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Designing the psychological safety model of knowledge workers in organizations

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ABSTRACT

BACKGROUND AND OBJECTIVES: Knowledge workers are people whose work is highlighted by the continuous and systematic development of organizational knowledge through the discovery mechanism and creation of new knowledge. The number of knowledge workers is increasing in today's organizations, and proper conditions must be provided for their activities. Also, the effective use of knowledge workers requires optimal psychological safety for them. So far, not so many studies have investigated psychological safety, especially for knowledge workers, and there is an obvious research gap in this field. Therefore, the innovation of this research is to increase knowledge about the psychological safety of knowledge workers and to create local and practical knowledge in the mentioned field.

METHODS: This research aims to design a psychological safety model for knowledge workers in the Tehran Municipality. The applied-developmental purpose aspect of this research puts it in the category of mixed (method) research. In the qualitative phase, a semi-structured method of interviewing experts, and thematic analysis techniques were used to design the research model. 18 experts from Tehran Municipality were purposefully selected to participate in the interviews. The model of the research was validated by structural equation modeling and Smart PLS software in the quantitative phase. For this purpose, 110 managers and specialists of Tehran Municipality were surveyed using a questionnaire.

FINDINGS: The results indicated that the personal, interpersonal, occupational, managerial, organizational, and spiritual dimensions are 6 dimensions that influence the psychological safety of knowledge workers in organizations. Also, several antecedents, moderating factors, and consequences were identified, which were created based on the identified variables of the research model. Also, the coefficient of determination was calculated as 0.740 for the psychological safety variable and 0.711 for the outcomes variable, based on the results of structural equation modeling, which indicates optimal values.

CONCLUSION: Ultimately, the results of the research indicated that the psychological safety of knowledge workers is a complicated, multidimensional, and dynamic phenomenon, and achieving it requires considering several factors and components, and of course, it brings valuable results.

NUMBER OF REFERENCES
56

NUMBER OF FIGURES
3

NUMBER OF TABLES
7

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INTRODUCTION

In today's world, the emergence of the knowledge-based economy has brought new demands in organizations and made important changes in organizational goals and human resource practices (Akbar *et al*., 2021). In the current situation, it's important to know that the skills and abilities of employees are the key to the success of new organizations; therefore, the transition from the traditional economy to the knowledge-based economy provides an opportunity to prioritize the role of human resources in the organization (Moinian *et al*., 2021). In the modern and knowledge-based economy, organizations are required to use knowledge-based human capital to create and maintain a competitive advantage so that they can guarantee their survival and durability against technological changes through their creativity and ideation (Igielski, 2017). Knowledge workers are considered the most important capital of the organizations (Katalnikova, 2018). For knowledge workers, the social-psychosocial work environment comes with risks and opportunities to promote health and well-being (Chirico *et al.*, 2019; Aronsson *et al.,* 2017; Helland, 2022). On the other hand, knowledge workers are generally more expected to go through burnout, which prevents them from being productive, due to heavy workloads, decision-making situations, and continuous learning needs (Ocha Pacheco *et al*., 2023). Therefore, offering healthy work environments for knowledge workers can come with valuable results for organizations and society (Helland, 2022). Over the past three decades, job opportunities for knowledge workers have increased and accelerated in today's world due to the impact of globalization and intense competition. Because knowledge workers are the most important wealth creators in the current economy, organizations are seeking ways to ensure their optimal productivity. Since knowledge workers may be more knowledgeable and skilled compared to their superiors, understanding their work psychology and sociology is essential for management (Akbar *et al*., 2022). Also, knowledge workers face many challenges in their workplace, including scattered work activities, multiple disorders, complicated tasks, and long working hours. These challenges can affect the stress, concentration, and alertness of knowledge workers and in turn affect their interaction with the digital environment, the quality of their tasks, and

generally their productivity (Soto *et al*., 2021). Mental health is known as a global challenge and one of the main leading causing factors of disease throughout the world (Elraz, 2018). Mental health and its problems are very important and exciting on social and organizational scales, as well as raising awareness of common mental health experiences around the world. However, there is a relative lack of knowledge about how mental health conditions are understood/ implemented in companies (Elraz, 2018; Helland, 2022). Mental health can be considered a basic human need that affects the quality of life in general. On the other hand, mental illnesses cause huge economic losses worldwide. For example, Patel *et al.* (2018) estimated the global economic loss caused by mental illness on a global scale to be around 16 billion U.S. dollars between 2010 and 2030. Therefore, mental health may be considered an important variable, tied to ethical and economic aspects in the modern world of work (Stuber *et al*., 2020). Also, mental health disorders at the workplace, such as depression and anxiety, are increasingly recognized as a problem in the majority of countries. By using the human capital approach, the global economic burden of mental illness was estimated at 2.5 trillion U.S. dollars in 2010, which will be increased to 1.6 trillion U.S. dollars in 2030; certainly, this problem is majorly caused due to the loss of productivity (De Oliveira *et al*., 2023). Therefore, focusing on health promotion and prevention of health risks in the psychosocial-social work environment of knowledge workers is necessary for quality knowledge production and managing the health and well-being of employees (Helland, 2022). In its latest report, the International Monetary Fund stated Iran's GDP, to be 1,596 billion dollars in 2022, according to the purchasing power index, which is increased by 141 billion dollars compared to the year before, and Iran is the 22nd world's greatest economic power in 2022. Also, in Iran's 1404 vision plan for the improvement and development of the country, the knowledge-based economy has been emphasized, therefore, its main requirements are also extremely important: one of the main prerequisites for achieving the goals of the 1404 vision plan is the development of the competence of the intellectual capital of the organization. In the general policies of the administrative system, Iran's Supreme Leader (may he live long) has also emphasized the importance of

knowledge-basing the administrative system; also, in the 4th and 8th Macro strategies, from the national comprehensive scientific map, the institutionalization knowledge and the development of knowledge-based organizations, along with the training and empowerment of human capital, have been emphasized (Abedini *et al*., 2021). Also, in many national higher documents, the importance of developing knowledge and improving the performance of knowledge workers for organizations has been emphasized. Various types of organizations operate in Iran, based on typology, municipalities are non-governmental or public institutions (Khodadai Qale-Salimi *et al*., 2019). In Article 5 of Iran's Public Accounts Act, these institutions are defined: "public, non-governmental institutions and organizations based on this law are specific organizational units that are established or will be established with the permission of the law, to fulfill duties and provide services which hold a public aspect''(Sheikhi and Moradkhani, 2019). In recent years, the number of knowledge workers in organizations, especially in Tehran Municipality, has been increasing. These employees have their own special psychological and mental characteristics and conditions. Job satisfaction and its dimensions are different based on academic degrees in Tehran Municipality employees, and employees with higher knowledge and academic degrees usually have higher expectations in terms of job satisfaction (Osanloo Bakhtiari *et al*., 2021). Also, one of the current problems and challenges of Tehran Municipality with its knowledge workers is the lack of a clear career development path for them. In other words, preserving knowledge capita and using their experiences during their service is a challenge that is currently considered one of the most important needs of Tehran Municipality (Davarzani *et al*., 2020). The design of jobs and the organizational environment in Tehran Municipality have not significantly changed since the early 21st century, even though during this period, the number of knowledge workers in this organization has increased significantly (Asanlu Bakhtiari *et al*., 2021). Also, the anxiety level and high workload of the municipality employees interact with their intellectual concentration and personal development, as well as increasing their mental disorders (Alaee, 2016). In addition, the conditions of salary payment in Tehran Municipality don't consider much difference between employees in terms of

knowledge and skills, and therefore, knowledge workers are not motivated to work harder (Ajal Afshar *et al*., 2021). As the number of knowledge workers in organizations continues to grow, research into this group has become increasingly important. Among the fundamental areas of study in this field is the concept of psychological safety, a topic that has garnered significant attention and discussion. Investigates psychological security among academic staff. It identifies strategies and actions to enhance psychological security, as well as the factors affecting it and its outcomes. Therefore, due to the presentation of a comprehensive and systematic model, it can answer many questions in the field of research. Therefore, conducting this research can provide the basis for the development of theoretical knowledge in the field of organizational behavior studies in general, and psychological security in particular. It can be used by professors, students, researchers, and others interested in scientific discussions in the field of organizational behavior. On the other hand, previous research on psychological security has been related to employees with average and low skills and knowledge, and less attention has been paid to the psychological security of academic staff. This makes the research topic innovative. In this study, human resource management, spiritual, and external organizational factors affecting psychological security, which have received less attention in previous research, are examined. Alongside this, efforts are made to more fully identify other factors (individual, interpersonal, occupational, managerial, and organizational) centered on academic staff, which is another innovation of the research. In addition, the discussion of psychological security in the municipal organization has not been raised so far, and considering the special organizational nature of the municipality, the research topic in this organization is a new discussion. Overall, it can be stated that organizations, especially Tehran Municipality, must provide proper conditions for the activity of their human resources, especially knowledge workers, and reduce their mental and physical pressures in the workplace as much as possible. On the other hand, workplace conditions put knowledge workers under the constant influence of mental, psychological, and physical pressures and stresses, and not only their performance is affected, but also they suffer many physical and psychological problems later on. Public

service organizations, including Tehran Municipality, are not an exception, and the employees of these organizations also suffer psychological stress in their work environments. Most of the weaknesses and inefficiencies of the employees in Tehran Municipality are not caused by the lack of knowledge and skills, but caused by mental and nervous pressure and stress, and result in a reduction in their mental health (Rezaei and Hosseini, 2014; Mirzaei *et al*., 2020). On the other hand, in Tehran Municipality, the employees have improved significantly in terms of academic degrees and job knowledge, and in other words, they are fulfilling tasks as "knowledge workers." Therefore, psychological safety in their jobs and being able to focus on solving the existing problems are an absolute must for them. Therefore, the results of the current research can be used to improve the performance of academic staff by creating psychological security for them in Tehran Municipality. In addition, by applying the research results, the groundwork for creating psychological security for the academic staff of Tehran Municipality is provided, subsequently improving their performance and better serve various stakeholders. As a result, conducting this research is necessary to meet the interests and expectations of the stakeholders of Tehran Municipality. In this article, after stating the problem and the necessity of the research in the introduction, the aim and innovation of the research are presented. The theoretical foundations are then elaborated in two sections: psychological security and academic staff, followed by a review of the research background. Subsequently, after stating the research method, the research findings are presented in two sections: qualitative (theme analysis) and quantitative (structural equation modeling). Finally, in the concluding section, after the discussion and conclusion, practical suggestions are presented. The research aims to provide a model for the psychological security of academic staff in Tehran Municipality. The main question of the present research is: What is the pattern of psychological safety of knowledge workers in Tehran Municipality?

Theoretical basis
Psychological Safety (PS)

Mental health is an important part of the general concept of health including the ability to communicate with others, adaptation to the environment, as well as knowing how to manage anxiety in everyday life when faced with critical conditions. Therefore, the mental health of an individual includes healthy behavior, beliefs, and thoughts (Rajabipour *et al*., 2022). Also, psychological safety is considered as a cognitive state, that doesn't result in risky behaviors or harm or threaten anyone's status, public image, or job (Nembhard and Edmondson, 2006). Psychological well-being refers to one's understanding of the coordination of themselves on the one side and the consequences of their performance on the other side. Psychological well-being is formed by 6 factors self-acceptance (having a positive attitude towards oneself), positive relationship with others (warmly communicating and close relationships with others and the ability to empathize), self-determination (feeling independent and being able to stand up against social pressures), purposeful life (having a goal in life and adding definitions to it), self-improvement (a sense of continuous improvement) and having control over the environment (a person's ability to manage the environment) (Ryff, 1995). Several factors in the workplace determine mental health, including employee stress, too many job requirements, low job control, low social support, the effort-reward imbalance, procedural or relational organizational justice, organizational change, job insecurity, temporary employment, unusual working hours, poor psychosocial-social safety and bullying (Akerstrom *et al*., 2021). Also, psychological safety includes 4 elements, which are: 1) senior management support and commitment, 2) prioritizing mental health by the management, 3) organizational communication, and 4) organizational participation and conflicts (Idris *et al*., 2012). On the other hand, the main factors of the psychological-social work environment include shift work, long working hours, repetitive tasks, no job control, high work requirements, lack of leadership, bullying, violence in the workplace, conflict between work and life, imbalance of the reward system and lack of justice in the organization (Hiesinger and Tophoven, 2019). These factors are mainly extracted from three theoretical models (1) job-demand control model, (2) effort-reward imbalance, and (3) organizational justice. The first model was proposed by Karasek Jr. (1979). He claimed that social support, psychological demand, and freedom in decision-making are necessary in all organizations. Another model was proposed by Siegrist (1996). According to this model, individual determination of effort and

reward balance is the fundamental factor. Elvainio *et al*.'s (2002) model emphasizes organizational justice as well. Many researchers have used these theoretical models to investigate health issues and their impact on employees (Harvey *et al*., 2017).

Knowledge Workers (KW)

The term knowledge workers was used by the great management philosopher, Peter Drucker, for the first time in 1959 (Arthur, 2008). Drucker (1999), stated that the most valuable asset of an organization in the 20th century was its production facilities and predicted that the most valuable asset of an organization in the 21st century would be its knowledge of workers and their efficiency. From Drucker's (1994) point of view, knowledge workers can be the ultimate key to competitive advantage for an organization. Drucker used the term knowledge workers to refer to the employees working with intangible resources. Since then, knowledge workers have been defined as high-ranking workers with scientific and analytical knowledge who are expected to develop new products and services. Knowledge work is complicated, and knowledge workers must hold special skills and talents, practical and theoretical knowledge, and be familiar with their field of activity. These employees are required to find information, access information, recall information, and apply information. Also, knowledge workers must nicely interact with other workers and have the ability and motivation to acquire and develop these skills as well. Although these characteristics can vary from one job to another, knowledge workers must have these basic conditions (kuzey, 2021). Knowledge workers are defined by three approaches (Mladkova *et al*., 2015): 1) conceptual approach (e.g., Peter Drucker's point of view) 2) job content approach (e.g., managers); and 3) industry approach (meaning people who work in knowledge industries). All three approaches share some defining characteristics, including using knowledge to create value and having an academic degree or an equivalent degree (Surawsky, 2019).

Some studies define knowledge workers as individuals who are qualified to gain information about the job more than anyone else in the organization. This type of employee can collect, mix, and use knowledge (Hoyos *et al*., 2016). Knowledge workers help organizations improve efficiency and achieve a competitive advantage in the market.

Since organizations have realized the importance of knowledge workers in organizational development, management has focused on the job performance of knowledge workers, which ultimately results in the improvement of organizational performance (Bhatija *et al*., 2017). To ensure that knowledge workers are optimally efficient and can achieve their personal goals, they should have resources and services that meet their needs, especially in the physical and social environment (Palvalin *et al*., 2017). Also, factors affecting the productivity of knowledge workers can be categorized into two (Butt *et al*., 2018): organizational and individual factors. Organizational factors include company strategy, structure, quality of human resources and organization performance, and the ability to use knowledge of the staff by using tools, processes, and products, and as a result, the efficiency of innovation. Working on these organizational factors promotes three important ways to create brand-new knowledge and innovation: continuous improvement, continuous exploitation of knowledge, and true innovation. Individual factors are related to the knowledge workers and include intrinsic motivation, believing in the organization's mission, participating in knowledge management and task supervision, leading career learning, theoretical knowledge, analytical knowledge, formal training, mastering expertise in the field, communication skills, improving peace and stability, etc. (Butt *et al*., 2018).

Research background

A few local and foreign studies have investigated topics that are close to the research topic. Among the local studies, Shirazi and Mesri (2022) designed a local model of mental stress of employees in hospitals of Tabriz. In this research, the identified factors were categorized into two controllable (management, structural, and human) and uncontrollable (environmental and attitudinal) categories. The findings of Noorahmadi *et al*. (2022) research showed a significant connection between psychological safety and organizational commitment. In research, Alavi (2022) worked on finding out the factors influencing mental health based on physical activity in Navy workers. The results indicated that "depression", "stress and anxiety", "OCD" and "fear" were considered the most important components of mental health, and physical activity also had a positive and significant effect on mental health.

The findings of Amrollahi and Arami Ardakani's (2020) research on employees of Iran's oil industry, indicated the positive and significant connection of mental health with organizational virtue and positive individual behaviors, and the organizational bullying variable plays a moderating and opposite role in the relationship between organizational virtue variables and positive individual behaviors with mental health. Also, in another study, Golchin *et al*. (2019) investigated the aspects forming mental health in employees of electronic payment services companies. The results showed that the mental-psychological health structure of employees in Iran has four main dimensions, mental-psychological health based on the person's life, individual's mental-psychological health; social mental-psychosocial health, and occupational mental-psychological health. The findings of Tajabadi and Mohebi Menesh's research (2020) show a great impact factor of the spirituality variable of the workplace on the overall mental health of employees. Taheri (2018) also worked on compiling the framework of the psychosocial-social-therapeutic environment at Qom University of Medical Sciences and two affiliated organizations in another study and based on the findings, the dimensions include leadership, the role of expectations, loyalty to the organization, job demands, control at work, organizational culture and situation, balance between work and personal life, and social interactions. The results of Sepahvandd *et al*.'s research (2018) also showed a significant connection between perceived organizational support, the spirituality of the workplace, and self-efficacy and their components with psychological well-being. The findings of Mehdad *et al*.'s research (2015) showed a high correlation between the variables related to the psychological health of workplace components and dimensions of job alienation. Finally, the findings of Golparvar *et al*.'s study (2014) indicate a significant connection between occupational stress-causing factors with psychosocial-social needs and also a significant connection between psychosocial needs and overall performance. Among foreign studies, the results of De Oliveira *et al*. (2023) research suggest that poor mental health (commonly considered as depression and/or anxiety) is associated with low productivity (i.e., attending or not attending meetings). Also, according to the findings of Ochoa Pacheco *et al*.'s (2023) research, there is a significant connection between the psychological empowerment of employees and the emotional loyalty and task-based job performance variables. The research results of Kim et al. (2022) also showed that three different strategies positively affect job attitudes, mental health, and job performance: (1) task assignments according to one's ability; (2) trust beliefs, and (3) management coaching. The results of Mathibe and Chinyamurindi (2021) also showed a direct relationship between organizational citizenship behavior and employees' mental health. Also, this relationship is significant only through the mediating effect of workplace social support. Also, in Kuzey *et al*. (2021) research, six factors affect the job satisfaction of knowledge workers, including management attitude, organizational support, job security, reward and salary, working conditions, and work partners' attitude. In another research, Akbar *et al*. (2021), prioritized the psychological-social factors of the work environment for knowledge workers. The results of their study show that the high priority dimensions are: conflict, workplace bullying, unpleasant harassment, organizational justice, and violent threats. The results of the research background showed that despite the focus of previous studies on psychological safety in organizational environments, less attention has been paid to this issue among knowledge workers, and there is an obvious research gap in this field. Considering the increase in the number of studies on knowledge workers due to the increasing number of them in the organization, psychological safety is one of the basic topics in the field of knowledge worker studies. On the other hand, in Iran, and especially in Tehran Municipality, many local factors affect the psychological safety of employees; therefore, it is necessary to address psychological safety among knowledge workers of Tehran municipality and provide a local model in this field. The previous theoretical views and theories are mainly for countries with different conditions compared to Iran and cannot be used for this country and Tehran Municipality, which is an organization with special conditions and characteristics. Therefore, the present research is necessary to fill the existing research gap. This research was conducted in the Tehran Municipality in 2023.

MATERIAL AND METHODS

The purpose of this research is to design a model

Table 1: Descriptions of the statistic sample size

Factor	Number
Gender	
Male	82
Female	28
Academic degree	
Bachelor's degree	21
Master's degree	55
PHD	34
Work experience (in years)	
Less than 10	19
10-20	35
20-30	44
Over 30	12

of the psychological safety of knowledge workers in Tehran Municipality. Based on the purpose, this research is developmental-applied. Also, because this research is aimed at designing a psychological security model for knowledge workers of Tehran Municipality, which is something new, and not so many researchers have worked on it before, the current research is considered to be an exploratory type of research. Also, this research is considered a mixed type of research as well. In the qualitative phase of this research, semi-structured interviews with experts and the thematic analysis method are used to design the research model, and in the quantitative phase, the structural equation modeling method is used to validate the designed model.

18 experts and specialists of Tehran Municipality were the participants in the qualitative phase. To design the model, the participants were selected by using the purposeful sampling technique based on knowledge and expertise in connection with the research title, and semi-structured interviews were conducted with each of them based on the defined framework. It is worth mentioning that the process of interviewing the experts continued up until the theoretical saturation point was reached, and when the researcher realized that there were no new points to be obtained from the interviews, the interviews were stopped. The selection criteria of experts included at least owning a master's degree, over 5 years of management experience in Tehran Municipality, and familiarity with topics related to organizational behavior and organizational psychology. In the quantitative phase, to validate the model that was designed in the qualitative stage, the structural equation modeling technique and PLS

smart software were used. Before beginning to model the structural equations, the adequacy of the sample size was tested using the KMO index and Bartlett's test, the normality of the data was examined using the Kolmogorov-Smirnov test, and the results showed that the sample size was sufficient and the data are being a good fit for the structural equation modeling calculations. The statistical sample in this phase was 110 managers and experts in the municipality. In the quantitative phase, the sample size was calculated using Cochran's formula, and the simple random method was used as the sampling method. Also, to collect data, the mode questionnaire was used, the validity of which was confirmed by 3 experts. The reliability of the questionnaire was also checked by Cronbach's alpha method, and 0.825 was acceptable as calculated. The characteristics of the statistical sample are in Table 1.

RESULTS AND DISCUSSION

In this research, the thematic analysis was used to design the research model. To do so, the obtained data from the semi-structured interviews with experts were analyzed with the thematic analysis technique. After that, based on Braun and Clarke's theory (2006), the taken steps for designing the research model with the thematic analysis technique are as follows.

Step 1 - Familiarity with the data: In this research, after the researchers conducted semi-structured interviews with the experts, they proceeded to extract their content. After taking notes, the researchers analyzed them only based on the views and opinions of experts, with total accuracy and away from any subjectivity and prejudice. Of course, in cases where the researchers had doubts about their

Table 2: The context of the interviews and the extracted cod for the psychological safety dimension of the employees

Row	Context of the interview	Code (index)
1	"An important part of the demotivation of knowledge workers is caused by the simplicity and ease of their tasks, and that anyone else, who is normally skilled, can do them as well."	The meaningfulness of the job
2	"Appropriate jobs for knowledge workers should be designed in a way to include a variety of tasks and responsibilities so that they are challenged and attracted."	Career richness
3	"If knowledge workers receive appropriate feedback about their working conditions, they can better their performance by working on the improvement of the existing problems and shortcomings and also, strengthening their abilities."	Job feedback
4	"The knowledge workers should be expected based on the level of authority assigned to them. Inadequacy puts individuals under mental pressure and stress and prevents them from acting in a suitable mental condition.	A proper balance of powers and tasks
5	Managers should not have unreasonable and excessive expectations from knowledge workers. This puts them under extreme psychological pressure and does not allow them to work with full concentration. Thus, the expectations should be realistic and adjusted according to what they provide for knowledge workers and the existing restrictions.	Balance between job demands and job resources
6	"Unfortunately, in many cases, we see that knowledge workers are employed in jobs that are unrelated to their educations, and proper conditions are not provided for them to be able to use what they have learned."	Connection of education and job
7	"In today's world, it has become so important that a person's job fits his life conditions and can properly balance their job requirements and family expectations."	Compatibility of work and personal life

understanding of the content, they tried to resolve the ambiguities by contacting the participants.

Step two - Creating initial codes: In this step, the researchers considered a code for each point or content mentioned by the experts that referred to a specific topic. The process of creating codes continued until the researchers made sure that there were no missed points left and all the codes were extracted. The text of the interview and the extracted codes for the components of the psychological safety variable of knowledge workers are presented in Table 2.

Step 3 - Looking for themes: After extracting the codes, the identified codes were categorized in the form of themes. The researchers identified codes that were similar in conceptual and content terms. They proceeded to create the fundamental themes after combining them. Also, the researchers combined the fundamental themes that had conceptual common parts, and as a result, the organizing themes were also identified. Therefore, the output of this step included the identification of fundamental themes and organizing themes.

Step 4 - Reviewing the themes: This step includes reviewing and refining the themes. First, the coded summaries are reviewed. Then, the validity of the themes of the data is considered. This step was finished after obtaining a satisfactory map of themes aligned with the extracted codes.

Step 5 - Defining and naming themes: Finally, after creating a satisfactory and acceptable map of themes by the researcher, in the fifth step, he titles the categories of themes.

Titling is based on the nature and content of the categories, and it was tried to set titles in a way to achieve the maximum coordination and compatibility between the codes of each category and the chosen titles. Table 3 shows the results of the safety theme of the knowledge workers in Tehran Municipality. As can be seen, 6 basic themes and 15 organizing themes have been identified.

Also, according to experts' view, several antecedents, moderating factors, and outcomes of the psychological safety of knowledge workers in Tehran Municipality were found. Table 4 includes the results of the thematic analysis for the identified variables.

Finally, after identifying the research variables and determining their relationships, the model of psychological safety of knowledge workers of Tehran Municipality was designed. After the model was designed, 3 experts were consulted about it, and the model was approved by them. Fig. 1 is the research model.

Validation results of the model using the structural equation modeling method

Structural equation modeling based on the

Table 3: Thematic analysis of psychological security of knowledge workers

General themes	Organizer themes	Fundamental themes	Codes
Psychological security of knowledge workers	career dimension	Job design factors	Job meaningfulness, job richness, variety of tasks, job identity, job independence, job attractiveness, and clarity of job roles and tasks.
		Job dynamic factors	Job feedback, the possibility of job learning, job success opportunities, balanced job demands and job resources, job innovation, having the required tools to perform tasks, and job time flexibility.
		Job professional factors	Proper job income, connection of education and occupation, balance of job and personal life, appropriate amount of authority and tasks, low job stress and pressure, job security, and unity of supervision
	Interpersonal dimension	Effective communication factors	Face-to-face communication, continuous and close communication between managers and employees, multiple communication channels, open and free communication between employees, and freedom of speech and democracy.
		Positive interpersonal relationship factors	interpersonal empathy and kindness, organizational citizenship behavior, interpersonal trust, supportive atmosphere of employees and solidarity, and coordination of employees
	Management dimension	leadership style factors	relationship-focused style, transformative attitude, coaching, collaborative management, servant leadership, leader competence, and strategic actions
		Effective human resource management factors	efficient compensation system service, continuous and purposeful training, evaluation of effective performance, meritocracy, talent management, and effective incentive system
	Organizational dimension	Effective organizational structure factors	Horizontal structure of organization, limited organizational bureaucracy, teamwork and group work, flexible and appropriate rules, and efficient organizational processes
		Effective organizational system factors	Administrative transparency, administrative health, respecting the rules, organizational knowledge management, and organizational justice
	Personal dimension	Personality characteristics	Self-efficacy, self-confidence, extroversion, adaptability, emotional stability, and risk-taking
		Attitudinal characteristics	Being Positive minded, being hopeful of the future, self-disclosure, innovation, realism, and ambitiousness
		Skill features	Emotional intelligence skills, effective communication skills, innovative thinking skills, problem-solving skills, decision-making skills, argument ability, the ability to persuade others, and sports and physical activity.
	Spiritual dimension	Ethical	Staying true to moral values, altruism, and philanthropy, respecting others' rights, work conscience, and honesty
		Personal spirituality	Personal virtue, faith in God, righteousness, staying true to the religious rules and forgiveness, and selflessness
		Ethics	Responsibility, accountability, work loyalty, loyalty to the organization, prioritizing organizational interests (over individual interests), and avoiding corruption and conspiring.

partial least squares (PLS) method and Smart PLS software were used to test the conceptual model of the research. To do so, firstly, the adequacy of the sample size was investigated. There are various methods for checking the adequacy of sampling, and in this research, the Kaiser-Meyer-Olkin measure of

Table 4: The results of the thematic analysis of the antecedent, moderating factors, and psychological safety of the knowledge workers in Tehran Municipality

General themes	Organizer themes	Fundamental themes	Codes
Antecedents	Antecedents of knowledge workers' problems	Psychological factors of knowledge workers	Job alienation of knowledge workers, lack of motivation in knowledge workers, burnout of knowledge workers, and high anxiety of knowledge workers
		Functional factors of knowledge workers	Improper use of knowledge workers' capabilities, low participation of knowledge workers in organizational affairs, and low productivity of knowledge workers
	Antecedents of organizational problem	Functional conditions of the organization	The ever-increasing expectations of citizens, continuous environmental changes, gaining organizational legitimacy, growth of the organizational brand, and pressure from external groups
		Environmental pressures	
Moderating factors	features of Tehran Municipality	Features of the organizational environment	Organizational culture, concentration of organizational units, organizational rules and regulations, and diversity of organizational employees
		Features of Organizational Orientation	Organizational values, organizational goals and strategies, the quality of inter-organizational relations and communication with scientific institutions
	Features of knowledge workers	Demographic characteristics	Gender of knowledge workers, the academic degree of knowledge workers, work experience of knowledge workers, and maturity level of knowledge workers
consequences	Organization's Internal consequences	personal consequences	Improvement in performance of knowledge workers, personal growth and improvement of knowledge workers, job satisfaction of knowledge workers, and mental peace of knowledge workers
		Organizational consequences	Realization of organizational efficiency and improvement of organizational effectiveness
	organization's external consequences	Stakeholder consequences	Ensuring the interests of the stockholders and obtaining the satisfaction of the stockholders

sampling adequacy (KMO) and Bartlett's test (t) were used. The output of the KMO and Bartlett test is presented in Table 5.

According to Table 5, since the KMO index value is 0.812 and is over 0.6, and on the other hand, the significance of Bartlett's test is 0.000, the sample size is sufficient. After confirmation of the adequacy of the sample size, reliability and validity should be checked.
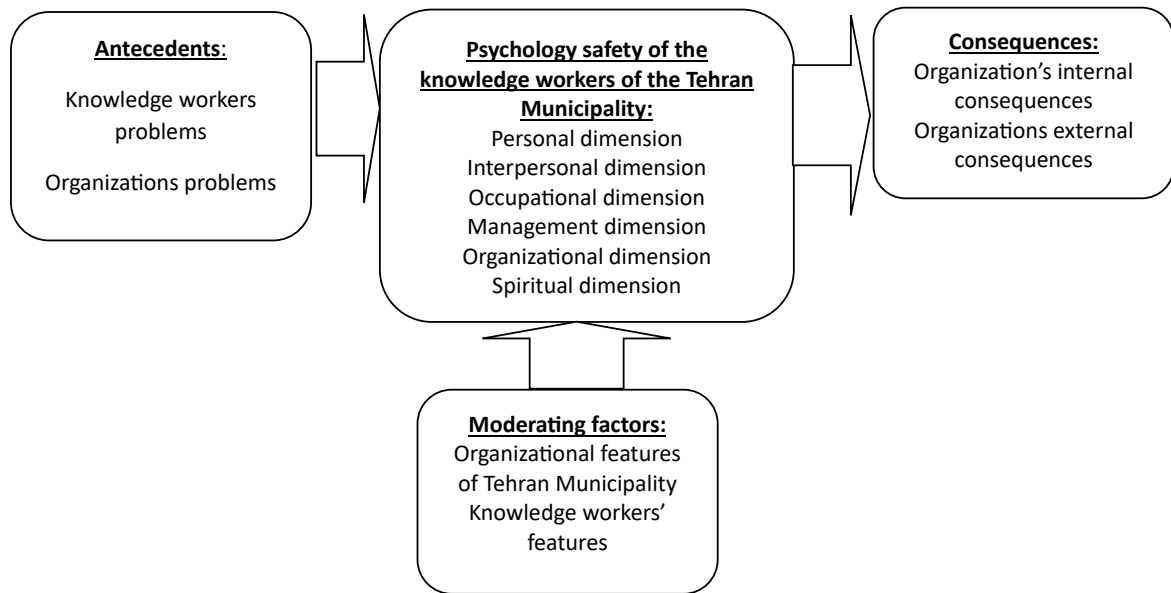
Fig. 1: Psychological safety model of knowledge workers of Tehran Municipality

Table 5: Results of the Calculation of KMO Index and Bartlett's Test

Index	KMO	Bartlett	Sig	Freedom degree	Test result
Value	0.812	52750.40	0.000	35	confirmed

Table 6: Cronbach's Alpha Value, composite reliability, and AVE

variable	Cronbach's Alpha	composite reliability	AVE
Antecedents	0.88	0.90	0.72
Psychological safety	0.83	0.87	0.74
Moderating factors	0.81	0.83	0.67
consequences	0.85	0.88	0.69

To check reliability, Cronbach's alpha and composite reliability methods were used, and the acceptable limit of both values is over 0.7. Cronbach's alpha is a classic measure of reliability and a suitable measure for evaluating internal stability (internal consistency). Also, the composite reliability presented by Verts *et al*. (1974) is a more modern measure of reliability. In the composite reliability, the reliability of the constructs is not calculated in an absolute way but instead according to the correlation of their questions to each other (correlation of questions of a variable in the model). Also, the Average Variance Extracted (AVE) measure was used to test the convergent validity. This measure shows the correlation degree

of the structure with its indicators. Fornell and Larker (1981) introduced the AVE criterion to measure convergent validity and stated its critical value as 0.5. The calculated values in Table 6 are all higher than the threshold, and therefore, convergent validity and reliability are confirmed.

Finally, discriminant validity is the third measure of the fit of measurement models. According to the Fornell and Larker (1981) point of view, discriminant validity is acceptable when the average variance extracted for each construct is above the shared variance between that construct and other constructs in the model. According to Table 7, it can be said that the discriminant validity is at an acceptable level.

Table 7: Calculations Related to Divergent Validity

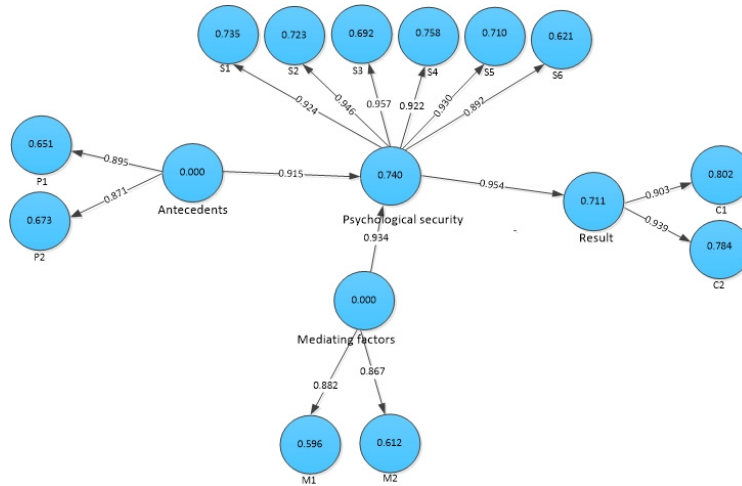| Variable	Antecedents	Safety	moderator	consequences
Antecedents	0.792			
Psychological safety	0.336	0.820		
Moderator factors	0.372	0.245	0.753	
Consequences	0.379	0.360	0.339	0.789

Fig. 2: The structural research model in the significance mode

Because the square root of the average variance extracted ($\sqrt{AVE}$) or all variables are over the correlation of that variable with other variables. Therefore, the discriminant validity of the variables of the questionnaire is confirmed.

Also, unlike the measurement models, the structural part of the model has nothing to do with the questions and obvious variables of the model and only focuses on the hidden variables and their relationships. In this research, the structural model was fitted using the coefficient of determination (R^2), Q^2 criterion, redundancy, and significance coefficients. The most basic criterion for measuring the relationship between structures in structural equation models is the significant numbers of t. If the t-statistic value is not in the range (-1.96 to +1.96), it is significant at the 95% confidence interval. If the t-statistic value is within this range, then the estimated path coefficient is not significant and its hypothesis is rejected. Fig. 2 shows the conceptual model of the research in the significance mode of the coefficients.

Fig. 3 shows the conceptual model of the research

estimating standard coefficients. In this figure, the intensity of the influence of the variables on each other is specified. In a structural equation model, each direct effect specifies and shows a relationship between a dependent variable and an independent variable. However, a dependent variable in another direct effect can be an independent variable and vice versa.

Table 8 shows the relationships between the components of the model. As it is presented, all path coefficients are significant, and therefore, the defined relationships in the research model are confirmed.

Also, the coefficient of determination (R^2) is a measure that indicates the level of changes in each of the dependent variables of the model, which is explained by the independent variables (Samimi and Nouri, 2023). It can be said that the R^2 value is only provided for the intrinsic variables of the model, and in the case of extrinsic structures, its value is zero. The higher the value of R^2 related to the intrinsic structures of the model, the model is better fitted (Samimi and Shahriari Moghadam, 2018). Chin (1998) has defined three values of 0.19, 0.33, and 0.67 as the criterion
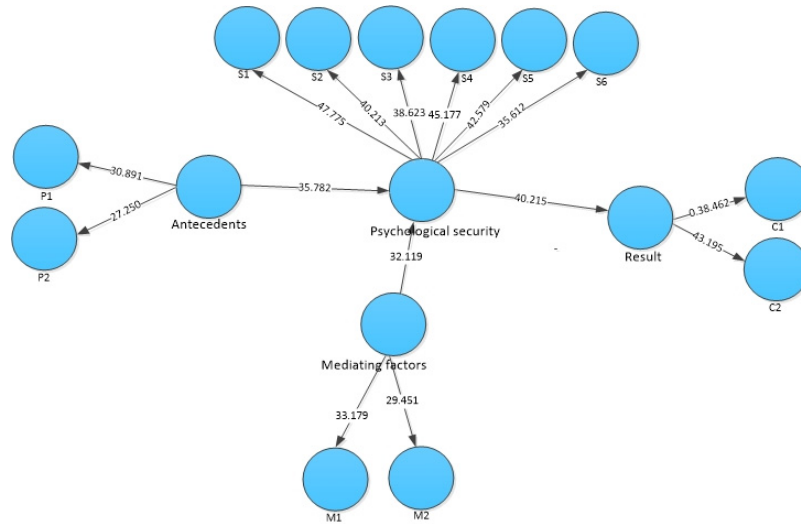
Fig. 3: Structural model of the research in the standard mode

Table 8: Results of the path analysis

Row	Path		Path coefficient	t-Value	result
1	Antecedents	Psychological safety	35.782	0.915	confirmed
2	Moderating factors	Psychological safety	32.119	0.934	Confirmed
3	Psychological safety	Consequences	0.954	0.954	confirmed

value for weak, medium, and strong values of the fit of the structural part of the model by using the coefficient of determination. The calculated R^2 value for the psychological safety of knowledge workers is 0.740, and for the outcomes variable is 0.711, which are suitable values. The Q^2 index was introduced by Stone (1974) and defines the predictive power of the model. According to them, models whose structural part is properly fitted should be able to predict the indicators related to the intrinsic structures of the model. If the value of Q^2 of an intrinsic structure is zero or less, it means that the relationships between other structures in the model and that very intrinsic structure are not well explained, and as a result, the model needs to be modified. Hensler *et al*. (2009) have determined three values of 0.02, 0.15, and 0.35 regarding the intensity of predictive power regarding intrinsic structures. According to them, if in an intrinsic structure, the Q^2 value is close to 0.02, it

indicates that the model has weak predictive power. The Q^2 criterion for the variable of psychological safety of knowledge workers is 0.33, and for the outcome variable is 0.30, which are favorable values. Finally, the GOF criterion is also related to the general part of structural equation models; meaning that by this criterion, the researcher can control the fit of the general part after checking the fit of the measurement part and the structural part of the general research model. In a way, the average Communalities show the average communal values of each structure, and Ave R^2 is the intrinsic structure of the model. Three values of 0.01, 0.25, and 0.35 are considered weak, medium, and strong values for GOF, and for this research model, a value of 0.55 was obtained, which indicates the appropriate fit of the research model.

Discussion

In today's world, the contribution of knowledge

workers in organizations is increasing, and due to their special abilities and skills, organizations continue to need more of these employees. Although knowledge workers can make the organization grow and develop, with their extraordinary performance providing them with suitable conditions for activity, especially health and psychological safety, is extremely important. In other words, the nature of knowledge workers' tasks requires them to be calm and focused, and any tension and mental pressure can greatly reduce their performance. Tehran Municipality, as an influential and important organization, is not an exception in this regard, and considering the growing number of knowledge workers and the need of this organization for optimal performance, it is necessary to provide a safe and calm environment for their activities. Therefore, in this research, it was attempted to design a model for the psychological safety of knowledge workers in Tehran Municipality. To do so, semi-structured interview methods with experts and thematic analysis techniques were used. According to the findings, 6 dimensions and 15 components were identified for the variable of psychological safety of the knowledge workers. Also, several antecedents, moderating factors, and consequences were identified, and the research model was formed based on them. The results of structural equation modeling also showed that the designed model is approved and has good fitting power. The value of the coefficient of determination calculated for the variable of psychological safety of knowledge workers is 0.740, and for the outcome variable is 0.711, which are favorable values. Based on research findings, the variable of psychological safety of knowledge workers includes 6 dimensions: individual, interpersonal, occupational, managerial, organizational, and spiritual. From the individual dimension point of view, knowledge workers should develop a set of capabilities, including personality, attitude, and skills, so that they can experience favorable psychological conditions. To reach a favorable point in the field of psychological safety, each person must first start with themselves and create a set of favorable characteristics for themselves. For example, improving problem-solving skills causes knowledge workers to deal with problems more calmly and not lose their mental or psychological focus; by being self-efficient, a person who believes in their ability's experiences higher

mental strength and copes with tasks better. Also, the interpersonal dimension is related to the relationships formed in the organization between different people, which can affect the psychological conditions of knowledge workers. The environment of the organization should provide a platform for effective communication between employees in different ways so that people can form relationships with each other in the most optimal way possible. In addition, forming positive relationships between people is very helpful for creating a positive and calm atmosphere and forming synergy. However, it must be accepted that creating a favorable social environment has a great impact on reducing psychological problems since humans are social beings. Plus, the individual and interpersonal dimensions, the job, and related matters are also decisive for knowledge workers. The job is actually something for the development of knowledge workers' capabilities and the flourishing of their talents and competencies. Usually, most of the dissatisfactions of knowledge workers are due to the type and features of their jobs. A job should be challenging both in terms of the features considered for it (job design) and in terms of its dynamism. Also, the professional conditions of the job should be in a way that the employees are freed from issues outside of the job and focused on their tasks. Another dimension is related to management factors that are related to leadership style features and human resources management actions. Organizational leaders create a special environment and conditions with their approaches and attitudes for communicating with employees and keeping the actions of the organization going. For organizations like Tehran Municipality, which have a high number of knowledge workers, leaders should choose a style that matches the characteristics of knowledge workers while having competence. For example, according to the desire of knowledge workers to new problems and their dynamism in their activities, they should have a transformational approach to affairs. Also, the human resource management system should adapt its subsystems according to the conditions of knowledge workers. For example, in the reward system, the share of quantitative criteria for knowledge workers is reduced, and the quality of actions is considered instead. Or, a meritocracy system should be implemented to motivate the knowledge workers. The other identified dimension

is the organizational dimension, which refers to the characteristics of the organization's structure as well as organizational systems. However, knowledge workers work within the framework of organizational structure and conditions, and improper conditions can reduce their performance. The horizontal organizational structure is nice for knowledge workers and minimizes their restrictions in the way of doing their tasks. On the other hand, the systems of the organization should minimize mental and psychological pressure for knowledge workers. For example, injustice in the organization causes knowledge workers not to use their full capabilities and get satisfied with the bare minimum; corruption, as an example, causes lawlessness, discourages, and demotivates knowledge workers. The last dimension is related to spiritual conditions. Spirituality, on its own, is a relaxing factor for people, and paying attention to this helps knowledge workers experience better psychological conditions. Morality and individual spirituality of knowledge workers calm the knowledge workers down and make them experience better conditions by balancing their expectations and better communication with others. Also, following the rules should be noticed as well, which are usually followed by knowledge workers due to their professionalism, and it gives them peace of mind. In general, the results of the research showed that the psychological safety of knowledge workers is a complicated, multifaceted, and dynamic phenomenon that a set of factors must be considered for its better management. In total, the research results showed that the psychological security of academic staff is a complex, multifaceted, and dynamic phenomenon. To achieve this, a set of individuals, interpersonal, occupational, managerial, organizational, and spiritual factors are considered. In other words, at other employee levels, psychological security is more related to individual factors and factors such as wages and job security. However, among academic staff, achieving psychological security depends on multiple and multidimensional factors. Considering these factors can produce valuable results at the individual and organizational levels. Also, the results are compatible with the findings of other previous researchers such as Shirazi and Mesri (2022), Pourahmadi *et al*. (2022), Alavi (222), Golchin *et al*., (2020) Tajabadi and Mohammadimanesh (2020) Sepahvand *et al*. (2018), Golparvar *et al*. (2014), De

Oliveira *et al*. (2023), Pacheco *et al*. (2023), Mathibe & Chiniamorindi (2021), Kozi *et al*. (2021) and Akbar *et al*. (2021) and confirms their findings. The current research, while enhancing knowledge and promoting scientific foundations in the field of mental health and psychological security of academic staff in an organizational environment, can be used by the managers of Tehran Municipality for more effective utilization of academic staff. Also, the application of the research results can improve the mental and psychological well-being of academic staff, leading to the enhancement of their job and organizational performance. This, in turn, improves the services provided to citizens and secures the interests of other stakeholders. Finally, it is recommended that future studies investigate the psychological safety of knowledge workers in other types of organizations and compare them with the results of this research. Also, the most important restriction of the research is that the results are related to Tehran Municipality and cannot be generalized to other organizations. To overcome this limitation, future research can be conducted in a broader community.

CONCLUSION

These days, the most valuable asset of an organization is knowledge workers. Knowledge workers use their expertise, knowledge, and experience to create, share, or use their knowledge on the job to help the organization achieve its goals. On the other hand, workplaces are increasingly recognized as important environments where employees' psychological health and safety must be supported and improved. Psychological safety is especially important for academic staff because of their strong need for peace and intellectual concentration in their work. Therefore, this study aimed to design a model of psychological safety for knowledge workers in the Tehran Municipality. This research included two qualitative and quantitative phases, and it is a mixed type of research. In the qualitative phase, semi-structured interview methods with experts and thematic analysis techniques were used to design the research model. Experts of Tehran Municipality who were selected purposefully were interviewed in this phase. In the quantitative phase, the research model was validated by using the structural equation modeling method and Smart PLS software. For this, the managers

and experts of the Tehran municipality were surveyed using a questionnaire. Results showed that individual, interpersonal, occupational, managerial, organizational, and spiritual dimensions are six dimensions, influencing the psychological safety of knowledge workers in organizations. Also, several antecedents, moderating factors, and consequences were identified as well, which were created based on the identified variables of the research model. In addition to the knowledge acquisition, the results can form practical and local knowledge for Tehran municipality managers to provide suitable working conditions for knowledge workers.

Several recommendations are presented based on the research findings:

• It is recommended to redesign the knowledge workers' job positions in Tehran municipality and to create appropriate features in these jobs.

• It is recommended that the managers of Tehran municipality use cooperative and relationship-oriented styles for knowledge workers.

• It is recommended to redesign the compensation system of knowledge workers according to their characteristics.

• It is recommended to strengthen the personality traits of knowledge workers with academic and skill training.

• It is recommended to promote and institutionalize moral values in Tehran Municipality.

• It is recommended to horizatilize the organizational structure of Tehran Municipality and to reduce the level of administrative bureaucracies.

• It is recommended to implement meritocracy and talent management systems in Tehran Municipality.

• It is recommended to promote and encourage positive interpersonal relationships between employees in Tehran Municipality.

• It is recommended to redesign the performance evaluation system based on the characteristics and performance conditions of knowledge workers.

AUTHOR CONTRIBUTIONS

S. Mahdinezhad conducted the research, which involved gathering materials, developing the methodology, collecting and analyzing data, interpreting the findings, and drafting and finalizing the article. M.H. Boochani was responsible for conceptualizing, supervising, orienting, collecting data, and revising the article. A.A. Malekafzali contributed to the research methodology, techniques, and modeling, as well as project management.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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