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Anxiety, Depression and Attention Control in Health Care Professionals

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Abstract: *Introduction:* Attention control is crucial for healthcare professionals. Anxiety and depression have the potential to interrupt attention resulting in medical errors. The literature lacks studies about the attention control of healthcare professionals. Our study aims to determine whether attention differs among healthcare professionals and to reveal its relation to common psychiatric disorders. *Materials and Methods:* 170 healthcare professionals were enrolled in the study. Online surveys containing informed consent, the Attention Control Scale (ATTC), the Hospital Anxiety and Depression scale (HADs), and the demographic data form were delivered to the participants by e-mail. Responses were collected online. *Results:* The HADs scores revealed almost 48% anxiety and 60% depression in healthcare professionals. The highest anxious and depressive group was the doctors' group. This finding may be linked to the higher responsibility of doctors on the patients. Correlation analysis showed negative correlations between psychiatric disorders and attention regardless of the subgroups of the healthcare professionals. A multivariate regression analysis revealed a significant impact of anxiety on attentional scores, rather than depression. *Conclusion:* Anxiety and depression may interfere with attention control which may result in medical errors. So, these disorders in health care professionals need periodical screening to prevent attention deficits and consequent malpractice and health care quality disruption. At this point, the attention control scale is a beneficial and practical test for the assessment of the attentional status of healthcare professionals.

Keywords: Anxiety, Attention, Healthcare Professionals, Malpractice, Medical Error, Health Care Quality

1. Introduction

Attention may be simply defined as an essential component of cognitive processes. All of the activities in daily practice (riding a bike or singing a song, etc.) need attention to be successfully done. As one can imagine, these activities also need some subconscious participation which is maintaining balance for riding or adjusting vocal tone for singing. These subconscious interventions are not dependent on attention but may be modified by current sensorial input volume changing according to the attentional status. This phenomenon explains the greater performance when the actors fully concentrate on their task. On the other hand, it is not possible to talk about attention in situations like blood pressure regulation or peristaltic movements of the intestine since these events take place without any conscious participation of the human brain.

Not only the physical activities but also the thinking procedures need attention. It is expected to make better decisions with a full concentration against poor choices of inadequate attentional processing. Meanwhile, this connection between attention and thinking procedures makes attention vulnerable to distracting thoughts like worry. Sources of the attentional system are allocated to cope with the distracting thought or stimulus [1]. This situation results in poor task performance, even if the task is creating a thought. The interaction between thought and attention becomes even more important in tasks needing the highest attentional participation, like diagnosing, monitoring, and treating a patient. At this point, any deficit in attentional processes may result in medical errors which may have detrimental effects on the patient's and the healthcare provider's lives.

Medical errors are thought to be the third leading cause of

death. In the US, approximately 250 000 deaths are reported annually [2]. Apart from death, many other adverse events occur due to various reasons (lack of communication, fatigue from long working hours, inappropriate medication choice or wrong administration, etc.). Unfortunately, some of these errors may result in malpractice lawsuits. This situation makes healthcare providers use defensive medicine in which unnecessary tests are ordered or some treatment options are avoided due to their risks [3]. No doubt that increasing costs and inadequate treatment quality are inevitable results of this kind of practice [4].

The most common type of medical error is medication error [5]. We believe that some of these errors arise from attentional deficits interrupting prescribing and administration steps. To prevent these errors, healthcare professionals should have a full capacity of attention while working.

In our study, we aimed to determine the attentional statuses of healthcare professionals and their correlations to psychiatric disorders. Revealing the existence of a relationship between psychiatric disorders and attention in healthcare professionals may be a great target in reducing medical errors and consequent malpractice rates.

2. Materials and Methods

An online survey was created on Google Forms. It contained informed consent. Participation relied on volunteering. Questions about the medical history and demographic data, the Attention Control Scale (ATTC), and the Hospital Anxiety and Depression scale (HADs) were all the other parts of the survey. The survey was distributed among healthcare professionals randomly via e-mail and social media. All the responses were collected online and analyzed. Ethics committee approval was obtained from Acıbadem University and Acıbadem Healthcare Institutions Medical Research Ethics Committee (ATADEK) and the approval number is 2022-20/27. Written consent was obtained for participation in this study.

The demographic data included the age, gender, smoking status, medical history, and medication usage of the participants.

Attention Control Scale (ATTC) is a four-point Likert scale containing twenty questions. It is a self-reported test measuring attention and its two major components; attention focusing and shifting. The responses are rated from 1 (almost never) to 4 (always). The first nine questions are used to calculate the attention-focusing sub-scale while the rest eleven questions are used for attention-shifting. At the end of the test, all scores are summed to get a total score resembling the participant's attention level. One can get 20 to 80 points from the test. Some questions are reverse-scored. Higher scores mean better attentional status. There are a few reliability and validity studies for the ATTC in the literature [6-8].

The two major subscores and the total test score are calculated. There are no cut-off values for the total score, attention focusing, or shifting subscores. Instead, the scores are used for comparative studies.

The Hospital Anxiety And Depression Scale is a four-point Likert scale containing fourteen questions. Half of the questions are related to anxiety, and the other half are linked to depression. Cases fill the test on their own, and the tester calculates the scores. The validity and reliability of the Turkish version of the test revealed cut-off points. Seven points were found to be a significant threshold for depression and ten points for anxiety [9].

One hundred and seventy healthcare professionals who live and work in distinct cities participated in the study after obtaining their consent. Participants were sixty-eight doctors, seventy nurses, and thirty-two other healthcare workers (secretaries, support personnel, etc.). The medical history and self-reported scale results of the participants were evaluated, and exclusions were made according to the exclusion criteria.

In addition to the main groups of occupations, the groups were divided by their median values to create high anxious/low anxious and high attenders/low attenders groups.

Participants with any chronic disease or daily medication usage were excluded from the study. Also, it was paid attention to choose participants without a past psychiatric diagnosis.

In summarizing the data, continuous variables' mean ± standard deviation, categorical variables' frequency, and percentage values were calculated. Independent Samples t-test for two groups and One-Way ANOVA test for three or more groups were used to compare groups in terms of scale scores. Pearson chi-square or Likelihood ratio tests were used to analyze the relationships between categorical variables, depending on the distribution of the data, and the Pearson correlation coefficient was calculated for continuous variables. Finally, a multivariate regression analysis was done to determine the predicting variables for attentional scores. Statistical analyzes were done with the SPSS v. 25 package program and the significance level was accepted as 0.05.

3. Results

According to the demographic data obtained from our study, we had 53% male and 47% female participants. The average age ± SD of the doctors was 42.94 ± 7.92 years and the average age of the nurses was 34.06 ± 8.77 years. The mean age ± SD of the other healthcare workers group was 32.50 ± 9.65 years.

74.1% (n=126) of the participants were from non-surgical departments, while 15.9% (n=27) were working in surgical departments. 10% (n=17) of the participants noted that they worked in the emergency department. 28.2% (n=48) of the whole group were smokers.

According to the scale scores, 47.6% (n=81) of the participants were anxious, while 59.4% (n=101) were depressive. Interpreting groups separately revealed 54% (n=37) anxiety, and 66% (n=45) depression in the doctors' group. 42% (n=30) of the nurses had anxiety, while 54%

(n=38) had depression. 43% (n=14) of the other healthcare workers showed anxiety symptoms, and 56% (n=18) had depression. The doctors had the highest mean score in both anxiety and depression sub-scales. This finding may be linked to the higher responsibility of doctors on the patients. The results of the HAD scale are summarized in Table 1.

A one-way ANOVA was performed to compare the effect of the three groups on the HAD scores. The analysis of anxiety scores revealed that there was not a statistically significant difference in mean scores between at least two groups (F (2, 167) = [1.800], p = 0.168). Likewise, depression scores did not show a statistically significant difference in mean scores between the groups (F (2, 167) = [2.195], p = 0.115). Repetition of the ANOVA according to the work field (non-surgical, surgical, and emergency department) revealed non-significant results for anxiety (F (2, 167) = [1.158], p = 0.317) and depression (F (2, 167) = [.388], p = 0.679). These analyzes indicated that the working field or specialty did not affect the psychiatric status of healthcare professionals.

The mean values and standard deviations of the Attention Control Scale results of participants are summarized in Table 2. According to these results, the highest attention scores were recorded in the nurse group.

Again, a one-way ANOVA was performed to compare the effect of the three groups on the ATTC scores. The analysis of attention scores revealed no statistically significant difference in mean scores between at least two groups for focus (F (2, 167) = [929], p = 0.397), shift (F (2, 167) = [986], p = 0.375), and total attention (F (2, 167) = [892], p = 0.412). Repetition of the ANOVA according to the work field (non-surgical, surgical, and emergency department) revealed non-significant results for focus (F (2, 167) = [1.021], p = 0.363), shift (F (2, 167) = [1.466], p = 0.234), and total shift (F (2, 167) = [1.429], p = 0.242). These results indicated that the working field did not affect the attentional statuses of healthcare professionals.

Comparison analyzes of means were repeated regarding the presence of anxiety and depression. All attention scores were significantly higher in non-anxious and non-depressive participants. This result showed negative correlations between psychiatric disorders and attention regardless of the subgroups of the healthcare professionals. The results are summarized in Table 3.

The correlation analysis of HAD scores of participants to the attentional test scores is summarized in Table 4.

Focus (r= -0.447, p<0.01), shift (r=-0.380, p<0.01), and total attention (r=-0.452, p<0.01) scores of the participants were all moderately correlated to anxiety scores. Focus (r= -0.215, p<0.01), shift (r=-0.304, p<0.01), and total attention (r=-0.290, p<0.01) scores were all mildly correlated to depression scores. These findings meant higher anxiety and depression scores significantly reduced the attentional scores of the participants. Also, there was a strong positive correlation between anxiety and depression scores (r=0.698, p<0.01).

The results of the multivariate regression analysis, which tests whether psychiatric disorders significantly impact total attention scores, are listed in Table 5. The scatter plot and histogram of the model are shown in Figure 1.

The dependent variable total attention score was regressed on the predicting variables (anxiety and depression). HAD anxiety (dF 2, F= 21.365, p<0.01) scores significantly predicted disruption in total attention score, which indicated that anxiety played a significant role in the disruption of participants' attentional status (b= -.948, p<0.01). There was not a significant relationship between total attention score and HAD depression (dF 2, F= 21.365, b= .100, p>0.05). These data show that anxiety has a more powerful impact on attention than depression. The results of the regression analysis are summarized in Table 5 and Figure 1.

Table 1. *Results of the Hospital Anxiety and Depression scale.*

Subscale	Group	**Mean** ± Std. Deviation	95 %Confidence Interval (Lower-Upper)
Anxiety	Doctor (n=68)	9.91±4.66	8.78 - 11.03
	Nurse (n=70)	8.48±4.26	7.46 - 9.50
	Other (n=32)	9.06±4.25	7.52 - 10.59
Depression	Doctor (n=68)	8.51±4.76	7.36 - 9.66
	Nurse (n=70)	7.08±4.02	6.12 - 8.04
	Other (n=32)	7.12±3.93	5.70 - 8.54

Table 2. *Results of the Attention Control scale.*

Subscale	Group	**Mean** ± Std. Deviation	95 %Confidence Interval (Lower-Upper)
Focus	Doctor (n=68)	22.95±5.05	21.73 - 24.18
	Nurse (n=70)	23.50±3.83	22.58 - 24.41
	Other (n=32)	22.25±3.75	20.89 - 23.60
Shift	Doctor (n=68)	29.73±5.94	28.29 - 31.17
	Nurse (n=70)	30.97±4.92	29.79 - 32.14
	Other (n=32)	30.37±3.68	29.04 - 31.70
Total	Doctor (n=68)	52.69±10.21	50.21 - 55.16
	Nurse (n=70)	54.47±7.93	52.58 - 56.36
	Other (n=32)	52.62±6.18	50.39 - 54.85

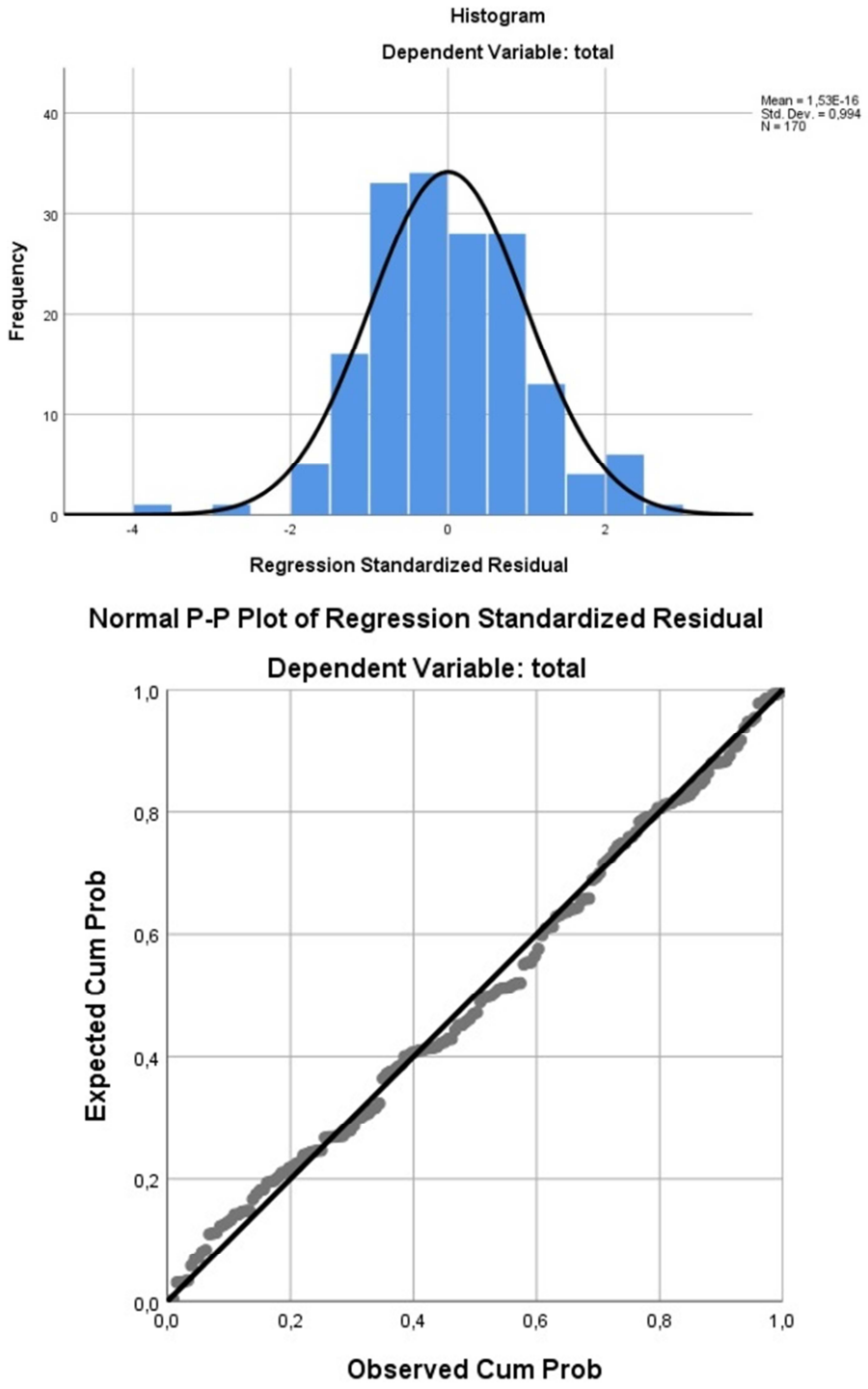

Figure 1. *The histogram and the scatter plot of the regression model for the participants.*

Table 3. *Comparison of ATTC test results of the participants according to the presence of psychiatric disorders.*

	Anxious (n=81) Mean ± SD	Non-anxious (n=89) Mean ± SD	P value
Focus	21.43± 4.05	24.51± 4.10	0,000
Shift	28.53± 4.87	32.03± 4.87	0,000
Attention Total	49.96± 8.00	56.55± 8.03	0,000
	Depresssive (n=101) Mean ± SD	Non-depressive (n=69) Mean ± SD	
Focus	22.09± 4.15	24.43± 4.29	0,001
Shift	28.99± 5.18	32.37± 4.46	0,000
Attention Total	51.08± 8.53	56.81± 7.69	0,000

Bold values indicate statistical significance.

Table 4. *Results of the correlation analysis.*

HAD sub-scales	Focus Correlation Coeff. Significance	Shift Correlation Coeff. Significance	Attention Total Correlation Coeff. Significance	Depression Correlation Coeff. Significance	Anxiety Correlation Coeff. Significance
Anxiety	-0.447	-0.380	-0.452	0.698	1
	.000	.000	.000	.000	
Depression	-0.215	-0.304	-0.290	1	0.698
	.005	.000	.000		0.000

Bold values indicate statistical significance. Scale scores of all participants are analyzed without grouping.

Table 5. *Results from the multiple linear regression analysis of the associations between total attention scores (dependent outcome) of the participants, and HAD scores (predictors).*

Variables	Std. Beta Coefficient	Standard Error	T-Value	95% Confidence Interval	P-Value
Constant		61.331	44.061	58.583 to 64.080	**0.000**
HAD anxiety	-.487	.187	-5.060	-1.318 to -.578	**0.000**
HAD depression	.050	.192	.522	-.278 to .478	.603

The R2 and F values applied to the model are .206 and 21.635 respectively. Degrees of freedom dF: 2. Bolded values indicate statistical significance.

4. Discussion

Medical error is defined as "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim". This error may range from a simple medication misusage to a severe pressure ulcer or an event like wrong-site surgery [10]. Medical errors are usually under-reported, and these errors are estimated to be the third leading cause of death after heart disease and cancer [2]. The causes of these errors are studied in the literature extensively. The most common causes are failure to review the medical record, poor communication between healthcare professionals and the patient/family, failure of diagnostic attempts, inappropriate medication choice or administration, fatigue due to long working hours, and inadequate experience [11-13]. However, the literature lacks research on the attentional status of healthcare professionals and its psychiatric correlations. Any attentional deficit may lead to a medical error which may result in irreversible consequences for both the patients and the healthcare providers.

Attentional control theory may explain the background of medical errors resulting from deficits of anxiety. This theory has two main components: processing efficiency and performance effectiveness. Efficiency represents the number of resources allocated for a task. Performance effectiveness is the quality of task performance. According to this theory, attention is controlled in a goal-driven and stimulus-driven fashion. A threatening stimulus during a current task causes the allocation of attention to the stimulus-driven fashion. This situation results in a decrease in attentional focus on the current task and an increase in attentional resources needed for good performance effectiveness which is defined as reduced processing efficiency [1]. High anxiety (worrisome thoughts, threatening stimulus) was associated with slower reaction times (bad performance effectiveness) in previous studies [14]. If attentional resources are adequate, performance effectiveness may not be reduced in anxious individuals [15].

Threatening stimuli, regardless of being external (threatening task-irrelevant distractors) or internal (anxiety and related worrisome thoughts), consume attentional resources of working memory. Delayed disengagement from these stimuli increases the burden on the goal-driven fashion of the attentional system [16]. This situation results in a decreased attentional focus on the current task. Our study documented significant correlations of anxiety scores to not only attentional focus ($r= -0.447$, $p<0.01$) score, but also attentional shift ($r=-0.380$, $p<0.01$) and total attention ($r=-0.452$, $p<0.01$) scores. Also, the comparison of means resulted in significant differences in all attentional scores between anxious and non-anxious healthcare professionals ($p<0.01$). All these results prove previous findings of major studies interpreting anxiety and attention [17]. Finally, a multivariate regression analysis revealed that anxiety (dF 2, $F= 21.365$, $p<0.01$) was a strong predictor of attentional distortion rather than depression (dF 2, $F= 21.365$, $p>0.05$).

5. Conclusion

As a result of our research, it was found that regardless of specialty and work field, all healthcare professionals need periodical assessments for psychiatric disorders. If needed, treatment of anxiety in particular may help maintain attention intact and prevent medical errors and subsequent malpractice lawsuits. At this point, the attention control scale is a beneficial and practical test for the assessment of the attentional status of healthcare professionals.

Recommendations

Attention control is an important topic in medical practice. The literature lacks research about health care quality and its relation to attention. Further studies in this area would raise awareness on this topic and the need for routine psychiatric and attentional assessments in medical facilities. Consequently, these efforts would be helpful in improving health care quality by reducing medical errors.

Conflict of Interest

The authors declare that they have no competing interests.

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