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The Relationship Between Mindfulness and Job Performance Among Air Traffic Controllers: The Role of Decision-Making



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Abstract

This study examines the effect of air traffic controllers' mindfulness levels on job performance and explores the mediating role of decision-making perception in this effect. The study, conducted with 421 air traffic controllers from different operational units and professional experience levels throughout Türkiye, used an online survey method. The data collection tools included the *Mindful Attention Awareness Scale*, *Decision-Making Styles Scale*, and the *Job Performance Scale*. Demographic characteristics of the participants, such as gender, education level, professional experience, and the unit they work in were also analyzed. Findings indicated that mindfulness levels positively affect decision-making perception ($\beta = .288$) and job performance ($\beta = .379$). The mediation analysis revealed that decision-making perception significantly strengthens the relationship between mindfulness and job performance ($\beta = .047$; 95% BCA CI [.011, .047]). These findings highlight that mindfulness plays a critical role in enhancing job performance through its positive impact on decision-making processes. The study presents the practical contributions of mindfulness-based interventions to improve air traffic control performance by revealing that decision-making perception is a critical mediating variable in the context of the mindfulness-job performance relationship.

Keywords

Air traffic control • Aviation • Decision-making • Job performance • Mindfulness.

Jel Codes

M54, D91, J24, L93

Author Note

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The Relationship Between Mindfulness and Job Performance Among Air Traffic Controllers: The Role of Decision-Making

Air traffic controllers are professionals who work under high-stress conditions where safety is of critical importance and who are constantly required to make fast, accurate decisions. This profession is shaped by a variety of factors, including individual skills and the nature of the job. The professional success of controllers depends not only on their technical knowledge and skills but also on how effectively they can use this knowledge and skills under stress. Managing air traffic safely and efficiently under difficult working conditions requires controllers to have high performance. According to the latest estimates by the International Air Transport Association (IATA), the number of global air passengers is expected to reach 5.2 billion by 2025. This represents a 6.7% increase compared to 2024 and is considered a significant turning point in the aviation industry (IATA, 2024). Similarly, the International Civil Aviation Organization (ICAO) predicts that the demand for air passengers in 2024 will be approximately 3% above 2019's. This increase could reach up to 4% on routes where recovery is accelerating (ICAO, 2024). This growth reveals the need for extensive improvements in the aviation infrastructure to meet the increasing air traffic volume. This increase in air traffic further increases the importance of human factors, especially in operations conducted by air traffic controllers. Effective communication, decision-making processes, and overall business performance are critical to ensuring safe and efficient airspace management. However, the current distribution of airspace management among different control units leads to communication difficulties in some regions (ICAO, 2024). This requires focusing on the cognitive and psychological competencies of air traffic controllers working in complex and stressful working environments.

In aviation operations, the performance of air traffic controllers is based not only on psychomotor skills but also on complex decision-making processes and cognitive flexibility. Air traffic controllers undertake critical tasks including safely directing multiple aircraft, managing emergencies, and making strategic decisions for the operation. In this context, decision-making processes include situational awareness, risk assessment under time constraints, and rapid selection between alternatives (Dekker, 2017). However, under conditions of high workload and stress, decision-making errors can lead to serious consequences. For example, Hollnagel and Woods (2005) emphasized that errors due to human factors in air traffic management can increase operational risks by combining with the complexity of systems. Studies on decision-making errors have shown that such errors are generally due to an overload in cognitive processes and a lack of situational awareness (Maurino et al., 2017).

Air traffic controllers' decision-making processes are vital to the safety and efficiency of aviation operations. However, accidents throughout history have shown that air traffic controllers face challenges due to human factors such as lack of communication, lack of situational awareness, and poor decision-making under stress. The 2002 Uberlingen mid-air collision is a tragic example of a conflict between air traffic control instructions and the Traffic Alert and Collision Avoidance System (TCAS) that led to the loss of 71 lives (BFU, 2004). The 2001 Linate Airport accident resulted in the loss of 118 lives due to inadequate air traffic control supervision and lack of communication in poor visibility conditions (ANSV, 2004). The deadliest accident in aviation history, the 1977 Tenerife Airport disaster, caused the deaths of 583 people and demonstrated the great risks that misunderstandings and lack of communication between air traffic controllers and pilots can

create (ICAO, 1978). These accidents provide a critical framework for understanding the relationship between conscious awareness, rational decision-making, and the job performance of air traffic controllers.

Mindfulness has been widely associated with cognitive and emotional regulation, both of which are critical for effective decision-making processes. Research indicates that individuals with higher mindfulness levels demonstrate enhanced attentional control, reduced cognitive biases, and improved judgement when navigating complex decision-making scenarios (Teper et al., 2013). By fostering present-moment awareness and mitigating impulsivity, mindfulness facilitates more rational and well-informed decisions, particularly in high-stakes environments such as air traffic control (Jha et al., 2010). Moreover, mindfulness has been shown to strengthen executive functions, including working memory and cognitive flexibility, which are fundamental components of decision-making (Shapiro et al., 2006). These cognitive enhancements contribute to better situational awareness and more adaptive responses to dynamic operational demands (Langer, 1989). Additionally, mindfulness has been linked to improved job performance, as it enhances focus, reduces stress, and fosters more effective decision-making, ultimately leading to increased efficiency and accuracy in task execution (Dane & Brummel, 2014). This is particularly relevant in high-reliability professions, such as air traffic control, where optimal performance depends on sustained attention and well-regulated cognitive resources. The study aims to examine the relationship between mindfulness, decision-making, and job performance in the context of air traffic controllers. By analyzing the effect of mindfulness levels on job performance and the mediating role of decision-making processes in this effect, the research aims to contribute to the theoretical knowledge of human factors and offer practical implications for improving performance in air traffic control operations.

Literature Review

Mindfulness, decision-making, and job performance are among the areas of increasing importance in human factors research. Understanding the interaction of these variables is crucial for air traffic controllers, who work under high stress and cognitive load while managing complex air traffic systems. There is strong evidence in the literature that mindfulness positively affects individuals in areas like coping with stress, developing situational awareness, and cognitive flexibility (Dane, 2011; Kabat-Zinn, 2003). These characteristics are important in optimizing performance in occupations that require complex and time-pressured decision-making, as seen in air traffic control.

Decision-making is a cognitive process in which individuals choose among alternatives for a specific purpose. In the literature, decision-making processes are generally divided into three main categories: *rational decision-making*, *intuitive decision-making*, and *naturalistic decision-making*. Rational decision-making refers to a process in which the decision-maker systematically evaluates all available information and tries to determine the most optimal option that provides maximum benefit (Fischhoff & Broomell, 2020; Simon, 1957). This type of decision-making is of indispensable importance to ensure safety and efficiency in complex and critical situations, especially in high-risk sectors like aviation. In the aviation industry, decision-making is of vital importance for professionals who play critical roles, for instance, pilots and air traffic controllers. Aviation requires the ability to choose the most appropriate decision among alternative options within a limited time frame (Endsley, 1995; Szafran & Lukaszewicz, 2020). Decisions made during an operation directly affect not only the safety of the current flight but also the order and success of future operational options (Fischhoff & Broomell, 2020). Aeronautical Decision-Making (ADM) is defined as a systematic approach that encompasses all decisions made in aviation and is aimed at optimizing individuals' decision-making processes (FAA, 2022). ADM is a set of mental processes that aviation professionals use to

determine the best course of action under certain conditions. The 3-P Model (*Perceive - Process - Perform*), developed by the FAA for the effective implementation of ADM, allows air traffic controllers and pilots to systematically collect information at each flight stage, process this information, and implement the best course of action. In the literature, air traffic controller decision-making processes are often associated with situational awareness, workload management, and information processing capacities. Anthony and Ahmad (2021) emphasized that fast and accurate decision-making by air traffic controllers is a critical element for flight safety, and that delayed decisions can lead to aircraft accidents and incidents. In addition, it has been shown that decision-making processes are affected by individual factors such as thinking style, and air traffic controllers with a holistic thinking style intervene earlier, increasing safety but decreasing airspace efficiency (Xiaotian & Zhang, 2017). On the other hand, Bonaceto et al. (2005) examined decision-making processes in air traffic control towers with a naturalistic approach and evaluated the factors affecting air traffic controllers' performance using methods such as cognitive modelling, critical incident analysis, and coordination analysis. These studies made significant contributions to understanding the causes of errors and their solutions, especially in non-routine situations. Tang et al. (2022) stated that human errors in air traffic control systems increase safety risks and should be supported by comprehensive safety management systems to reduce these risks. This study also highlighted the importance of analytical methods for developing the cognitive skills required for complex tasks.

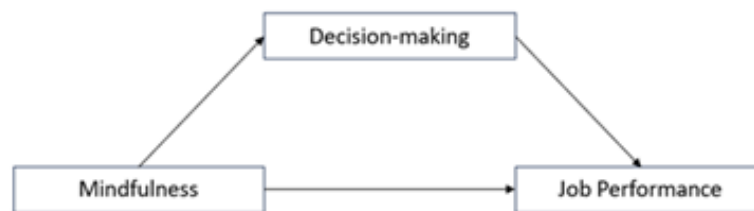
Mindfulness stands out as a tool that improves the job performance and well-being of professionals who work under high stress and cognitive load, such as air traffic controllers. Mindfulness allows individuals to focus on the present moment and develop a clear awareness of environmental and internal stimuli, allowing them to manage their mental processes more effectively (Cardaciotto et al., 2008; Sutcliffe et al., 2016). These features are of critical importance for air traffic controllers working in a dynamic and complex work environment because in these situations, attention and focus are key elements for safe and effective operations (Ngo et al., 2020). Research has shown that mindfulness practices reduce air traffic controllers' stress levels, increase attention span, and support problem-solving skills (Li et al., 2022). For example, one study found that mindfulness improved air traffic controllers' cognitive flexibility under workload and reduced emotional burnout (Meland et al., 2020). This allows individuals to make faster and more effective decisions in complex situations. In addition, it was stated that mindfulness acts as a buffer to alleviate the negative effects of stress and has a positive relationship with job satisfaction (Alaydi & Ng, 2024; Jha, 2020). However, it has also been discussed in the literature that mindfulness may not always produce positive results in the workplace. For example, it was stated that excessive mindfulness practices can lead to distraction and decreased performance (Britton, 2019).

Air traffic controllers' job performance is seen as one of the fundamental elements of safety and operational success in the aviation sector. Job performance is a multidimensional concept, including technical skills, decision-making processes, and communication competencies that air traffic controllers display while ensuring airspace regulation. Air traffic controllers' task performance involves directing aircraft in a safe and orderly manner. Contextual performance includes social and organizational contributions such as cooperation, team harmony, and effective communication in critical situations (Van Dyck et al., 2005). Mental workload is a factor that directly affects air traffic controllers' job performance. High traffic volume, airspace complexity, and unexpected events can especially strain controllers' cognitive resources and elevate the risk of errors (Cummings & Guerlain, 2007). Therefore, managing the effects of mental load on air traffic controllers' performance is of critical importance in terms of flight safety. How mental workload affects job performance is also associated with personal skills such as individual resilience, emotional intelligence, and

attention management (Karasek & Theorell, 1990). When mental workload increases, job performance may decrease due to distraction and errors in information processing (Majumdar and Ochieng, 2002). However, these effects can be mitigated by individual and organizational resources. For example, the JDR (Job Demands-Resources) model reveals that the negative effects of job demands can be reduced by individual resources (e.g., mindfulness) and organizational support (e.g., social support mechanisms) (Bauer et al., 2014). In this context, the presence of personal resources can increase the capacity of air traffic controllers to cope with complex and stressful situations (Alaydi & Ng, 2024). Job performance in aviation is associated not only with individual skills but also with organizational processes and leadership approaches. For example, the empowering leadership style has been shown to increase air traffic controllers' participation in safe decision-making processes and support organizational performance (Martínez-Corcoles & Vogus, 2020). In addition, improving situational awareness and team coordination are among the factors that positively affect air traffic controllers' performance (Endsley, 1995). Designing work processes and supporting controllers are important for improving performance. Simulator-supported training programs and decision support systems enable air traffic controllers to perform their duties more effectively (EUROCONTROL, 2018).

Hypothesis Development & Research Model

Figure 1
Research Model



The research model created for the research hypotheses is shown in [Figure 1](#).

Mindfulness includes awareness and acceptance dimensions by enabling individuals to focus on current situations (Cardaciotto et al., 2008). These features allow air traffic controllers to better manage their attention during decision-making processes in busy work environments and cope with stress (Jha, 2020). Positive effects of mindfulness on work performance have been reported in the literature; for example, a study conducted in Spain showed that mindfulness practices increased memory and concentration in air traffic control, while reducing negative effects such as burnout and tension (Li et al., 2022). Ngo et al. (2020) stated that mindfulness directly increases work performance and promotes creativity. However, the effects of mindfulness may not always be positive. Britton (2019) stated that excessive mindfulness can lead to the depletion of individual resources, namely attention, and negatively affect performance. Air traffic controllers can use mindfulness as an important resource to maintain their work performance while working under a high mental load. The Job Demand-Resources (JDR) model emphasizes the role of personal resources, specifically mindfulness, in reducing the effects of job demands like mental load on job performance (Bauer et al., 2014). Mindfulness can support flight safety by enhancing the performance of air traffic controllers under mental load and improving decision-making processes in critical situations. However, the effects of mindfulness may vary depending on context and individual differences, so a more in-depth examination of the effects of mindfulness practices on air traffic controllers is necessary. These theoretical arguments and previous research findings lead us to our first hypothesis.

H1: Mindfulness positively and significantly effects air traffic controllers' perceptions of job performance.

In the aviation sector, decision-making processes include elements particularly situational awareness, risk analysis, and outcome prediction, while individual awareness (mindfulness) can play an important role in these processes. Individual awareness can increase the effectiveness of decision-making processes by allowing the decision-maker to focus on the current situation, manage attention more effectively, and reduce stress-related cognitive load (Shapiro et al., 2006). Especially in aviation professions, for instance air traffic controllers, where fast and accurate decision-making is critical, individual awareness can have a positive effect on decision-making processes. If an air traffic controller has a high level of awareness when determining a safe route for aircraft in an emergency, it becomes possible for them to evaluate environmental factors and flight plans more quickly and accurately. This not only increases operational efficiency but also plays an important role in preventing accidents (Endsley, 1995). On the other hand, it is known that factors, notably time pressure and cognitive load, can negatively affect decision-making processes (Wickens, 2000). However, individual awareness can support decision-makers in overcoming such difficulties and increase decision quality. In this context, it is thought that mindfulness can positively and significantly affect air traffic controllers' decision-making perceptions.

H2: Mindfulness positively and significantly effects air traffic controllers' perceptions of decision-making.

Decision-making perception is considered a critical mechanism that shapes the relationship between job performance and individual characteristics. In particular, mindfulness can positively affect decision-making processes by increasing the individual's capacity to focus on the current situation and develop situational awareness (Dane & Pratt, 2007). It has been shown that mindfulness supports individuals' cognitive processes and improves decision-making skills, thus increasing the performance of professionals working in complex and dynamic environments (Good et al., 2016). In this context, mindfulness may be a critical prerequisite for effective decision-making in high-stress air traffic control environments. The effect of decision-making perception on individuals' job performance perceptions can be explained particularly by the regulation of cognitive processes and their contribution to the solution of complex problems. Decision-making not only ensures operational safety in air traffic controllers' duties but also plays a role in workload management and balancing stress levels (Orasanu & Fischer, 1997). The increased situational awareness provided by mindfulness can improve controllers' decision-making perceptions, which can positively contribute to job performance perception (Hülshager et al., 2013). However, decision-making perception can explain the relationship between individuals' mindfulness levels and job performance perceptions as a mediating variable. The theory of mindfulness proposed by Langer (1989) argues that it strengthens decision-making processes by allowing individuals to focus more consciously and clearly in their current situations. This process allows air traffic controllers to make more effective and strategic decisions that increase job performance (Klein, 2008). Therefore, to fully understand the effect of mindfulness on job performance, it is necessary to focus on the mediating role of decision-making perception. In this context, revealing the mediating role of decision-making perception in the relationship between mindfulness and job performance perception can fill an important gap in the literature.

H3: Decision-making perception mediates the relationship between mindfulness and air traffic controllers' job performance perceptions.

Method

Participants

The population of the study consisted of air traffic controllers in Türkiye. As in many other countries, air traffic controllers in Türkiye are employed under the Air Navigation Service Provider (ANSP), which, in the national context, corresponds to the General Directorate of State Airports Authority (DHMI). Furthermore, they are organized under the Turkish Air Traffic Controllers' Association (TATCA). According to DHMI (2024), there were 1,948 licenced air traffic controllers in Türkiye at the time of data collection. Participants were reached through convenience sampling, and data were also gathered via dissemination on social media platforms whose members consisted exclusively of air traffic controllers. In total, 421 air traffic controllers from various regions and operational units across Türkiye participated in the study. All participants completed the survey online and took part in the study voluntarily. As the dataset did not contain any missing or erroneous responses, the data obtained from all participants were considered valid and included in the final analysis.

Ethical Approval

The study involving human participants was reviewed and approved by the Istanbul University Research Ethics Committee (IUREC 404/2024). The participants provided their written informed consent to participate in the study.

Data Collection Tools

Demographic Form: The demographic form used in the study was prepared to determine the individual and professional characteristics of the participating air traffic controllers. The form consists of four main categories: gender, education level, professional experience period, and air traffic control unit. The information was included in the study to obtain detailed data on the participants' professional backgrounds and areas of duty.

Mindful Attention Awareness Scale (MAAS): The MAAS, developed by Brown and Ryan (2003), was adapted into Turkish by Özyeşil et al. (2011). The scale has 15 items and is one-dimensional. The scale employs a 5-point Likert format. Scoring is as follows: "Strongly Disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), "Strongly Agree" (5). The Cronbach's alpha internal consistency coefficient calculated based on item analysis for the reliability of the scale is .80 and the test-retest correlation is .86.

Decision-Making Styles Scale (DMSS): The DMSS, developed by Scott and Bruce (1995) and adapted to Turkish by Taşdelen (2002), is a 25-item scale that measures individual differences in decision-making styles. The DMSS has a five-factor structure and uses a 5-point Likert scale. Scoring is as follows: "Strongly Disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), "Strongly Agree" (5). The overall internal consistency coefficient of the scale is .74. In the study, the 5-item rational decision-making subscale was used, with an internal consistency coefficient of .76.

Job Performance Scale: The job performance scale is an 11-item scale developed by Karakurum (2005) based on the performance scales of Beffort and Hatstrup (2003) and Borman and Motowidlo (1993). The scale has two dimensions: contextual and task performance. Scoring is as follows: "Strongly Disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), "Strongly Agree" (5).

Findings

Descriptive Statistics

The demographic information of the participants is presented in Table 1. The study included 421 air traffic controllers. The majority of participants were male (64.61%), while females accounted for 35.39% of the sample. Regarding the educational background, 81.71% of the controllers held a bachelor's degree, and 18.29% had a graduate degree.

In terms of professional experience, 25.42% of the participants had less than six years of experience, while another 25.42% had 11–15 years of experience. Those with 6–10 years of experience made up 14.96% of the group, followed by 13.78% with 16–20 years and 20.43% with over 20 years of experience.

When categorized by their air traffic control unit, more than half (54.87%) of the participants worked in aerodrome control units (TWR). Approach control units (APP) accounted for 22.33% of the participants, while 22.80% worked in area control centers (ACC).

Table 1
Demographic information

		n	%
Gender	Female	149	35.39
	Male	272	64.61
Education	Bachelor's degree	344	81.71
	Graduate degree	77	18.29
Experience (year)	< 6	107	25.42
	6-10	63	14.96
	11-15	107	25.42
	16-20	58	13.78
	> 20	86	20.43
Air Traffic Control Unit	Aerodrome control unit (TWR)	231	54.87
	Approach control unit (APP)	94	22.33
	Area control centre (ACC)	96	22.80
Total		421	100.00

Reliability Analysis

The reliability results for the scales used in the study are presented in Table 2. As shown in the table, the Cronbach's alpha coefficient for the mindfulness scale was .872, indicating excellent internal consistency. The decision-making scale demonstrated acceptable reliability with a Cronbach's alpha of .702. Similarly, the job performance scale showed good internal consistency with a Cronbach's alpha value of .775. According to Büyüköztürk (2011), a Cronbach's alpha value of .70 or above is generally considered acceptable, indicating that the scales used in the study are reliable for measuring the respective constructs.

Table 2
Reliability results

	Cronbach's Alpha
Mindfulness	.872

	Cronbach's Alpha
Decision-making	.702
Job Performance	.775

Normality Test

The distribution of the variables used in the study was assessed using skewness and kurtosis values, as presented in Table 3. The skewness values for mindfulness (-.190), decision-making (.223), and job performance (.080) indicated that the data for these variables were approximately symmetrical. Similarly, the kurtosis values for mindfulness (-.387), decision-making (-.244), and job performance (-.338) suggested that the distributions were relatively normal. According to Tabachnick and Fidell (2013), ± 1.5 are considered acceptable for normality in most research settings. Based on these criteria, the variables in the study meet the assumptions of normal distribution, supporting their suitability for regression analyses.

Table 3

Skewness and kurtosis values

	Skewness	Kurtosis
Mindfulness	-.190	-.387
Decision-making	.223	.244
Job Performance	.080	-.338

Correlation Analysis

The correlation results regarding the relationships among mindfulness, job performance, and decision-making are presented in Table 4. As shown in the table, mindfulness was found to have a significant positive correlation with job performance ($r = .379$, $p < .01$) and decision-making ($r = .288$; $p < .01$). Additionally, job performance was positively and significantly correlated with decision-making ($r = .256$; $p < .01$). These findings indicate that higher levels of mindfulness are associated with improvements in both job performance and decision-making, and that job performance is also positively linked to decision-making.

Table 4

Correlation Analysis

	MI	JP	DM
MI	1		
JP	.379**	1	
DM	.288**	.256**	1

****Correlation is significant at the 0.01 level.**

MI= Mindfulness

JP= Job Performance

DM= Decision-making

Regression Analysis

The regression results regarding the effect of mindfulness on job performance are presented in Table 5. The mindfulness was found to have a significant impact on job performance ($\beta = .379$, $p = .000$). It was observed that as mindfulness levels increased, job performance also improved. In this context, Hypothesis 1 suggesting a positive effect of mindfulness on job performance was supported.

Table 5*Effect of Mindfulness on Job Performance*

Model	Unstandardized Coefficients		Standardized Coefficients	t	p
	b	se	β		
(Constant)	3.116	.115		8.375	.000
Mindfulness	.221	.026	.379		

Dependent Variable: Job Performance

The regression results regarding the effect of mindfulness on decision-making are presented in Table 6. The mindfulness was found to have a significant impact on decision-making ($\beta = .288$, $p = .000$). It was observed that as mindfulness levels increased, decision-making also improved. In this context, Hypothesis 2 suggesting a positive effect of mindfulness on job performance was supported.

Table 6*Effect of Mindfulness on Decision-Making*

Model	Unstandardized Coefficients		Standardized Coefficients	t	p
	b	se	β		
(Constant)	3.499	.112		6.151	.000
Mindfulness	.159	.026	.288		

Dependent Variable: Decision-making

Mediating Analysis

The mediating relationships between the variables in the study were analyzed using the Process macro (v4.2) plug-in developed by Hayes (2022) within the SPSS (v27) program. The significance of the mediation analyses was determined by evaluating the BootLLCI (lower limit confidence interval) and BootULCI (upper limit confidence interval) values. These values are required to align (both positive or both negative) to indicate a statistically significant effect. If the value of 0 falls within the confidence interval, the findings are interpreted as statistically insignificant (Hayes, 2022; MacKinnon, Lockwood, & Williams, 2004).

The results of the analysis are presented in Table 7. The total effect of mindfulness on job performance was found to be statistically significant ($b = .221$; $se = .026$; $\beta = .379$; $p < .001$; 95% CI [.169, .273]). Similarly, the direct effect of mindfulness on job performance was also found to be significant ($b = .194$; $se = .027$; $\beta = .332$; $p < .001$; 95% CI [.141, .248]).

The indirect effect of mindfulness on job performance revealed that decision-making significantly mediated this relationship ($b = .027$; $se = .009$; $\beta = .047$; $p < .05$; 95% BCA CI [.011, .047]). This result indicates that the positive relationship between mindfulness and job performance is enhanced through decision-making, which acts as a mediating variable. Furthermore, the proportion of the indirect effect within the total effect was calculated as 0.122, indicating that 12.2% of the total effect of mindfulness on job performance was mediated through decision-making. The remaining 87.8% of the effect was attributed to the direct relationship between mindfulness and job performance.

Based on these findings, Hypothesis 3 of the research hypotheses was supported and accepted.

Table 7*Mediating effect*

Total effect of MI on JP							
	b	se	b	t	p	LLCI	ULCI
	.221	.026	.379	8375	.000	.169	.273
Direct effect of MI on JP							
	b	se	b	t	p	LLCI	ULCI
	.194	.027	.332	7133	.000	.141	.248
Indirect effect of MI on JP							
	b	se	b	LLCI		ULCI	
DM	.027	.009	.047	.011		.047	

Discussion

The aim of this study was to examine the effect of air traffic controllers' levels of mindfulness on job performance and the mediating role of decision-making perception in this effect. The findings obtained in the study indicate that the research hypotheses were supported, and the quantitative investigation of decision-making as a mediating role between mindfulness and job performance made a significant contribution to the literature.

The research findings show that mindfulness positively and significantly affects job performance. The analyses revealed that an increase in mindfulness levels improved job performance. This suggests that mindfulness helps individuals enhance their attention and focus, allowing them to concentrate more on the present moment, thus facilitating more effective actions in achieving job goals. Supporting studies in the literature also highlight these findings. King and Haar (2017). Akdeniz Balyemezler and Saraç (2022), Aydoğmuş (2022), Vaculik et al. (2016), Dane and Brummel (2014), Reb, Narayanan, and Chaturvedi (2014), and Shao and Skarlicki (2009) emphasized the positive impact of mindfulness on job performance. Dane and Brummel (2014) noted that this positive relationship in the workplace is strong and independent of factors such as job satisfaction. Similarly, Reb, Narayanan, and Ho (2013) and Karavardar (2015) confirmed the positive relationship between mindfulness and job performance in different contexts. Additionally, Monteiro and Padhy (2020) showed that employees' cognitive and emotional mindfulness levels positively affect job performance. These findings suggest that mindfulness should be considered as a factor that enhances individuals' efficiency in the workplace and contributes significantly to job performance.

The study also found that mindfulness positively and significantly affects decision-making perception. An increase in mindfulness levels was found to improve individuals' decision-making perception, enabling them to adopt more conscious and effective approaches in decision-making processes. This is consistent with the findings of Glomb et al. (2011), which suggested that mindfulness allows individuals to quickly assess different perspectives and approaches. Fiol and O'Connor (2003) highlighted that mindfulness contributes to better decision-making, and Galles et al. (2019) emphasized the meaningful relationship between mindfulness and decision-making processes. In this context, it can be understood that mindfulness plays a critical role not only in job performance but also in decision-making processes.

Another significant finding of the study is the evidence that decision-making perception plays a mediating role in the relationship between mindfulness and job performance. Mediation analysis showed that decision-making perception significantly strengthened the positive relationship between mindfulness

and job performance, with 12.2% of the total effect occurring through decision-making. This suggests that mindfulness improves individuals' ability to control, organize, and make more conscious decisions, thus enhancing their job performance. Similar results are found in the literature. Kabat-Zinn (2003), Kiken and Shook (2011), Moore and Malinowski (2009), and Ostafin and Kassman (2012) emphasized that mindfulness enhances cognitive flexibility, decision-making accuracy, and problem-solving skills. Good et al. (2016), Reb et al. (2017), and Schmertz et al. (2009) found that mindfulness helps individuals pay more attention to details, detect potential problems, and maintain emotional stability. These findings show the significant indirect effect of decision-making skills on job performance.

Conclusion, Practical Implications and Limitations

The study makes a significant contribution to the literature by examining the effect of mindfulness on job performance among air traffic controllers and the mediating role of decision-making perception. The findings showed that mindfulness enhances individuals' attention, focus, and emotional regulation, leading to improved job performance and more conscious and effective decision-making approaches. Air navigation service providers should implement mindfulness-based training programs due to their positive effects on job performance and decision-making processes for air traffic controllers. Such training can help employees gain new experiences related to tolerance and mindfulness in their lives. Furthermore, it can enable employees to focus more on the present moment and develop a deeper connection with themselves, allowing them to exhibit more conscious and constructive behaviors rather than reflexive or defensive reactions (Christopher et al., 2006). Organizations like Google, Aetna, Mayo Clinic, and the U.S. The Army has successfully implemented mindfulness training to enhance workplace functionality (Jha et al., 2015; Tan, 2018; West et al., 2014; Wolever et al., 2012). These training programs are expected to enable air traffic controllers to work more effectively in high-stress and attention-demanding environments, thereby increasing individual performance and the decision-making process. Thus, mindfulness-based approaches can be considered a strategic tool to enhance flight safety and efficiency in high-risk sectors such as aviation.

The findings of the study shed light on various practical applications to improve the job performance and decision-making processes of air traffic controllers. First, mindfulness training and awareness-raising programs are recommended to be implemented in the workplace. Baer et al. (2006) stated that mindfulness skills are effective in reducing employees' job stress and increasing their cognitive flexibility. In this respect, mindfulness programs specially designed for air traffic controllers can help them perform more effectively in high-stress and intense work environments. Second, innovative technologies can be used to support decision-making processes. Parasuraman et al. (2000) showed that decision support systems (DSS) supporting human-machine collaboration both reduce error rates and increase decision-making speed. When such technologies are combined with the mindfulness skills of air traffic controllers, they can provide safer and more effective results in decision-making processes. Third, it is recommended that leadership approaches at the organizational level be restructured to encourage mindfulness practices. Spreitzer et al. (2005) drew attention to the effect of leadership styles on developing employees' psychological resources. Empowering leadership can enable air traffic controllers to be more effective in both decision-making processes and job performance. Finally, mixed methods be used to better understand the individual differences in air traffic controllers. Mixed methods studies, as emphasized by Creswell and Plano Clark (2023), can provide a more comprehensive understanding by combining quantitative and qualitative data. For example, in-depth interviews on air traffic controllers' mindfulness levels and decision-making processes and observational studies analyzing their daily work patterns can expand the current knowledge in this area.

The study has some limitations. The first limitation is that the current attitudes and emotional states of air traffic controllers may influence the measurement of their mindfulness levels and the interpretation of the results. Because participants' psychological states at the time of the survey could affect the responses, the generalizability of the findings may be limited. A second limitation is that the study only employed quantitative data collection methods. This may have prevented a deeper understanding of the participants' mindfulness and decision-making perceptions. Future studies could use qualitative data collection methods to enable a more comprehensive analysis of the findings and contribute to the growing knowledge in the field.

**Ethics Committee Approval****Informed Consent****Peer Review****Author Contributions****Conflict of Interest****Grant Support**

This study was approved by the Istanbul University Research Ethics Committee (IUREC 404/2024).

Written consent was obtained from the participants.

Externally peer-reviewed.

Conception/Design of Study- S.Ç., A.T.; Data Acquisition- S.Ç., A.T.; Data Analysis/Interpretation- S.Ç., A.T.; Drafting Manuscript- S.Ç., A.T.; Critical Revision of Manuscript- S.Ç., A.T.; Final Approval and Accountability- S.Ç., A.T.

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