, determined the mediating role of work stress on the effect of employees' perception of the VUCA environment on burnout levels during the COVID-19 process. Güл and Sönmez (2022), in their study presented as a review, explored how talent management can be used as a method for coping with VUCA environments such as the COVID-19 pandemic in the nursing workforce. In another study, İnal, Akdemir, and Cihan (2021) examined the mediating role of anxiety level in the effect of the VUCA environment on human resources efficiency among 627 employees. International studies have also been reviewed; Mathew, Gupta & Jagose (2023), in their study based on secondary data, aimed to understand various technology-based innovations and change management techniques adopted by healthcare sector enterprises in the VUCA world and to explore innovations that will drive the Indian healthcare sector in the coming years. Pandit M. (2020), in his brief report based on experiences at Oxford University Hospitals, suggested that the culture of an organization serves as a fundamental pillar in managing crises such as the COVID-19 pandemic and emphasized that leaders need to make many changes to cope with the challenges.

In their study, Marques da Rocha et al. (2023) investigated the impact of Post-Traumatic Stress (PTS) symptoms reported during the COVID-19 pandemic on decision-making styles. Tanış and Yanık (2021) conducted a study with 51 healthcare managers on decision-making styles and job engagement during the pandemic. Valente, C.O., et al. (2022) analyzed the scientific output related to the decision-making processes of healthcare workers during the COVID-19 pandemic. The authors conducted an integrative review in databases such as CINAHL, MEDLINE, Scopus, ScienceDirect, WoS, and BVS. When studies on decision-making during the Covid period across different sectors are evaluated, it is observed that only a limited number of studies exist. Among these, Jamshaid et al. (2023) conducted a study with 350 students aged 18-25, investigating the effects of participants' mood states and cognitive styles on their decision-making styles during the Covid period. Garcia, Oliveira, Pitelli, and Vieira (2023) proposed a methodology for managerial decision-making based on scenario planning and multi-criteria approaches in their study conducted in an agricultural business during crisis periods such as Covid. The researchers aimed to provide managers with a structured methodology that they can use for planning the future of their businesses. In his study, Al-Dabbagh (2020) identified the role of decision-makers in crisis management (COVID-19). Using in-depth

interviews with 15 decision-makers, a theory was developed that explains the decision-making process, skills, and strategies during crises based on the findings obtained. Finally, Vallejo (2021) conducted a survey with 303 individuals from various sectors (production, finance, education, technology, professional services, transportation, medical care, etc.). The study used a hypothetical model to measure the effectiveness percentage of business outcomes caused by the results of three decisions made by managers during the first weeks of the COVID-19 pandemic, evaluating the decisions taken. When the literature on the decision-making styles of managers during the COVID-19 process was examined, it was seen that the subject was mostly addressed in terms of the factors affecting the decision-making process. (Schippers & Rus, 2021; Johnson, 2022).

In this context, no study has been identified in the national and international literature that examines the relationship between the VUCA environment and managerial decision-making styles during the COVID-19 period. This study aims to introduce a new perspective to the literature. In the existing literature, the concept of VUCA (Volatility, Uncertainty, Complexity, Ambiguity) has generally been addressed within the context of the business world, focusing on managerial decision-making processes during periods of crisis. However, these studies have neglected to explore the impact of global health crises, such as COVID-19, on the healthcare sector and how they shape the decision-making styles of healthcare managers. The healthcare sector experienced a unique VUCA environment during the pandemic, where operational, clinical, and managerial challenges intertwined. In this regard, our study contributes to the literature by examining how decision-makers in the healthcare sector adopt different decision-making styles in a VUCA environment. Accordingly, this article aims to analyze the relationship between the VUCA environment—brought about by the global health crisis, which required a radical mental transformation in decision-making positions and where conditions fundamentally changed, rendering old methods, techniques, beliefs, and experiences insufficient—and managerial decision-making styles.

## 2. CONCEPTUAL FRAMEWORK

### 2.1. Understanding the VUCA Environment

VUCA, which became popular in the 1990s as a way for the U.S. military to describe the more complex and difficult-to-understand geopolitical landscape in which it operated (Health Research Institute, 2015), has now become an inevitable environment for

businesses in all sectors. The sense of certainty, stability, and familiarity that individuals and organizations were accustomed to has given way to chaos and uncertainty. Furthermore, the world has undergone rapid structural changes with the declaration of the COVID-19 pandemic by the World Health Organization on March 11, 2020. Structural changes are often triggered by factors such as technological innovations, new economic developments, shifts in global capital and labor pools, changes in the availability of resources, changes in the supply and demand for resources, and changes in the political landscape. However, this time, many structural changes were triggered by unknown viruses (Nishimoto, 2021).

Baran and Woznyj (2021), in their interviews with more than 1,000 company executives between June 2015 and June 2018, investigated how 35 trends would affect them over the next three years. The top 5 of these trends, which could be considered VUCA, were as follows: (1) technological advancements and innovations, (2) economic and financial issues, (3) environmental and social concerns, (4) geopolitical, regulatory, and security issues, and (5) workforce dynamics. During the period when the study was conducted, no one could have anticipated a pandemic that would affect the entire world. However, the pandemic was added to the major trends listed by Baran and Woznyj (2021), further challenging healthcare institutions operating in an already volatile environment in their daily operations. Therefore, healthcare institutions that want to succeed in a VUCA environment must develop a growth mindset that includes new regulations, new products, new paradigms, and new technologies (Mathew, Gupta & Jagose, 2023).

VUCA is an acronym formed by the initials of Volatility, Uncertainty, Complexity, and Ambiguity. The acronym describes dynamic changes in the external environment that affect the functioning of businesses. These changes lead to internal restructuring within organizations and the transformation of competency models, requiring the identification of key behaviors and skills of employees. The VUCA world is characterized by rapid and chaotic changes, a lack of standards, and the constant invalidation of plans and projects. In the 21st century, VUCA has significantly impacted the corporate and business world, making it difficult for managers to understand and define their environments. Leadership agility and the ability to adapt have become essential skills to succeed in the VUCA world. Managers need to be flexible and capable of making quick decisions, constantly changing human resources, processes, technology, and structure (Pearse, 2017; Baran & Woznyj, 2021; Popova, Shynkarenko, Kryvoruchko & Zeman,

2018; Nowacka & Rzemieniak, 2022). Consequently, VUCA brings together four different types of challenges in one word and offers four different types of responses to them. The four different environments of VUCA are briefly explained below.

**Volatility:** Volatility can be defined as a situation that is unstable or unpredictable; this does not imply a complex structure, a lack of critical information, or an inability to know what the consequences of significant events might be. Rather, it indicates that the causes of change are known and that the change is unpredictable or unstable to a certain extent (Bennett & Lemoine, 2014a). Examples include fluctuations in prices as a result of a natural disaster taking a supplier offline (Bennett & Lemoine, 2014b) or the blocking of highways and ports, and the limitation or stoppage of production in factories due to measures taken to control the number of cases during COVID-19. The negative effects experienced during the pandemic, such as supply chain disruptions in various electronics like electric/self-driving cars, white goods, and mobile phones (chip crisis), led to financial fluctuations.

**Uncertainty:** Characterized by a dominant sense of a lack of information about what kinds of changes may occur in the near future. The Organization for Economic Cooperation and Development (OECD) defines uncertainty as the quality of the information we have about a particular event/situation occurring and the inability to predict a possible outcome before it is triggered (Cernega et al., 2024). An example could be the uncertainty of the future of the business and the market due to the expected product launches by competitors (Bennett & Lemoine, 2014b). During the pandemic, policymakers who had to respond urgently or take innovative approaches had to adopt regulatory actions without complete evidence or scientific certainty.

**Complexity:** It refers to interconnected parts, networks, and procedures in the organization's internal and external business environment. These parts may be undefined and/or contradictory (Saleh & Watson, 2017). An example could be a business operating in many countries, each with its own unique regulatory environments, tariffs, and cultural values (outsourcing/offshoring) (Bennett & Lemoine, 2014b). Additionally, during the COVID-19 process, healthcare institutions faced an uncontrollable, variable accumulation that complicated normal and known ways of doing business (costs, tariffs, regulations, people, etc.) (Cernega et al., 2024).

**Ambiguity:** It refers to the blurring of facts, the potential for misreading events and situations, and

the cause-and-effect confusion. Ambiguity also expresses the risk of interpreting information, situations, and events in the wrong ways (Yurdashev, 2019). Examples could include businesses attempting to enter immature or developing markets or launching products outside their core competencies (Bennett & Lemoine, 2014b). During the COVID-19 process, there were many sources of information about events and outcomes, offering different perspectives and multiple interpretations of reality, which led to ambiguity regarding the information circulating worldwide (Cernega et al., 2024).

## 2.2. Decision-Making Styles

Decision-making is one of the primary tasks of all managers. Mintzberg (1990) defined four out of ten managerial roles as "decision-making roles." Decision-making is not a standalone function but a critical part of all management functions (Cosgrave, 1996). In other words, decision-making encompasses all managerial functions, and all management processes involve decision-making. Managers are continually in the process of making decisions while performing managerial activities (planning, organizing, directing, coordinating, and controlling functions). In this respect, decision-making is an important element that constitutes the entirety of managerial processes and activities (Bilgiç, 2024).

The decision-making process can vary depending on the positions, knowledge levels, education levels, and personality structures of employees in the organization. Thus, decision-making styles diversify, resulting in different decision-making styles. Many studies have been conducted on decision-making styles in the literature, and various approaches have been developed (Bozkurt & Ercan, 2019). One of the most well-known is the General Decision-Making Style developed by Scott and Bruce (1995). The researchers tried to integrate all previous studies on decision-making styles and defined decision-making style as "a learned, habitual response pattern exhibited by an individual when confronted with a decision situation" (Bilgiç, 2024). Scott and Bruce (1995) noted that the conceptual framework in the decision-making style research field was not clear and that useful tools synthesizing data from all studies were lacking. They developed a conceptually consistent and psychometrically robust scale of decision-making styles through a multi-phase study involving four samples. As a result of their study, they developed the General Decision-Making Styles Scale, which identifies five decision-making styles: rational, intuitive, dependent, avoidant, and spontaneous (Scott & Bruce, 1995). This study also uses the General Decision-Making

Style developed by Scott and Bruce (1995). These decision-making styles are briefly as follows:

*Rational Decision-Making:* Situations where a rational and systematic approach is exhibited in decision-making, alternatives are thoroughly researched, and logical evaluation is conducted.

*Intuitive Decision-Making:* Situations where abstract factors such as feelings, foresight, and similar elements dominate decision-making, relying more on instincts and emotions.

*Dependent Decision-Making:* Characterized by seeking advice and guidance from others.

*Avoidant Decision-Making:* Involves avoiding decision-making and postponing the decision-making process.

*Spontaneous Decision-Making:* Marked by a desire to complete the decision-making process as quickly as possible without much thought.

In conclusion, managers are required to make critical decisions under uncertainty and time pressure, especially during crisis periods like the COVID-19 pandemic. The effectiveness of decision-making processes depends on how well they integrate and interpret complex information. This process requires balancing various interests, such as public health, the economy, mental health, and human rights. These high-risk situations make the decision-making process vulnerable to errors and biases (Schippers & Rus, 2021). In a VUCA environment, managers can better manage uncertainty and complexity by adopting the decision-making style most suitable for the situation, as defined by Scott and Bruce (1995). This can help these managers overcome uncertainties and make effective decisions.

## 3. RESEARCH

### 3.1. Purpose of the Study

The purpose of this study is to determine the relationship between the VUCA environment and the decision-making styles of managers during the global health crisis. The specific research questions addressed are as follows:

Is there a relationship between the VUCA environment and the decision-making styles of managers?

Do decision-making styles vary according to certain characteristics of the participants?

Do responses to the VUCA environment differ based on some characteristics of the participants?

Which decision-making style do managers prefer the most?

Which VUCA environment is predominantly perceived among managers?

### 3.2. Research Method

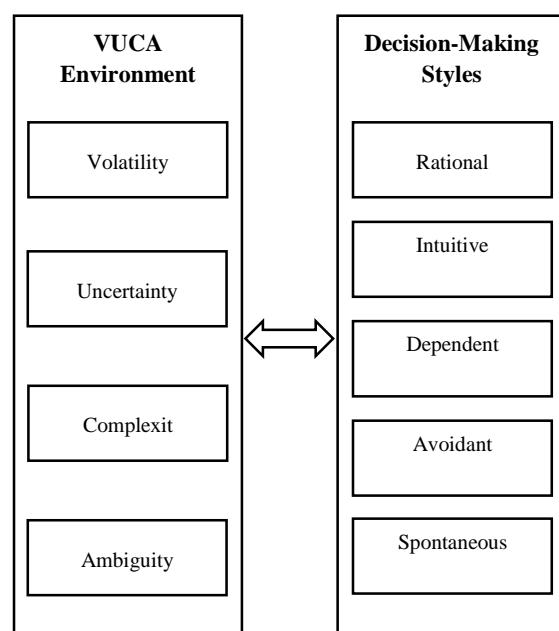
This study includes 90 unit managers and assistant managers out of 120 middle level managers working at Yunus Emre State Hospital in Eskişehir province of Turkey. This hospital is a tertiary care health institution (the highest level of medical technology and inpatient care). During the COVID-19 pandemic, it served as a designated pandemic hospital, which led to an intense VUCA (Volatility, Uncertainty, Complexity, Ambiguity) environment both operationally and clinically. Throughout the pandemic, the hospital became a significant regional reference center, offering patient admissions, intensive care services, and isolation units. With a capacity of 700 beds and a large healthcare workforce, it stands as one of the largest and most comprehensive public hospitals in the region. This scale increased the managerial and operational complexity, making the VUCA environment more pronounced. These characteristics provided a suitable basis for examining the impact of the VUCA environment on the decision-making styles of healthcare managers.

For this research, Ethics Committee Approval was received from Afyon Kocatepe University, Social and Human Sciences Scientific Research and Publication Ethics Committee with the decision number 2021/206 dated 24.05.2021.

Questionnaires were sent to all unit managers online, and responses were requested. Due to the pandemic, the surveys were shared with participants online. The questionnaire included questions to determine certain characteristics of the participants and scales prepared in a 5-point Likert type. The study employed the "VUCA Scale" developed by Yurdasever (2019), which consists of 20 items, and the "General Decision-Making Styles Scale," developed by Scott and Bruce (1995) and adapted into Turkish by Acar (2020), consisting of 24 items, to measure individual differences in decision-making approaches. Data collected in the study were evaluated using the Statistical Package for Social Sciences (SPSS) 22.0 program. Cronbach's Alpha coefficients were calculated for the reliability analysis of the scales used in the study. For the analysis of the data obtained from the research, statistical techniques such as arithmetic mean,

standard deviation, and correlation analysis were utilized. Additionally, descriptive information about the participants was presented using number and percentage distributions. In the study, whether the managerial evaluations related to VUCA and decision-making styles differed according to various demographic variables was analyzed using the Mann-Whitney U and Kruskal-Wallis tests. Furthermore, Spearman correlation analysis was performed to determine the relationship between VUCA and decision-making styles.

Below in the following sections, the research model and analysis findings developed based on the studies in the literature are given in Tables 2, 3, 4, 5 and 6.



**Figure 1:** Research Model

Basic hypotheses of the study are constructed as follows depending on the research model.

H<sub>1</sub>: There is a significant difference in the perception of the VUCA environment based on the participants' status of having a medical role.

H<sub>2</sub>: There is a significant difference in the perception of the VUCA environment based on the participants' duration of working as a manager.

H<sub>3</sub>: There is a significant difference in decision-making styles based on the participants' gender.

H<sub>4</sub>: There is a significant difference in decision-making styles based on the participants' educational level.

H<sub>5</sub>: There is a significant difference in decision-making styles based on the number of subordinates managed by the participants.

H<sub>6</sub>: There is a significant difference in decision-making styles based on the participants' total years of professional experience.

#### 4. FINDINGS

The findings of this study, which aimed to determine the relationship between the VUCA environment and the decision-making styles of managers at Yunus Emre State Hospital, a 700-bed facility in Eskişehir, Turkey, are presented below. The first section provides some descriptive statistics related to VUCA and decision-making styles. The following section analyzes whether perceptions of VUCA and decision-making styles differ according to various demographic variables using the Mann-Whitney U and Kruskal-Wallis tests. Finally, the correlation analysis concerning VUCA and decision-making styles is presented.

When examining the demographic characteristics, it is seen that 67% of the managers are female, and 33% are male; 24% have a high school-associate degree, while 76% have a bachelor's or postgraduate degree. Among the participants, 72% are fulfilling both managerial duties and medical roles (such as doctors, nurses, etc.), while 28% are engaged solely in managerial duties. Of the managers, 12% have been in the profession for 5-10 years, 14% for 10-15 years, 20% for 15-20 years, and 53% for more than 20 years. When looking at the number of years the participants have worked as managers, 49% have been in managerial positions for 1-3 years, 30% for 3-5 years, and 21% for over 5 years. Regarding the number of subordinates, it is observed that 36% of managers have 1-19 subordinates, 30% have 20-39, and 34% have over 40 subordinates.

##### 4.1. Findings Related to the Scales Used

When examining the data in Table 1, it is observed that the Cronbach's Alpha value of the 20-item VUCA scale is 0.911, and the Cronbach's Alpha value of the 24-item Decision-Making Styles scale is 0.908. In general, it can be stated that the Cronbach's Alpha values of the scales and their respective factors fall within the range of  $0.60 \leq \alpha < 0.80$  and  $0.80 \leq \alpha < 1.00$ , indicating that they are highly reliable and very reliable (Özdamar, 2004: 56).

Looking at the average values related to the sub-dimensions of the scales, it is seen that, in the hospital where the research was conducted, Complexity (4.22) is perceived as the most dominant among the VUCA environments.

When examining the values related to decision-making styles, it is observed that managers prefer Rational decision-making the most, with an average score of 4.41. The behavior of postponing or avoiding decisions, with an average score of 2.01, was the least preferred by the managers.

Some descriptive statistics regarding the scales are given in Table 1 below.

**Table 1: Descriptive Statistics and Reliability Coefficients for the Scales**

Scales and Subscales	Number of Items	$\bar{X}$	SS	Cronbach's Alpha
Complexity	5	4.22	0.58	0.779
Volatility	5	3.95	0.66	0.782
Ambiguity	5	3.28	0.84	0.787
Uncertainty	5	3.45	0.85	0.785
<b>General VUCA</b>	20	3.72	0.62	0.911
Rational decision making	5	4.41	0.50	0.849
Intuitive decision making	5	3.07	0.91	0.897
Dependent decision making	4	3.64	0.75	0.872
Avoidant decision making	5	2.01	1.04	0.941
Spontaneous decision making	5	2.71	0.83	0.789
<b>General decision-making styles</b>	24	3.15	0.57	0.908

##### 4.2. Comparison of Demographic Characteristics in Terms of VUCA and Decision-Making Styles

Mann-Whitney U and Kruskal-Wallis tests were conducted to compare demographic characteristics. These tests were applied to all demographic questions directed at mid-level managers. However, the analyses revealed significant differences for certain variables. Therefore, only findings with significant differences are presented in the study.

The analysis results showed significant differences in participants' evaluations of VUCA based on the presence of a medical role and tenure as a manager. On the other hand, decision-making styles were found to differ significantly based on gender, number of subordinates, total years of professional experience, and education level.

Evaluations showing significant differences are presented in Tables 2, 3, 4, 5, 6, and 7. In addition, effect sizes for the Mann-Whitney U and Kruskal-Wallis tests (Cohen's d, eta squared) were calculated, and the findings and related comments are given below each table.

**Table 2:** Comparison of Evaluations Related to the VUCA Environment Based on the Status of Having a Medical Role

VUCA Environment	Role	N	SS	Z	U	P	r
Complexity	Clinician-manager	65	4.12	0.60	-2.216	569.00	0.027*
	Non-clinical manager	25	4.44	0.451			
Volatility	Clinician-manager	65	3.89	0.68	-1.016	700.50	0.309
	Non-clinical manager	25	4.09	0.60			
Ambiguity	Clinician-manager	65	3.28	0.83	-0.511	756.00	0.610
	Non-clinical manager	25	3.26	0.86			
Uncertainty	Clinician-manager	65	3.39	0.83	-0.845	719.00	0.398
	Non-clinical manager	25	3.61	0.85			

Managers' evaluations of the VUCA environment show differences according to the variable of having a medical role ( $P = 0.027 < 0.05$ ). There is a significant difference between the complexity perceptions of managers without a medical role ( $\bar{X} = 4.44$ ) and those with a medical role ( $\bar{X} = 4.12$ ). It can be said that managers without a medical role perceive the environment as more complex during the COVID-19 process compared to those with a medical role. On the other hand, when examining the effect size, the effect size (r) for complexity was found to be 0.234. The proximity of this value to 0.3 indicates that it approximates a medium-sized effect (Cohen, 1988). Part of the difference in the perception of complexity stems from the presence of a medical duty. Managers without medical duties have a significantly higher perception of complexity ( $\bar{X} = 4.44$ ) compared to those with medical duties ( $\bar{X} = 4.12$ ). Managers without medical duties may

have focused more on the complexity of operational and managerial processes during an uncertain and dynamic process such as COVID-19. In contrast, managers with medical duties may have perceived complexity as an intrinsic part of healthcare delivery and thus regarded it as more natural. Ambiguity has the smallest effect size, with a value of 0.054. According to Cohen (1988), this indicates a small effect. Only 5.4% of the differences in ambiguity perception can be attributed to the presence of a medical duty. This suggests that having a medical duty has a very limited impact on the perception of ambiguity. These perceptions may be more related to individual characteristics or the general work environment rather than professional duties. In this case, the hypothesis " $H_1$ : There is a significant difference in the perception of the VUCA environment based on the participants' status of having a medical role" is accepted.

**Table 3:** Comparison of Evaluations Related to the VUCA Environment Based on the Duration of Working as a Manager

VUCA Environment	Years of managerial experience	N	SS	P	Eta-squared
Complexity	1-3 year	44	4.35	0.55	0.021*
	3-5 year	27	4.20	0.49	
	5-8 year	5	4.12	0.33	
	8-10 year	6	4.13	0.74	
	10+	8	3.60	0.68	
Complexity	1-3 year	44	4.02	0.64	0.421
	3-5 year	27	3.94	0.66	
	5-8 year	5	3.76	0.68	
	8-10 year	6	4.13	0.54	
	10+	8	3.55	0.84	
Ambiguity	1-3 year	44	3.33	0.64	0.115
	3-5 year	27	3.06	0.66	
	5-8 year	5	3.00	0.68	
	8-10 year	6	4.06	0.54	
	10+	8	3.25	0.84	
Uncertainty	1-3 year	44	3.60	0.77	0.324
	3-5 year	27	3.38	0.61	
	5-8 year	5	2.84	1.07	
	8-10 year	6	3.50	1.34	
	10+	8	3.17	1.22	

Participants' evaluations of the VUCA environment differ according to the variable of the duration of working as a manager ( $P = 0.021 < 0.05$ ). A significant difference was found between the complexity perceptions of those who have been working as managers for more than 10 years ( $\bar{X} = 3.60$ ) and those who have been in managerial positions for less than 10 years.

The effect sizes for the test were determined by examining the eta-squared values. Accordingly, the eta-squared value for complexity was determined to be 0.089, indicating that the effect is slightly above a medium level. This result means that 8.9% of the variance in the perception of complexity is explained by the managerial tenure of the participants. In other words, the variable of managerial tenure is an important factor that explains part of the variations in the perception of complexity.

The effect size for ambiguity was found to be 0.04, indicating a medium effect. This suggests that managerial tenure has a moderate impact on the perception of ambiguity. On the other hand, the effect size for uncertainty was 0.008, which is quite small. This indicates that managerial tenure has an almost negligible effect on the perception of uncertainty.

Due to the very small test statistic value calculated for volatility, the negative eta-squared value was not reported in the table. It can be concluded that managerial tenure does not have a significant effect on the perception of volatility.

Therefore, the hypothesis " $H_2$ : There is a significant difference in the perception of the VUCA environment based on the participants' duration of working as a manager" is accepted.

Participants' evaluations of decision-making styles differ based on the gender variable ( $P=0.019 < 0.05$ ). A significant difference was found between the avoidance decision-making style of male

participants ( $\bar{X} = 2.39$ ) and that of female participants ( $\bar{X} = 2.39$ ).

When examining the effect sizes ( $r$  values), the effect size for intuitive decision making was found to be 0.063, which indicates a small effect. This means that 6.3% of the variance in intuitive decision-making style is explained by the gender variable.

The effect of gender on intuitive decision-making is limited and relatively low. For avoidant decision making, the effect size was 0.247, indicating a medium effect. This suggests that 24.7% of the variance in the avoidant decision-making style is explained by the gender variable, showing that gender is an important determinant of the avoidant decision-making style.

When other eta-squared findings are evaluated; for dependent decision making, the eta-squared value was 0.102, meaning that 10.2% of the variance is explained by gender. This demonstrates that gender has a significant effect on dependent decision-making.

The eta-squared value for spontaneous decision making was 0.119, representing a medium effect size. This indicates that 11.9% of the variance in spontaneous decision-making style is explained by gender, suggesting that gender plays a notable role in spontaneous decision-making.

Finally, the effect size for rational decision making was 0.184, which also indicates a medium effect. This shows that 18.4% of the variance in the rational decision-making style is explained by the gender variable, highlighting that gender has a strong impact on rational decision-making.

Therefore, the hypothesis " $H_3$ : There is a significant difference in decision-making styles based on the participants' gender" is accepted.

**Table 4:** Comparison of Evaluations Related to Decision Making Styles Based on Gender

Decision making Styles	Gender	N	SS	Z	U	P	r
<b>Rational decision making</b>	Female	60	4.49	0.43	-1.743	700.00	0.081
	Male	30	4.24	0.58			
<b>Intuitive decision making</b>	Female	60	3.02	0.90	-0.597	830.50	0.551
	Male	30	3.16	0.93			
<b>Dependent decision making</b>	Female	60	3.62	0.65	-0.965	790.50	0.335
	Male	30	3.68	0.93			
<b>Avoidant decision making</b>	Female	60	1.81	0.90	-2.340	628.50	0.019*
	Male	30	2.39	1.20			
<b>Spontaneous decision making</b>	Female	60	2.62	0.77	-1.133	768.50	0.257
	Male	30	2.90	0.91			

Participants' evaluations of decision-making styles (intuitive, spontaneous, and general decision-making) differ based on educational level ( $P = 0.035$ ;  $P = 0.049$ ;  $P = 0.021 < 0.05$ ).

A significant difference was found between the intuitive decision-making style of managers with undergraduate or graduate education ( $\bar{X} = 3.18$ ) and those with high school or associate degree education ( $\bar{X} = 2.70$ ).

When examining the  $r$  values in the table, the effect size for intuitive decision making was found to be 0.222, indicating a medium effect. This means that 22.2% of the variance in the intuitive decision-making style is explained by the education level variable. This demonstrates that education level has a strong impact on the intuitive decision-making style. Managers with undergraduate and postgraduate education levels exhibit significantly higher intuitive decision-making styles compared to those with high school and associate degree levels.

**Table 5:** Comparison of Evaluations Related to Decision-Making Styles Based on Educational Level

Decision making styles	Educational Status	N	SS	Z	U	P	r
<b>Rational decision making</b>	high school - associate's degree	22	4.31	0.55	662.00	0.411	0,087
	undergraduate- graduate	68	4.44	0.48			
<b>Intuitive decision making</b>	high school - associate's degree	22	2.70	0.96	524.00	0.035*	0,222
	undergraduate- graduate	68	3.18	0.86			
<b>Dependent decision making</b>	high school - associate's degree	22	3.38	1.01	601.00	0.155	0,149
	undergraduate- graduate	68	3.72	0.63			
<b>Avoidant decision making</b>	high school - associate's degree	22	1.97	1.05	705.00	0.684	0,043
	undergraduate- graduate	68	2.01	1.05			
<b>Spontaneous decision making</b>	high school - associate's degree	22	2.49	0.83	540.00	0.049*	0,207
	undergraduate- graduate	68	2.78	0.82			
<b>General decision making styles</b>	high school - associate's degree	22	2.95	0.64	503.00	0.021*	0,243
	undergraduate- graduate	68	3.21	0.53			

Similarly, a significant difference was found between the spontaneous decision-making style of managers with undergraduate or graduate education ( $\bar{X} = 2.78$ ) and those with high school or associate degree education ( $\bar{X} = 2.49$ ).

Additionally, a significant difference was observed in the overall decision-making styles scale between managers with undergraduate or graduate education ( $\bar{X} = 3.21$ ) and those with high school or associate degree education ( $\bar{X} = 2.95$ ).

For avoidant decision making, the effect size was 0.043, representing the smallest effect among the variables. Only 4.3% of the variance in avoidant decision-making is explained by the education level variable. This indicates that the effect of education level on the avoidant decision-making style is weak. Additionally, general decision-making styles were found to have a medium effect size of 0.243.

**Table 6:** Comparison of Evaluations Related to Decision-Making Styles Based on the Number of Subordinates Reporting to the Manager

Decision making Styles	Span of control	N	$\bar{X}$	SS	P	Eta-squared
Rational decision making	1-19	32	4.46	0.60	0.543	-
	20-39	27	4.34	0.46		
	40+	31	4.41	0.42		
Intuitive decision making	1-19	32	3.01	1.13	0.676	-
	20-39	27	2.99	0.77		
	40+	31	3.19	0.77		
Dependent decision making	1-19	32	3.46	1.00	0.396	-
	20-39	27	3.64	0.56		
	40+	31	3.82	0.53		
Avoidant decision making	1-19	32	2.00	1.23	0.423	-
	20-39	27	1.86	0.67		
	40+	31	2.13	1.11		
Spontaneous decision making	1-19	32	2.98	0.80	0,028*	0.059
	20-39	27	2.47	0,62		
	40+	31	2.64	0.95		

This means that 24.3% of the variance in general decision-making styles is explained by the education level variable. Managers with undergraduate and postgraduate education levels exhibit significantly higher general decision-making styles compared to those with high school and associate degree levels.

Therefore, the hypothesis "H<sub>4</sub>: There is a significant difference in decision-making styles based on the participants' educational level" is accepted.

Participants' evaluations of spontaneous decision-making style differ based on the number of subordinates reporting to the manager ( $P = 0.028 < 0.05$ ). A significant difference was found between managers with 20-39 subordinates ( $\bar{X} = 1.86$ ) and those with 1-19 subordinates ( $\bar{X} = 2.00$ ) or more than 40 subordinates ( $\bar{X} = 2.13$ ).

Since the Kruskal-Wallis H test statistic values were found to be quite small for the first four factors, eta-squared values could not be calculated. For the spontaneous factor, the eta-squared value was calculated as 0.059, which is very close to 0.06, indicating a medium effect size.

Approximately 6% of the differences in the spontaneous decision-making style can be attributed to the number of employees reporting to the managers.

This suggests that while the number of employees has a limited effect, it is still a meaningful factor influencing managers' adoption of this decision-making style.

Therefore, the hypothesis "H<sub>5</sub>: There is a significant difference in decision-making styles based on the number of subordinates reporting to the manager" is accepted.

**Table 7:** Comparison of Evaluations Related to Decision-Making Styles Based on Total Work Experience

Decision-making Styles	Total work experience	N	SS	P	Eta-squared
Rational decision making	5-10	11	4.83	0.006*	0,111
	10-15	13	4.13		
	15-20	18	4.36		
	20+	48	4.40		
Intuitive decision making	5-10	11	2.51	0.110	0,036
	10-15	13	2.78		
	15-20	18	3.20		
	20+	48	3.22		
Dependent decision making	5-10	11	3.40	0.376	0,001
	10-15	13	3.30		
	15-20	18	3.77		
	20+	48	3.73		
Avoidant decision making	5-10	11	1.49	0.091	0,041
	10-15	13	2.24		
	15-20	18	2.17		
	20+	48	1.99		
Spontaneous decision making	5-10	11	2.45	0.482	-
	10-15	13	2.89		
	15-20	18	2.70		
	20+	48	2.72		

Evaluations of rational decision-making style by managers differ based on the total years of professional experience ( $P = 0.006 < 0.05$ ). A significant difference was found between managers with 5-10 years of experience ( $\bar{X} = 4.83$ ) and those with 10-15 years ( $\bar{X} = 4.13$ ), 15-20 years ( $\bar{X} = 4.36$ ), and over 20 years ( $\bar{X} = 4.40$ ) of experience. When evaluating the eta-squared values in the table, rational decision making was found to have a medium effect size of 0.111. This indicates that 11.1% of the total variance in the rational decision-making style is explained by the variable of professional tenure.

This demonstrates that professional tenure has a significant and notable effect on rational decision-making. Managers with 5-10 years of professional experience ( $\bar{X} = 4.83$ ) adopt the rational decision-making style at a higher level. However, managers with 10-15 years ( $\bar{X} = 4.13$ ), 15-20 years ( $\bar{X} = 4.36$ ), and over 20 years ( $\bar{X} = 4.40$ ) of professional experience exhibit lower levels of rational decision-making. This suggests that as professional experience increases, there may be a decline in the adoption of the rational decision-making style. For spontaneous decision making, the test value was negative; therefore, it was not reported in the table. This indicates that professional tenure does not have a significant effect on the spontaneous decision-making style. Therefore, the hypothesis " $H_0$ : There is a significant difference in decision-making styles based on total years of professional experience" is accepted.

#### 4.3. Correlation Analysis between VUCA and Decision-Making Styles

To observe whether there are interactions between VUCA and decision-making styles and to examine their relationship, a correlation analysis was conducted. This analysis aims to test the direction and strength of the relationship between the VUCA environment and decision-making styles.

When Table 8 was evaluated in general, there was a moderately significant relationship between the complexity environment and course decision making ( $r=0.390$ ). Here, it would not be wrong to say that as complexity increases, the tendency to make rational decisions increases. Additionally, a weak relationship is observed between volatility and rational decision-making ( $r=0.292$ ), as well as between volatility and dependent decision-making styles ( $r=0.278$ ). A weak relationship is found between ambiguity and intuitive decision-making ( $r=0.297$ ), while a moderate relationship is identified between ambiguity and spontaneous decision-making ( $r=0.364$ ). Furthermore, a moderate relationship is noted between uncertainty and rational decision-making ( $r=0.335$ ), and between uncertainty and dependent decision-making ( $r=0.319$ ). A weak relationship is observed between uncertainty and spontaneous decision-making ( $r=0.271$ ).

#### 5. CONCLUSION

The COVID-19 crisis has brought numerous unexpected challenges and issues worldwide. Managers have been forced to make high-risk decisions in the context of constantly evolving and incomplete information. This process has been conducted under time constraints, significant uncertainties, and public pressures. These suboptimal conditions have made decision-making processes vulnerable to all environmental influences, thereby increasing the likelihood of faulty decision-making and adverse outcomes. This study aims to determine the relationship between the VUCA (Volatility, Uncertainty, Complexity, Ambiguity) environment created by the global health crisis and managers' decision-making styles. In response to the primary question of the research, "Is there a relationship between the VUCA environment and managers' decision-making styles?" a moderate significant relationship was found with other decision-making styles except for avoidant decision-making.

**Table 8:** Correlation Analysis between VUCA and Decision-Making Styles

		Rational Decision Making	Intuitive Decision Making	Dependent Decision Making	Avoidant Decision Making	Spontaneous Decision Making
Complexity	<u>Spearman Correlation</u>	0.390**	0.080	0.091	0.025	0.120
	<u>Sig. (2-tailed)</u>	0.000	0.453	0.392	0.818	0.261
Volatility	<u>Spearman Correlation</u>	0.292**	0.159	0.278**	0.128	0.178
	<u>Sig. (2-tailed)</u>	0.005	0.136	0.008	0.230	0.094
Ambiguity	<u>Spearman Correlation</u>	0.262*	0.297**	0.259*	0.227*	0.364**
	<u>Sig. (2-tailed)</u>	0.013	0.004	0.014	0.032	0.000
Uncertainty	<u>Spearman Correlation</u>	0.335**	0.172	0.319**	0.129	0.271**
	<u>Sig. (2-tailed)</u>	0.001	0.106	0.002	0.226	0.010

\*p<0,05; \*\*p<0,01

The mid-level managers participating in the study perceived the COVID-19 environment as complex, as indicated by the averages presented in Table 1. A review of the literature reveals similar findings. For instance, Sum (2022), based on interviews with four primary and secondary school administrators, highlighted the uncertainty of internal trust within organizations, a perceived disconnect between implementation and policy, and a lack of reciprocity among employees and other stakeholders. Similarly, Dima, Meseşan, Schmitz, and Simon (2021), in their study involving 83 social service managers, emphasized the necessity for managers to explore, understand, and adapt to the VUCA environment. This adaptation would help reduce the pressures experienced by managers and enable them to develop vision, understanding, clarity, and agility.

In this study, participants preferred the rational decision-making style in the Covid-19 environment, which they described as complex. This result indicates that managers conduct a detailed investigation on the subjects they decide on and try to select the most appropriate option among the ones obtained from their research (Scott & Bruce, 1995). The fact that participants do not prefer avoidant decision-making indicates that they are not inclined to "postpone decision-making until the last moment by avoiding it in almost every situation" (Üngüren, 2011). A crisis is a situation where accurate, complete, and up-to-date information cannot be collected, healthy communication cannot be established, communication barriers cannot be eliminated, and managerial and organizational activities cannot be carried out properly, which puts organizations and managers in distress (Tutar, 2007). In such an environment, it is quite rational for managers to choose rational decision-making. In rational decision-making, the decision-maker does not act outside of established norms. The decision-maker in rational thinking identifies the best alternative in the most logical way and proceeds accordingly. In addition, it is seen that individual economic interests (using the least time, the least effort, etc.) are prioritized in this decision-making, and decisions are made using scientific and objective data (Tozlu, 2016). Acar (2020), in his study with educational managers, also found that participants relatively preferred the rational decision-making style the most and the avoidance decision-making style the least. Thomas (2019) suggested that decision-making in an organizational crisis environment can be defined as a complex system. However, his research identified the decision-maker's self-perceptions as the most influential factor in decision-making. In this case, it can be said that the decision deviates from rationality.

In order to compare the characteristics of the managers with the scales, Mann-Whitney U and Kruskal-Wallis tests were conducted and effect sizes (Cohen's d, eta squared) were calculated. When the findings obtained as a result of these analyses were evaluated;

Non-clinical managers were found to evaluate the crisis environment as more complex compared to clinician-managers. This can be associated with the fact that non-clinical managers are less involved in the clinical aspects of healthcare services and thus feel the complexity of medical processes and terminology more acutely. Clinician-managers may focus more on clinical practices and may find it easier to manage uncertainties in this area. However, for non-clinical managers, this situation may seem more foreign and therefore more complex.

Managers with over 10 years of experience were found to have a lower perception of complexity. This result can be linked to the experience and knowledge of managers with over 10 years of experience and their ability to cope with complexity. Those who have been managers for relatively longer periods may have more experience in VUCA environments, enabling them to manage the complexity of these environments more effectively. These managers may have developed different skills or strategies due to encountering various crisis situations.

An interesting finding is that male managers prefer the avoidant decision-making style more than female managers. Acar (2020) and Temur (2012) also identified in their studies that male managers exhibit avoidance behavior in decision-making more than female managers.

The study found that managers with undergraduate or graduate education levels adopted intuitive and spontaneous decision-making styles. In intuitive decision-making, the process relies on "the individual's experiences and feelings rather than facts and data." In spontaneous decision-making, "making quick decisions without much thought" is dominant. Individuals inclined toward spontaneous decision-making also tend to urgently conclude the decision-making process (Scott & Bruce, 1995). These incredibly difficult and extraordinary times may have revealed the agile adaptation and improvisation abilities of managers with high levels of education and knowledge. Because during this period, both national and international public protocols requiring urgent adaptation may have led these highly educated managers to use intuitive and spontaneous decision-making styles. When the literature is evaluated, Acar (2020), Sen et al. (2019), and Küçükendirci et al. (2016) indicated that the educational status variable had no effect on

decision-making styles in their studies.

Another finding is that managers with more employees are inclined toward spontaneous decision-making. An increase in the number of employees can bring additional burdens for these managers, such as communication difficulties, coordination and control issues, ensuring employee motivation, resource management, managing potential conflicts between employees, and performance evaluation. In short, managing more employees can increase the workload, which may raise the tendency for managers to make quick and spontaneous decisions.

Managers with 5-10 years of experience were found to adopt a rational decision-making style. Managers with 5-10 years of experience are still in the process of active learning and development in their professions. These managers may be inclined to conduct detailed research on the subjects they decide on. According to the research findings, as the duration of experience in the profession increases, the tendency for rational decision-making decreases.

In conclusion, this study aims to provide a new perspective on the limited number of studies addressing the impact of the VUCA environment on managers' decision-making styles during the COVID-19 process. The findings demonstrate the critical role of managers in the healthcare sector in adapting to the VUCA environment and that the strategies they developed during this period can serve as a guide for similar crisis situations that may be encountered in the future. Additionally, these findings emphasize the need for businesses to adopt flexible and adaptive management approaches to adapt more quickly to changing conditions and maintain their competitive advantages.

The study has several limitations. First, the research was conducted in only one public hospital. Although efforts were made to reach other hospitals in Eskişehir during the process of obtaining ethical and institutional approvals, permissions could not be secured due to the workload and complexity experienced during the pandemic. Consequently, the study was limited to Yunus Emre State Hospital, located in Eskişehir, Turkey. In summary, Yunus Emre State Hospital was deemed a meaningful and suitable sample for the study due to its size, service capacity, and strategic role during the pandemic. These characteristics provided an ideal setting to examine the impact of the VUCA environment on healthcare managers' decision-making styles. However, despite these positive attributes, the study's confinement to a single hospital limits its generalizability. Additionally, the data were collected through a survey method, which may

introduce response bias from participants. Another limitation is that, although nearly all mid-level managers in the hospital were reached, the number of participants was limited to 90. Despite these limitations, the study stands out as one of the first to address the relationship between VUCA and decision-making styles in the healthcare sector, which faced intense and urgent demands during the COVID-19 pandemic. Conducting future studies covering more than one hospital or sector will increase the generalizability of the findings. In addition, conducting studies that relate decision-making styles and VUCA to leadership and organizational culture issues may contribute to the enrichment of the literature.

## ETHICS DECLARATIONS

**Funding:** This study has not received support from any organization such as government, commercial or non-profit organizations.

**Ethical Approval:** All procedures performed in studies involving human participants conform to the ethical standards of the institutional and/or national research committee and the 1964 Helsinki declaration and its subsequent amendments or comparable ethical standards. This research was approved by the Ethics Committee of Afyon Kocatepe University, Social and Human Sciences Scientific Research and Publication Ethics Committee with decision number 2021/206 and date: 24.05.2021.

**Informed Consent:** Informed consent form was obtained from all individual participants who participated in the study.

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