Araştırma Makalesi

Investigating The Effect of Perceived Empowerment on Artificial Intelligence Anxiety Levels in Healthcare Workers

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Abstract: The aim of this study is to explore the correlation between AI anxiety and the perceived empowerment of healthcare professionals. An online survey was conducted among healthcare professionals at a training and research hospital. The survey included questions about the participants' socio-demographic characteristics, as well as the AI Anxiety Scale and the Perceived Empowerment Scale. A total of 285 healthcare professionals completed the survey between December 2023 and February 2024. Healthcare professionals AI anxiety at a level slightly above the medium, while their perception of empowerment is high. The level of AI anxiety varied based on factors such as gender, age, total years of work, and the specific unit they work in. Similarly, the perception of empowerment differed among groups based on age, total years of

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work, and marital status. The study also found a negative relationship between the meaning-competence dimension of perceived empowerment and the AI learning dimension, as well as a positive relationship between the AI sociotechnical blindness dimension.
It was found that individuals with a high perception of empowerment are less anxious about learning new information about artificial intelligence, but more anxious about the potentially harmful and dangerous aspects of artificial intelligence. The study suggests that empowerment, as an effective human resource management tool, can be utilized by health managers to alleviate employees' AI nxiety.
Keywords: Anxiety, artificial intelligence, empowerment, healthcare professionals, human resources.

Sağlık Çalışanlarında Algılanan Güçlendirmenin Yapay Zeka Kaygı Düzeyine Etkisinin İncelenmesi

Öz: Amaç: Bu çalışmanın amacı, sağlık çalışanlarının yapay zeka kaygısı ile algıladığı güçlendirme arasındaki ilişkiyi araştırmaktır.
Yöntem: Veriler bir eğitim ve araştırma hastanesindeki sağlık çalışanlarına uygulanan çevrimiçi anket aracılığıyla elde edildi. Anket, katılımcıların sosyo-demografik özellikleriyle ilgili soruların yanı sıra Yapay Zeka Kaygı Ölçeği ve Algılanan Güçlendirme Ölçeği'ni içermektedir. Aralık 2023 ile Şubat 2024 arasında toplam 285 sağlık çalışanı anketi yanıtlamıştır.
Bulgular: Sağlık çalışanlarının yapay zeka kaygısı orta seviyenin biraz üzerindeyken, güçlendirme algıları yüksektir. Çalışanların yapay zeka kaygı seviyesi cinsiyet, yaş, toplam çalışma yılı ve çalıştıkları birim gibi faktörlere göre değişmektedir. Benzer şekilde, güçlendirme algısı gruplar arasında yaşa, toplam çalışma yılına ve medeni duruma göre farklılık göstermektedir. Çalışma ayrıca algılanan güçlendirmenin anlam-yeterlilik boyutu ile yapay zeka kaygı ölçeğinin öğrenme boyutu arasında negatif bir ilişki ve sosyoteknik körlük boyutu arasında pozitif bir ilişki olduğunu göstermektedir.
Sonuç: Güçlendirme algısı yüksek olan bireylerin yapay zeka hakkında yeni bilgiler öğrenme konusunda daha az kaygılı oldukları, ancak yapay zekanın potansiyel olarak zararlı ve tehlikeli yönleri konusunda daha fazla kaygılı oldukları bulunmuştur. Çalışma, güçlendirmenin etkili bir insan kaynakları yönetim aracı olarak sağlık yöneticileri tarafından çalışanların yapay zeka kaygısını hafifletmek için kullanılabileceğini öne sürmektedir.
Anahtar kelimeler: Kaygı, yapay zeka, güçlendirme, sağlık çalışanları, insan kaynakları.

Introduction

Artificial intelligence (AI) can be defined most simply as the ability of computer-based technology to perform certain tasks attributed to entities with the ability to think and analyze (Castagno and Khalifa, 2020). In practical terms, the skills imitated and performed by computer systems called artificial intelligence include natural behaviors inherent in human intelligence, such as learning new information, reasoning, and problem-solving. It is important to note that AI should not be seen only as a technological product or process but as processes developed through different computational models and algorithms created for this purpose (Chen and Decary, 2020).

AI is utilized in various fields to predict and make decisions in different situations (Karimian et al., 2022). The concept of AI is broad and encompasses a range of learning methods, including machine learning, representation learning, deep learning, natural language processing, and computer vision. One of the branches of artificial intelligence, machine learning, is the use of computer algorithms to obtain a set of patterns from the raw data given to it and to obtain information independently of the human factor. Artificial neural networks, created by advanced algorithms, have the capacity to learn and make decisions automatically, much like the human brain. These networks can perceive complex relationships and patterns in data, mimicking the way the human brain processes information. In deep learning, the ability to uncover these pattern relationships is particularly valuable when dealing with more complex data sets that traditional machine learning techniques may not adequately handle (Akinrinmade et al., 2023).

The use of AI in healthcare is growing rapidly (Ali et al., 2023; Seoni et al., 2023; Yılmaz et al., 2021). AI is used in various medical specialties such as radiology, ophthalmology, dermatology, pathology, and pulmonology (Gillissen et al., 2022). In recent years, AI has become essential for the advancement and improvement of healthcare and medical diagnostic services. AI technologies have many benefits not only for patients but also for healthcare providers by assisting in the prediction, diagnosis, and treatment of diseases (Seoni et al., 2023). One of the most remarkable advantages of AI in healthcare is its accuracy in the diagnostic process. Moreover, AI can diagnose symptoms faster than most medical professionals, help monitor complex patient symptoms, improve quality of life, and increase medication compliance (Guo et al., 2020; Yılmaz et al., 2021). Additionally, AI can be integrated into administrative processes in the healthcare sector, including documentation management, efficiency applications, error prevention, and cost and quality management processes in healthcare facilities (Güzel et al., 2022; Karimian et al., 2022).

Despite its benefits, the use of AI in healthcare is met with concern and anxiety (Filiz et al., 2022; Karimian et al., 2022). Some believe that AI is overrated, while others fear that AI may eventually surpass human intelligence. Health-related concerns include the fear that machine learning will replace doctors and disrupt the doctor-patient relationship (Castagno and Khalifa, 2020). A systematic review of 45 studies revealed that while the most of doctors and medical students have positive opinions about AI, there are still hesitations on some issues. Many participants expressed a distrust of clinical AI and preferred that clinicians control patient outcomes. In addition, some participants are concerned about operator dependency and the potential for increased procedure times due to clinical AI. Other concerns included the possibility of the AI performing poorly in unexpected situations and its lack of empathy or communication skills (Chen et al., 2022).

Innovations such as new technologies, the integration of artificial intelligence in business processes, and the acceleration of digitalization are leading to changes in working environments within organizations. Organizations are implementing new working methods to help employees adapt to these innovations and complex processes, one of which is empowerment (Coun et al., 2022). In today's highly competitive environment, organizations are placing greater emphasis on the power of human capital and are seeking ways to leverage this power. Empowerment allows employees to contribute to strategic decisions, leading to increased organizational effectiveness and improved performance (Oliveira et al., 2023).

Empowerment can be briefly defined as the distribution of authority from the center to lower levels (Albasal et al., 2022). Empowered personnel have increased autonomy and play a crucial role in achieving organizational goals (Gottlieb et al., 2021). Empowerment as a management tool aims to delegate authority, reducing hierarchical levels and eliminating bureaucratic processes. This strategic management approach fosters self-management responsibility by enabling employees to make decisions regarding their own work (Oliveira et al., 2023). Employee empowerment is closely linked to the development of skills such as individual initiative and independent decision-making by employees. Additionally, it fosters increased innovation, creativity, and commitment among employees (Małys and Deszczyński, 2020).

The concept of empowerment is approached in two different ways: structural and psychological empowerment. Structural empowerment is seen as the responsibility of top management. In this perspective, empowerment is defined as management providing opportunities, support, and facilities to employees, sharing knowledge and power with subordinates, distributing decision-making power to lower levels, and allowing employees to take responsibility for their own work (Jafari et al., 2021). However, psychological empowerment emphasizes how

employees perceive it rather than what top management does. If employees do not perceive empowerment, none of the activities carried out by top management in the name of empowerment will achieve their purpose (Çöl, 2008). Psychological empowerment is possible if employees feel motivated on issues related to their workplace. It is when an employee believes that he/she has power and is motivated to use it. Structural empowerment, which is more prominent in administrative processes, defines the structures, policies, and opportunities developed to increase employee participation and involvement in processes and even commitment to work. It is stated that empowerment has a positive impact on organizational processes; it increases organizational commitment, job satisfaction, quality of working life, employee satisfaction, and job performance (Gottlieb et al., 2021; Jafari et al., 2021; Ta'an et al., 2020). Empowerment also encourages innovation and experimentation within the organization (Gottlieb et al., 2021).

According to Spreitzer (1995), the concept of empowerment comprises four perceptual dimensions: meaning, competence, self-determination, and impact. One of the dimentions of empowerment, "meaning" states the commitment an employee feels towards the goals of their job. "Competence" is linked to the employee's belief in their ability to perform their tasks successfully. "Self-determination" pertains to the freedom employees have to decide how to fulfill their duties. "Impact" reflects the extent to which an employee feels their tasks can impact the organization (Çöl, 2008; Oliveira et al., 2023).

As technology continues to advance in the healthcare sector, the use of AI applications in health services is are on the rise. This technological progress may lead to concerns and anxiety among healthcare professionals. Despite the increasing role of technology, healthcare remains a labor-intensive sector. As a human resources management strategy, empowerment can serve as a valuable tool for integrating human capital with new technological advancements. This study aims to explore the relationship between empowerment and artificial intelligence anxiety in healthcare workers. The goal is to uncover the impact of empowerment on AI-related anxiety among healthcare workers. Additionally, the study assesses healthcare professionals' awareness of artificial intelligence applications and their willingness to incorporate them into their professional lives. The findings of this study are expected to provide insights into human resources management in healthcare facilities and offer guidance for designing pre-professional and in-service training programs.

The research questions for this study are as follows: What is the level of artificial intelligence awareness among healthcare professionals? What is the level of anxiety among healthcare professionals regarding artificial intelligence? Does perceived empowerment have an effect on anxiety towards artificial intelligence?

Method

The study data were collected from healthcare professionals (doctors, nurses, anesthesia technicians, and x-ray technicians) at a training and research hospital in Istanbul. The total number of active healthcare workers in the hospital during the study was 673. With a 95% confidence level and a 5% margin of error, the sample size was calculated to be 245. Those who did not volunteer to participate, were on leave, or were in support roles and students doing internships in the hospital were excluded. A total of 285 employees completed the questionnaires.

Quantitative research methods are used in studies aimed at reaching a large number of participants, statistically evaluating the data, and generalizing the findings (Garip, 2023). Cross-sectional studies examine data from a population at a specific point in time. These studies are useful for measuring the prevalence of variables, understanding their determinants, and describing the characteristics of the population. They are typically inexpensive and easy to conduct, making them valuable as preliminary evidence for further research (Wang and Cheng, 2020). Given the study's purpose and the population examined, a quantitative and cross-sectional approach was deemed appropriate.

In this cross-sectional study, the data was collected using an online questionnaire on Google Forms, distributed to healthcare professionals over a three-month period from December 2023 to February 2024. Participants were asked for their voluntary consent before answering the questionnaire. In the first part of the questionnaire sociodemographic questions and work-related questions were asked. The "Artificial Intelligence Anxiety Scale" used in the second part was developed by Wang and Wang (2022) and adapted to Turkish by Akkaya et al. (2021). The scale consists of sixteen 5-point Likert-type questions ranging from 1-strongly disagree to 5-strongly agree. The scale asks participants to indicate the extent to which they agree with each statement regarding artificial intelligence anxiety. The lowest possible score from the scale is 16 and the highest is 80. High scores from the scale indicate high artificial intelligence anxiety. The scale has four subscales titled "learning", "job replacement", sociotechnical blindness", and "artificial ıntelligence configuration". The Cronbach alpha coefficient of the scale was found to be 0.96 in the original study and 0.94 in the Turkish adaptation study. In this study, the Cronbach alpha coefficient of the Artificial Intelligence Anxiety Scale is 0.944.

The Perceived Empowerment Scale developed by Spreitzer (1995) and validated in Turkish by Çöl was used in the third part of the questionnaire (Çöl, 2008). The scale comprises 12 statements and was originally designed with four dimensions. However, in the Turkish adaptation, the number of factors decreased to three due to the merging of meaning and competence into a single factor. In

Çöl's study, the Cronbach's alpha coefficients for the scale's dimensions were as follows: Meaning and Competence 0.872, Self-determination 0.811, and Impact 0.943. In the current study, the Cronbach's alpha coefficient of the Perceived Empowerment Scale was 0.899.

Statistical Analysis and Ethical Approval

The data were analyzed using SPSS statistical software. The Kolmogorov-Smirnov test indicated that the data were not normally distributed, leading to the application of nonparametric tests.

Before commencing the study, approval was obtained from the Ethics Committee of Süreyyapaşa Chest Diseases and Surgery Training and Research Hospital (Date: 02.11.2023; Decision No: 143). Prior to the questionnaire, all participants confirmed their voluntary participation in the study. Approval was obtained from the institution where the study is being conducted.

Results

The study surveyed a total of 285 health workers, 80% of whom were female and 20% were male. The participants' ages ranged from 20 to 58, with an average age of 30.82 (±7.727). On average, the participants had 7.905 (±8.091) years of experience in the profession. The sociodemographic and work-related characteristics of the participants, as well as their opinions on artificial intelligence, are presented in Table 1.

Table 1. Sociodemographic and job-related characteristics of the participants and their thoughts about artificial intelligence (AI) (n=285)

Variables		**Minimum-Maximum**	**Mean±Std. Deviation**
Age		20 – 58 year	30.82±7.727
Total years of work in the profession		0.5 – 36 year	7.905±8.091
Internet usage time (hours/day)		0.2 – 18 hours	4.503±3.012
Variables		**Number**	**Frequency %**
Gender	Female	228	80
	Male	57	20
Marital status	Married	137	48.1
	Single	148	51.9
Education	High School	11	3.9
	2 years degree	38	13.3
	Bachelor	198	69.5
	Postgraduate	38	13.3
Unit worked	Emergency department	13	4.6
	Operating room	14	4.9
	Outpatient units	40	14
	Inpatient units	104	36.5
	Non-clinical units	31	10.9
	Intensive care unit	83	29.1
Level of knowledge and use of computer technologies	None	2	0.7
	Little	25	8.8
	Medium	145	50.9
	Good	96	33.7
	Very good	17	6
Knowing the concept of artificial intelligence	No	6	2.1
	Some	35	12.3
	Yes	244	85.6
Level of knowledge about artificial intelligence applications used in healthcare	None	52	18.2
	Little	95	33.3
	Medium	104	36.5
	Good	33	11.6
	Very good	1	0.4
Desire to use artificial intelligence applications in the profession	No	18	6.3
	Some	115	40.4
	Yes	152	53.3
Want to receive training on AI	No	8	2.8
	Some	67	23.5
	Yes	210	73.7

Healthcare professionals experienced slightly higher levels of anxiety related to AI, while feeling quite empowered. The average score for the participants' AI Anxiety Scale responses was 2.999±0.756, with the highest mean in the socio technical blindness dimension (3.441±0.883) and the lowest in the learning dimension (2.526±0.921). On the Perceived Empowerment Scale, the participants averaged 3.789±0.615, with the highest mean in the understanding-competence dimension (4.137±0.693) and the lowest in the ımpact dimension (3.367±0.868). Table 2 shows the mean scores of the scales and their dimensions.

Table 2. Means of AI Anxiety Scale and Perceived Empowerment Scale and Dimensions of Scales

AI Anxiety Scale		Perceived Empowerment Scale	
Dimensions	**Mean + SD**	**Dimensions**	**Mean + SD**
Learning	2.526 ± 0.921	Meaning-Competence	4.137 ± 0.693
Job Replacement	3.095 ± 0.878	Self-determination	3.512 ± 0.877
Sociotechnical Blindness	3.441 ± 0.883	Impact	3.367 ± 0.868
AI Configuration	3.074 ± 0.973	Total Scale	3.789 ± 0.615
Total Scale	2.999 ± 0.756		

SD: Standard Deviation
AI: Artificial Intelligence

The study examined whether healthcare professionals' anxiety related to artificial intelligence varied based on their socio-demographic characteristics, years of employment, unit of work, and duration of internet use. The findings showed that women had higher scores in the sociotechnical blindness and AI configuration dimensions, and married individuals had higher scores in the Learning dimension (Table 3).

Post-hoc analyses revealed that participants aged 40 and over had higher scores in the sociotechnical blindness dimension compared to those in the 20-29 age group. Additionally, participants graduated from high school had higher scores in the learning dimension compared to all other education levels. Furthermore, those with 10 or more years of work experience had higher sociotechnical blindness scores compared to those with less than 5 years of experience (Table 3).

In terms of the unit of work, participants working in outpatient units scored higher in the learning dimension compared to those in the emergency department. Furthermore, those in outpatient units had higher scores in the job replacement dimension compared to those in the emergency department and intensive care unit. Participants in inpatient units also had higher scores in the job replacement dimension compared to those in the intensive care unit. Moreover, individuals in

outpatient units, inpatient units, and non-clinical units had higher scores in the sociotechnical blindness dimension compared to those in the intensive care unit. Those in outpatient units also had higher scores in the AI configuration dimension compared to those in the emergency department and intensive care unit, while individuals in inpatient units had higher scores compared to those in the intensive care unit. Lastly, in terms of the total AI Anxiety Scale, participants in intensive care units had lower scores (Table 3).

The study found no difference in artificial intelligence anxiety based on the participants' daily internet usage time (Table 3).

Married individuals scored higher than single individuals in the Impact dimension of the Perceived Empowerment Scale as well as in the total scale. Healthcare workers aged 40 years and older scored higher in the meaning-competence dimension compared to other age groups. This same age group also obtained higher scores in the impact dimension and the total scale compared to those in the 20-29 age group. Similarly, the group with the highest total working years (10 years and above) had higher scores in the meaning-competence dimension than the other two age groups. Those in the 20-29 age group scored lower in the impact dimension and the total scale compared to those in the older age group (Table 4).

No difference was found in the Perceived Empowerment Scale scores of the participants based on gender, education level, and unit of employment (Table 4).

Table 3. Artificial Intelligence Anxiety of Healthcare Workers based on Sociodemographic Characteristics, Years of Employment, Unit of Employment and Duration of Internet Use

Variables		Learning				Job Replacement				Sociotechnical Blindness				AI Configuration				Total Scale			
		Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p
Gender	Female (228)	2.20	1-5			3.00	1-5			3.75	1-5			3.00	1-5			3.00	1-5		
	Male (57)	2.20	1-5	6387.00	0.84	3.00	1-5	5863.00	0.25	3.25	1-5	5369.00	0.04	2.67	1-5	4634.00	**0.01**	2.81	1-5	5450.00	0.06
Marrital Status	Married (137)	2.40	1-5			3.00	1-5			3.75	1-5			3.00	1-5			3.06	1-5		
	Single (148)	2.20	1-5	8725.50	**0.04**	3.00	1-5	8942.50	0.08	3.25	1-5	8893	0.07	3.00	1-5	9187.5	0.17	2.87	1-5	8626	**0.03**
Age	20-29 years (168)	2.40	1-5			3.00	1-5			3.42	1-5		**0.02**	3.00	1-5			2.94	1-5		
	30-39 years (69)	2.20	1-5			3.00	1-5			3.50	2-5		**(1-3)**	3.00	1-5			3.00	1.56-5		
	40 and over years (48)	2.00	1-5	0.062	0.97	3.25	1-5	0.465	0.79	4.00	1-5	7.528		3.17	1-5	1.878	0.39	3.09	1-5	1.334	0.51
Education	High School (11)	3.00	2-5			3.00	2.75-5			3.00	2.75-5			3.00	2-5			3.00	2.63-5		
	2 years degree (38)	2.20	1-4.20		**0.01**	3.00	1-4.50			3.50	1-5			3.00	1-5			2.84	1.06-4.19		
	Bachelor (198)	2.40	1-5		**(1-2 1-3 1-4 2-3)**	3.00	1-5			3.50	1-5			3.00	1-5			3.00	1-5		
	Postgraduate (38)	2.10	1-5	13.081		3.00	1-5	1.569	0.67	3.50	2-5	0.132	0.99	3.00	1.33-5	3.279	0.35	2.97	1.56-5	4.372	0.22
Total years of work in the profession	Less than 5 years (136)	2.40	1-5			3.00	1-5			3.25	1-5			3.00	1-5			2.94	1-5		
	5-9 years (66)	2.40	1-4.40			3.00	1.25-4.50			3.50	2-5		**0.02 (1-3)**	3.00	1-4.67			3.00	1.63-4.38		
	10 years and over (83)	2.00	1-5	0.649	0.72	3.000	1-5	0.327	0.85	4.000	1-5	7.883		3.000	1-5	1.652	0.44	3.000	1-5	1.021	0.60
Unit worked	Emergency department (13)	2.00	1-4		**0.03**	2.75	2-5		**0.03**	3.50	2-5		**0.01**	2.00	1-5		**0.04**	2.56	1.94-4.38		**0.01**
	Operating room (14)	2.80	1-5	12.093	**(1-3)**	3.25	2-4.75	12.2284	**(1-3 3-6 4-6)**	3.63	2-5	14.869	**(3-6 4-6 5-6)**	3.00	1.33-5	11.103	**(1-3 3-6 4-6)**	3.06	2.31-4.69	15.402	**(1-3 1-5 3-6**

	Outpatient units (40)	2.70	1-5			3.50	1.25-5			3.75	2-5			3.33	1-5			3.16	1.63-5		**4-6 5-6)**
	Inpatient units (104)	2.40	1-5			3.00	1-5			3.75	1-5			3.00	1-5			3.03	1-5		
	Non-clinical units (31)	2.20	1-5			3.25	2-5			4.00	2-5			3.00	1-5			3.00	2-5		
	Intensive care unit (83)	2.00	1-4			2.75	1-5			3.00	1-5			3.00	1-5			2.75	1-4.13		
Internet usage time (hours/day)	Less than 3 hours (67)	2.40	1-5			3.00	1-5			3.75	1-5			3.00	1-5			3.00	1-5		
	3-5 hours (114)	2.20	1-4			3.00	1-5			3.25	1-5			3.00	1-5			2.94	1-4.38		
	5- 10 hours (83)	2.20	1-5			3.00	1-5			3.50	2-5			3.00	1-5			3.00	1.44-5		
	10 hours and over (21)	2.00	1-5	2.012	0.57	3.00	1-5	0.959	0.81	3.25	1-5	4.678	0.20	3.00	1.33-5	2.825	0.42	2.88	1.06-5	2.875	0.41

Table 4. Empowerment Perceptions of Healthcare Workers Based on Sociodemographic Characteristics. Employment Year. and Unit of Work

Variables		Meaning-Competence				Self-Determination				Impact				Total Scale			
		Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p	Median	Min-max.	U/X2	p
Gender	Female (228)	4.17	1-5			3.67	1-5			3.33	1.67-5			3.83	2-5		
	Male (57)	4.00	2-5	5783.50	0.195	3.67	1-5	6384.00	0.835	3.00	1-5	5993.50	0.356	3.75	1.83-4.92	5795.50	0.206
Marital Status	Married (137)	4.17	1-5			4.00	1.33-5			3.67	1-5			3.83	1.83-5		
	Single (148)	4.00	2-5	9302.00	0.225	3.67	1-5	9155.50	0.150	3.00	1-5	7425.00	**<0.001**	3.67	2-5	8395.00	**0.012**
Age	20-29 years(168)	4.00	2-5			3.67	1.33-5			3.00	1-5			3.75	1.83-5		
	30-39 years (69)	4.00	2-5		**<0.001**	4.00	1-5			3.33	1-5		**0.010**	3.75	2.17-5		**0.018**
	40 and over years (48)	4.50	1-5	13.546	**(1-3 2-3)**	3.50	1-5	0.825	0.662	4.00	1-5	9.256	**(1-3)**	4.00	1.83-5	7.999	**(1-3)**
Education	High School (11)	4.33	3-5			3.33	1.67-5			3.00	2-5			3.50	3-5		
	2 years degree (38)	4.33	2-5			3.67	1-5			3.00	1.67-5			3.75	2-4.92		
	Bachelor (198)	4.00	1-5			3.67	1-5			3.33	1-5			3.83	2-5		
	Postgraduate (38)	4.33	2-5	4.650	0.199	3.67	1.33-5	0.674	0.879	3.33	1-5	0.669	0.880	3.83	1.83-5	0.868	0.833
Total years of	Less than 5 years (136)	4.00	2-5	14.537	**0.001**	3.50	1.33-5	3.746	0.154	3.00	1-5	16.431	**<0.001**	3.67	1.83-5	12.759	**0.002**

work in the profession	5-9 years (66)	4.25	2-5		**(1-3 2-3)**	4.00	1-5			3.67	1-5		**(1-2 1-3)**	3.83	2-5		**(1-2 1-3)**
	10 years and over (83)	4.50	1-5			3.67	1-5			4.00	1-5			4.00	2-5		
Unit worked	Emergency department (13)	4.33	3.33-5			4.00	2-5			4.00	2.33-5			4.17	3.25-5		
	Operating room (14)	4.08	3.83-5			3.83	1.33-5			3.67	1-5			3.75	2.92-5		
	Outpatient units (40)	4.33	2-5			4.00	2-5			3.50	1-5			3.92	2.17-5		
	Inpatient units (104)	4.17	2-5			3.67	1-5			3.33	1-5			3.83	1.83-5		
	Non-clinical units (31)	4.00	1-5			3.33	1.33-5			3.33	1.67-5			3.67	2-4.67		
	Intensive care unit (83)	4.00	2-5	6.111	0.296	3.67	1.33-5	4.224	0.518	3.00	1.67-5	6.816	0.235	3.67	2-5	7.828	0.166

The Spearman correlation test was used to assess the connection between participants' AI anxiety and perceived empowerment. The results revealed a weak negative correlation between the learning dimension of the Artificial Intelligence Anxiety Scale and the meaning-competence dimension of the Perceived Empowerment Scale (rspearman=-0.181. p=0.01). Additionally, there was a significant weak positive correlation between the sociotechnical blindness dimension of the Artificial Intelligence Anxiety Scale and the meaning-competence dimension, as well as the total scale score of the Perceived Empowerment Scale (rspearman=0.202, p=0.01; rspearman=0.152, p=0.05) (Table 5).

Table 5. Correlation between Healthcare Workers' AI Anxiety and Perception of Empowerment

	1	2	3	4	5	6	7	8	9
1- AI_Learning	1.000								
2- AI_Job Replacement	0.567**	1.000							
3- AI_ Sociotechnical Blindness	0.339**	0.683**	1.000						
4- AI_ Configuration	0.514**	0.680**	0.634**	1.000					
5- AI_Total	0.754**	0.882**	0.782**	0.838**	1.000				
6- Empowerment_ Meaning-Competence	-0.181**	0.011	0.202**	0.072	0.000	1.000			
7- Empowerment_ Self-Determination	0.070	0.059	0.068	0.014	0.068	0.342**	1.000		
8- Empowerment_ Impact	0.100	0.068	0.060	0.088	0.090	0.387**	0.577**	1.000	
9- Empowerment_ Total	-0.046	0.045	0.152*	0.068	0.051	0.783**	0.746**	0.781**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The analysis did not find a significant relationship between the overall Artificial Intelligence Anxiety Scale and the total or sub-dimensions of the Perceived Empowerment Scale. However, there is a relationship between the learning dimension and the sociotechnical blindness dimension with the meaning-competence dimension and the total of perceived empowerment. As a result, linear multiple regression analyses were conducted for these dimensions.

In the regression analysis of the learning dimension of the AI scale, a significant regression model ($F=6.022$; $p=0.01$) was found, and 0.050% of the variance in the dependent variable (adjusted $R2=0.050$) was explained by the independent variables. Holding the effect of the other variables in the model constant, a decrease of -0.291 standard deviations was observed in the learning dimension of AI anxiety in response to a one standard deviation increase in the meaning-competence dimension of perceived empowerment (Standardized $B=-0.219$; $p=0.01$).

In the regression analysis of the sociotechnical blindness dimension of the AI scale, a significant regression model ($F=4.006$; $p<0.01$) was found, and 0.031% of the variance in the dependent variable (adjusted $R2=0.031$) was explained by the independent variables. Holding the effect of other variables in the model constant, an increase of 0.205 standard deviations is observed in the sociotechnical blindness dimension of AI anxiety in response to a one standard deviation increase in the meaning-competence dimension of perceived empowerment (Standardized $B=-0.205$; $p<0.01$).

Discussion

Today, the healthcare sector is undergoing rapid technological changes, with artificial intelligence being increasingly integrated into both clinical and non-clinical processes (Karimian et al., 2022). It is crucial to support healthcare professionals in adapting to these changes and technological innovations. Understanding how healthcare professionals perceive and approach this issue is important, and empowering them through various human resource strategies can be beneficial. This study aims to investigate healthcare professionals' level of anxiety regarding artificial intelligence and its relationship with perceived empowerment.

The findings of the study indicate that while the majority of healthcare professionals have heard of artificial intelligence, their knowledge about its applications in health is limited. Various studies have revealed that healthcare professionals generally have a low level of understanding about artificial intelligence applications in health. For instance, a study conducted in the UK found that 64% of healthcare professionals had never encountered artificial intelligence applications in their work. Additionally, 50% of the participants were familiar with the terms "machine learning" and "deep learning," but 87% stated that they did not know the

difference between the two terms (Castagno and Khalifa, 2020). A systematic review study analyzing the acceptance of artificial intelligence in clinical processes by doctors and medical students across 60 studies from different countries showed that while awareness of AI applications has increased, clinical AI experience remains very low. This indicates a lack of basic knowledge about AI technologies in healthcare (Chen et al., 2022). Another systematic review study revealed that healthcare professionals and students in health-related departments are interested in using AI to enhance healthcare services, but they lack sufficient training and knowledge about its practical applications (Kimiafar et al., 2023). In a study by Yılmaz et al., it was found that while students in the faculty of health sciences are aware of AI-supported programs, their knowledge about artificial intelligence applications in health is limited, with only 19% of the students obtaining information about AI applications from their courses (Yılmaz et al., 2021). These studies clearly demonstrate that both students and healthcare professionals have insufficient knowledge about the use of artificial intelligence in healthcare. To address this knowledge gap, it is essential to plan trainings on the subject and incorporate artificial intelligence into undergraduate, graduate, and in-service training programs.

In this study, healthcare professionals' anxiety level regarding AI is slightly above the medium level. The lowest anxiety is in the learning dimension, while the highest anxiety is in the sociotechnical blindness dimension. The surveyed healthcare professionals do not think they will have a problem with learning AI applications. However, they believe that AI products have the potential to be misused, get out of control, deteriorate, or cause problems. Similar results were obtained in two different studies conducted in Türkiye. It was found that nurses and healthcare professionals' anxiety about AI was moderate and slightly above average. The highest score was in the sociotechnical blindness, and the lowest score was in the learning sub-dimension (Gümüş and Uysal Kasap, 2022; Filiz and Karagöz, 2024). In another study, the level of AI anxiety among healthcare professionals was moderate (Filiz et al., 2022). According to the findings of a study conducted in a hospital in Turkey, one-third of healthcare workers find AI frightening and state that robot technology arouses anxiety in them (Orhan and Bülez, 2022). Privacy violation problems are among the main concerns about AI. However, only 10% of the participants were concerned that AI could replace them (Castagno and Khalifa, 2020). In a systematic review of studies, it is reported that while the participants generally have a positive opinion on AI, some reservations are also present. Some concerns include inequality in service delivery, the possibility of inaccuracy in medical decisions, and the idea that AI will replace physicians in the future (Chen et al., 2022). The concern that AI will replace people and take away their jobs is slightly above the medium level according to the findings of this study.

It is stated that individuals' attitudes about AI play an important role in the acceptance of AI. It has also been revealed that students who have a higher use of computer technology and are familiar with AI tend to show more optimistic and passionate attitudes towards AI-related studies (Kwak et al., 2022). In a study investigating the views of different generations on AI, it was found that Generation Z was more familiar with the concept of AI than other generations and had more knowledge about the use of AI in the field of medicine (Hoşgör and Bozkurt, 2023). In this study, younger healthcare professionals have lower concerns about the misuse of AI.

Another concept measured in the study is perceived empowerment. The findings reveal that the empowerment perceptions of the healthcare workers who responded to the questionnaire are high. Employees' perceptions of empowerment are higher in the meaning-competence dimension. The perception of empowerment of married employees, those with the highest age and working years, is higher than the others. The findings are consistent with other studies on healthcare workers in Türkiye (Aslan and Sünbül, 2018; Karagöz and İrge, 2023; Türkmen and Çetin Aslan, 2023; Yanık and Açar, 2020). According to the literature, there is a positive relationship between perceived empowerment and age and total working years (Llorente-Alonso et al., 2023; Salles et al., 2021). As the years of employment increase, the increase in experience and knowledge about the job, and gaining self-confidence due to familiarity with the workplace are effective in this. The maturation of the person with age can also be considered as another factor (Salles et al., 2021).

The concept of employee empowerment offers numerous benefits for organizations (Albasal et al., 2022; Bantha and Nayak, 2021; Coun et al., 2022; Llorente-Alonso et al., 2024). Bantha and Nayak (2021) found a positive correlation between psychological empowerment and innovative work behavior. Similarly, Coun et al. (2022) identified a positive relationship between psychological empowerment and workplace proactivity. From this perspective, it is assumed that empowerment will be effective in helping healthcare professionals accept artificial intelligence, a new technology, more quickly and easily. In fact, Al Fouri and his colleagues found a significant relationship between having positive thoughts about artificial intelligence and empowerment in their study on healthcare professionals (Al Fouri et al., 2024). Our study revealed a link between employees' perception of empowerment and their anxiety about artificial intelligence in certain aspects. Specifically, the meaning-competence dimension of empowerment and the learning dimension of AI anxiety showed a negative correlation. This implies that employees who are more dedicated to their job goals and possess greater knowledge and skills experience lower anxiety when learning about artificial intelligence. Additionally, empowered individuals who view themselves as competent are more likely to be innovative and creative (Llorente-Alonso et al., 2023; Sylvia Nabila et al., 2021).

Another notable finding is the positive relationship between the meaning-competence dimension of empowerment and the sociotechnical dimension of AI anxiety, as well as the overall scale. This indicates that employees who are more committed to their work, care about their job, and perform better are more anxious about potential issues and risks associated with AI. This heightened anxiety may be attributed to the perfectionist tendencies and the desire to maintain control exhibited by employees with these characteristics. The notion that control in AI applications will shift to the computer system rather than remaining with the individuals may be a contributing factor. Lambert and colleagues explain that more experienced healthcare professionals are inclined to place more trust in their own knowledge and experience than in an AI system (Lambert et al., 2023).

Limitations of the study

This study is restricted to healthcare professionals who are currently employed in a hospital setting. Additionally, the data obtained are based on self-reported statements from the employees. It is suggested that future studies should be more comprehensive and utilize different research techniques.

Conclusion

Just like in all industries, employees in the healthcare sector are crucial for success in a highly competitive business environment and play a significant role in organizational performance. In the rapidly evolving healthcare sector, the ability of employees to adapt to change is extremely important. Artificial intelligence offers benefits such as reducing employee workload, minimizing errors, and expediting processes. However, healthcare managers should also monitor the potential drawbacks it may bring and take precautions against them. The most significant drawbacks include healthcare professionals' lack of knowledge, anxiety about artificial intelligence, and negative attitudes. To address this, managers should first assess the current situation and employ various strategies to mitigate these issues among healthcare professionals. One human resources strategy that can be utilized in this regard is empowerment. Empowerment, which has shown numerous benefits for both employees and organizations, also facilitates employees' adaptation to innovations.

In this study, healthcare workers demonstrated a low level of knowledge regarding AI applications in healthcare, and their anxiety about AI was found to be above the medium level. Furthermore, a relationship was identified between the empowerment perceived by employees and their AI anxiety. Those employees who had a higher perception of empowerment in terms of understanding and competence experienced lower anxiety related to learning new information about AI.

Conversely, these employees exhibited higher anxiety levels concerning sociotechnical blindness.

Based on the findings of this study, the following suggestions can be made for healthcare managers:

- In-service training and courses can be organized to enhance healthcare professionals' understanding of artificial intelligence and its applications in healthcare services.
- Employees should be informed about the artificial intelligence applications actively used in the hospital and the benefits they provide.
- To promote research and the use of artificial intelligence among healthcare professionals, working groups can be established, and small projects can be encouraged.

This study contributes to the literature by revealing the relationship between health workers' perception of empowerment and artificial intelligence anxiety. To support these findings, it is recommended that similar studies be repeated with larger samples. Additionally, future research should explore the relationship between different organizational behavioral approaches and employees' anxiety related to artificial intelligence. This could help identify effective mechanisms to reduce AI-related anxiety.

Genişletilmiş Türkçe Özet

Yapay zeka (YZ) (artificial intelligence - AI) "Dijital bir bilgisayarın genellikle akıllı varlıklarla ilişkilendirilen görevleri yerine getirme yeteneği" olarak tanımlanmaktadır. Yapay zeka, pratik anlamda, öğrenme, akıl yürütme ve problem çözme gibi insan zekasının veya akıllı davranışın belirli bir yönünü simüle eden veya sergileyen bilgisayar sistemlerini ifade etmektedir. Yapay zeka yalnızca bir teknolojik ürün veya süreç olarak görülmemeli, farklı hesaplamalı modeller ve algoritmalar yoluyla geliştirilen süreçler olarak değerlendirilmelidir. Diğer tüm sektörlerde olduğu gibi sağlık alanında da yapay zeka kullanımı hızla artmaktadır. Sağlık alanında yapay zeka radyoloji, oftalmoloji, dermatoloji, patoloji ve göğüs hastalıkları dahil olmak üzere çeşitli tıbbi uzmanlık alanlarında kullanılmaktadır. Ancak getirdiği fayda ve katkılara rağmen, yapay zekanın sağlık alanında kullanımı bir yandan endişe ve kaygı ile karşılanmaktadır. Bazıları YZ'nın gereğinden fazla abartıldığını düşünürken diğer yanda nihayetinde YZ'nın insan zekasını aşabileceğine inananlar bulunmaktadır. Sağlıkla ilişkili kaygılar ise makine öğreniminin doktorların işine son vereceği, doktor-hasta ilişkisini bozabileceği şeklindedir. Bahsedilen diğer endişeler arasında operatöre bağımlılık ve klinik yapay zekanın neden olduğu artan prosedürel süre, beklenmedik durumlarda yapay zekanın düşük performansı ve empati veya iletişim eksikliği yer almaktadır.

Yeni teknolojiler, yapay zeka uygulamalarının iş süreçlerine dahil edilmesi, dijitalleşmenin hız kazanması gibi bazı yenilikler örgütlerde çalışma ortamlarında değişikliğe gidilmesine yol açmaktadır. Örgütler çalışanlarının bu yeniliklere ve karmaşık süreçlere adaptasyonunu kolaylaştırmak için yeni çalışma yöntemlerini uygulamaktadır. Bunlardan biri ise güçlendirmedir. Güçlendirme, kısaca yetkinin merkezden daha alt seviyelere dağıtılması olarak tanımlanır. Güçlendirilmiş personel, gelişmiş özerkliğe sahiptir ve kurumsal hedeflerin gerçekleştirilmesinde kendine düşen rolü hakkıyla yerine getirir. Çalışanların güçlendirilmesi, inisiyatif alma, bağımsız karar verme, yenilikçilik, yaratıcılık ve yapılan işlere bağlılık gibi becerilerin geliştirilmesiyle sıkı bir ilişki içindedir.

Yeni teknolojik gelişmeler ile insan sermayesinin bütünleşmesi ve uyumlu çalışması için insan kaynakları yönetim stratejilerinden biri olan güçlendirme etkili bir araç olabilir. Bu çalışmada güçlendirme ile yapay zeka kaygısı arasındaki ilişki araştırılmaktadır. Çalışmanın amacı sağlık çalışanlarında güçlendirmenin yapay zeka kaygısına etkisini ortaya koymaktır. İlaveten, sağlık çalışanlarının yapay zeka uygulamaları hakkındaki farkındalıklarının ve bu tür uygulamaları çalışma hayatlarında kullanmaya yönelik niyetlerinin araştırılması amaçlanmaktadır.

Çalışmada İstanbul ilinde faaliyet gösteren bir eğitim ve araştırma hastanesinde görev yapan sağlık çalışanlarına (doktor, hemşire, anestezi teknikeri ve röntgen teknikeri) çevrimiçi anket uygulanmıştır. Anket, katılımcıların sosyo-demografik özellikleriyle ilgili soruların yanı sıra yapay zeka kaygı ölçeği ve algılanan güçlendirme ölçeği'ni içermektedir. Aralık 2023 ile Şubat 2024 arasında toplam 285 sağlık çalışanı anketi yanıtlamıştır. Çalışma kapsamında anket uygulanan toplam 285 sağlık çalışanının %80'i kadın ve %20'si erkektir. Katılımcıların yaşları 20 ila 58 arasında değişmekte olup yaş ortalamaları 30,82±7,727'dir. Meslekte çalışma yıllarının ortalaması 7,905±8,091'dir.

Sağlık çalışanlarının yapay zeka kaygısı orta seviyenin biraz üzerinde, güçlendirme algıları ise yüksek seviyede bulunmuştur. Katılımcıların yapay zeka kaygısı ölçeğine verdikleri yanıtların ortalaması 2,999±0,756 olup en yüksek ortalamaya sahip boyut sosyo teknik körlük boyutu (3,441±0,883) ve en düşük ortalamaya sahip boyut ise öğrenme boyutudur (2,526±0,921). Algılanan güçlendirme ölçeğine verdikleri yanıtların ortalaması 3,789±0,615'tir. Bu ölçekte ise en yüksek ortalamaya sahip boyut anlama-yetkinlik boyutu (4,137±0,693) iken en düşük ortalama etki boyutundadır (3,367±0,868).

Çalışanların yapay zeka kaygı seviyesi cinsiyet, yaş, toplam çalışma yılı ve çalıştıkları birim gibi faktörlere göre değişmektedir. Benzer şekilde, güçlendirme algısı gruplar arasında yaşa, toplam çalışma yılına ve medeni duruma göre farklılık göstermektedir. Çalışma ayrıca algılanan güçlendirmenin anlam-yeterlilik boyutu ile

yapay zeka kaygı ölçeğinin öğrenme boyutu arasında negatif bir ilişki ve sosyoteknik körlük boyutu arasında pozitif bir ilişki olduğunu göstermektedir.

Günümüzde sağlık sektörü baş döndürücü bir teknolojik değişim içindedir ve her geçen gün yapay zeka uygulamaları klinik ve klinik dışı süreçlere daha fazla entegre edilmektedir. Bu değişime ve teknolojik yeniliklere hızlı adaptasyonu için sağlık çalışanlarının desteklenmesi gerekmektedir. Bunun için öncelikle sağlık çalışanlarının konuya nasıl baktığı ve nasıl hissettiğinin bilinmesi önemlidir. Ardından farklı insan kaynakları stratejileri ile çalışanların güçlendirilmesi faydalı olacaktır.

Çalışmanın bulgularına göre sağlık çalışanlarının büyük çoğunluğu yapay zeka kavramını duyduğunu ifade etmesine rağmen sağlıkta yapay zeka uygulamaları ile ilgili bilgi düzeyleri düşüktür.

Bu çalışmada sağlık çalışanlarının yapay zeka kaygı düzeyi orta seviyenin biraz üzerindedir ve en düşük kaygı öğrenme boyutunda, en yüksek kaygı ise sosyoteknik körlük boyutundadır. Buna göre anket uygulanan sağlık çalışanları yapay zeka uygulamalarını öğrenme ile ilgili bir sıkıntı yaşayacağını düşünmemektedir. Ancak yapay zeka ürünlerinin kötüye kullanılma, kontrolden çıkma, bozulma veya sorun çıkarma potansiyeli olduğunu düşünmektedir.

Çalışmanın bulguları sağlık çalışanlarının güçlendirme algılarının yüksek olduğunu ortaya koymaktadır. Çalışanların anlam-yetkinlik boyutunda güçlendirme algıları daha fazladır. Evlilerin, en yüksek yaş ve çalışma süresi süresine sahip olanların güçlendirme algısı diğerlerine göre daha fazladır.

Çalışanlar ve örgüt üzerine pek çok faydası ispatlanmış güçlendirme aynı zamanda çalışanların yeniliklere daha kolay adapte olması sağlamaktadır. Güçlendirme algısı yüksek olan bireylerin yapay zeka hakkında yeni bilgiler öğrenme konusunda daha az kaygılı oldukları, ancak yapay zekanın potansiyel olarak zararlı ve tehlikeli yönleri konusunda daha fazla kaygılı oldukları bulunmuştur. Çalışma, güçlendirmenin etkili bir insan kaynakları yönetim aracı olarak sağlık yöneticileri tarafından çalışanların yapay zeka kaygısını hafifletmek için kullanılabileceğini öne sürmektedir.

Anahtar kelimeler: Kaygı, yapay zeka, güçlendirme, sağlık çalışanları, insan kaynakları.

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