Clinical study

The anxiety levels, quality of sleep and life and problem-solving skills in healthcare workers employed in COVID-19 services

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ABSTRACT

Objective: The present study aims to investigate the level of anxiety experienced by healthcare workers employed in COVID-19 services, the effects of anxiety on sleep quality and quality of life and, the relationship between these variables and problem-solving skills of the healthcare workers.

Material and method: The study was conducted in two healthcare facilities which serve as pandemic hospitals. 140 healthcare workers, who were employed in the COVID-19 outpatient clinics or emergency departments, participated in the present study. All participants were submitted to the Pittsburgh Sleep Quality Index (PSQI), Problem Solving Inventory (PSI), World Health Organization Quality of Life-BREF (WHOQOL-BREF), Beck Anxiety Inventory (BAI).

Findings: The number of participants without anxiety was 41(29%), with mild anxiety was 53(38%). Clinically significant anxiety findings were found in only 33% of the participants. A positive correlation was found between the participants' BAI scores and PSQI, PSI scores, and a negative correlation with the WHOQOL-BREF scores. PSQI and PSI scores of nurses were statistically higher when compared to those of physicians and staff. WHOQOL-BREF scores were found to be lower.

Conclusion: Healthcare workers might develop psychiatric symptoms such as anxiety and sleep disturbance. Such symptoms could adversely affect the problem-solving skills of healthcare workers and cause a deterioration in their quality of life.

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1. Introduction

Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) resulted in an unprecedented challenge for the health community worldwide. The first case of the coronavirus disease, known as COVID-2019, was detected on December 8, 2019, in the Hubei province of China. The virus spread rapidly to several geographical regions in the world due to its asymptomatic transmission ability and caused a pandemic [1]. On March 26, 2020, the World Health Organization (WHO) confirmed that 416,686 individuals were infected and 18,589 died worldwide, as the outbreak spread to 197 countries [2]. Recently, a review study, investigating the psychological problems that could impact the well-being of the general population, including the survivors and caregivers during the COVID-19 pandemic, was published. The review article reported that symptoms such as anxiety, fear, depression, anger, guilt, per-ception of grief and loss, post-traumatic stress, and stigmatization, as well as higher feelings of empowerment and compassion towards others were the common themes within the scope of psychological responses [3]. In a study, conducted with the participation of 1210 individuals in China, the first epicenter of the outbreak, 53.8% of the participants rated the psychological effect of the outbreak as moderate or severe, 16.5% reported moderate to severe depressive symptoms and 28.8% reported moderate to severe anxiety symptoms [4]. Furthermore, other studies in China reported that COVID-19 patients, healthcare professionals, and even the whole population were under overwhelming psychological pressure that could lead to various psychological disorders such as anxiety, fear, depression, and insomnia [5,6].

Healthcare workers, who are at the service forefront to combat the pandemic, are expected to face an extraordinary workload due to the globally introduced health measures and regulations. It is evident that the healthcare workers will physically and mentally be affected by the pandemic, similar to other individuals in the society, due to this ongoing and challenging crisis, as in all

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unexpected events. Healthcare workers in Wuhan were exposed to a high risk of infection and contamination, work overload, frustration, discrimination, isolation, and burnout during the COVID-19 pandemic [7]. It was observed that the ongoing conditions resulted in mental health problems such as stress, anxiety, depressive symptoms, insomnia, denial, anger, and fear [8]. Lai et al. conducted a study with 1257 healthcare workers from 34 hospitals in China, to intending to evaluate the mental health of healthcare professionals who worked with COVID-19 patients. The findings of the study indicated that a significant portion of the participants, as 50.4%, presented symptoms of depression, where 44.6% had anxiety symptoms, 34% had insomnia and 71.5% reported distress [6].

The stress and anxiety of the physicians, nurses, and assistant healthcare staff, in direct contact with the patients, could affect both their work performance and health status and decrease their quality of life. Anxiety in healthcare workers, during or due to the intervention in the crisis might disrupt the mental ability of reasoning and abstract thinking and result in lack of attention and coordination [9]. Several emotions such as fear and anxiety could affect problem-solving performance [10]. The decrease in the problem-solving ability could lead to a decreased efficiency in the provided services to protect the health of individuals and community health and to facilitate livable conditions. In the present study, we aimed to investigate the level of anxiety experienced by healthcare workers employed in COVID-19 services, the effects of anxiety on sleep quality and quality of life and the level of relationship between these variables and the problem-solving skills of the healthcare workers.

2. Material and method

The present study was conducted concerning the approval obtained from the local ethics committee and in agreement with the Helsinki Declaration. The present study included 140 healthcare worker participants, who were employed in the outpatient clinics or emergency departments of the two healthcare facilities to combat the COVID-19 pandemic and who met the study criteria. The participants who were between the ages of 18 and 65, who provided service for patients diagnosed with or suspected of COVID-19, who were literate and signed a written informed consent form were included in the present study. Having certain physical and mental disorders that might prevent responding to the questionnaire and scales and previous psychiatric treatment was considered as the participant exclusion criteria. Psychiatric interviews were conducted with all participants included in the present study, outside of their COVID-19 service hours. All participants were submitted the sociodemographic and clinical data form, Pittsburgh Sleep Quality Index (PSQI), Problem Solving Inventory (PSI), World Health Organization Quality of Life-BREF (WHOQOL-BREF) – Short Version, Beck Anxiety Inventory (BAI). The reason for chosing BAI is that it has a self administration manner and in this way it minimizer contact considering the covid 19 infection risk. SPSS version 22 software was used for statistical analysis.

2.1. Sociodemographic and clinical data form

The sociodemographic and clinical data form employed in the study was prepared by the authors based on clinical experience and the knowledge derived from the sources in literature and concerning the objectives of the present study. The semi-structured form included socio-demographic information such as age, gender, marital status, education, occupation, place of residence, economic status, family structure, and clinical data.

2.2. Pittsburgh sleep quality index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) is a self-report questionnaire that evaluates subjective sleep quality and different aspects of sleep over a 1-month interval through 19 items. The scored subdimensions of the index include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication, and daytime dysfunction. The responses to the items are weighted on a scoring scale between 0 and 3. All subdimensions are evaluated internally as a component and the scores of these subdimensions are summed up to determine the overall index score. The total score is between 0 and 21 and scores equal or greater than 5 indicate a disturbance in sleep quality. PSQI is an internationally used and reliable scale to measure subjective sleep quality [11]. In the present study, the total score of the scale was taken into consideration.

2.3. Problem solving inventory (PSI)

The Problem Solving Inventory (PSI), developed by P. P. Heppner et al, is a scale that was intended to evaluate an individual's self-perception towards his/her problem-solving skills [12]. The instrument consists of 35 items scored on a six-point Likert scale, where 1 corresponds to "strongly agree" and 6 to "strongly disagree". The scale is reported to have three factors/sub-dimensions, "problem-solving confidence" (Alpha coefficient = 0.85), "approach-avoidance" (Alpha coefficient = 0.84) and "personal control" (Alpha coefficient = 0.72). Problem-solving confidence involves an individual's sense of assurance in his/her problem-solving skills, approach-avoidance encompasses the desire of an individual to cope with the demanding challenges encountered and personal control expresses the feeling that the individual is in control of the situation [13]. "Problem-solving confidence" scores range between 11 and 66, "approach-avoidance" score range is between 16 and 96, and "personal control" scores range between 5 and 30. The lowest score an individual might obtain from the scale is 32 and the highest is 192. A higher total score indicates a lower competence perceived by an individual in problem-solving.

2.4. World health organization quality of life-BREF (WHOQOL-BREF) – short version

WHOQOL-BREF-TR is an assessment instrument, developed by the World Health Organization (WHO) for the subjective assessment of the quality of life, through the initial contribution of 15 centers from various countries [14]. The validity studies of the instrument in the Turkish language resulted in an additional item, thus the Turkish version of WHOQOL-BREF-TR consists of 27 items [15]. The participants are expected to respond to items considering the last 15 days into consideration. Physical, psychological, social, environmental, and national context scores are calculated for all items, except for the first two general items. The present study considered the total score of the instrument into consideration. The scale has no cutoff score. High scores yield higher levels of quality of life.

2.5. Beck anxiety inventory (BAI)

Beck Anxiety Inventory (BAI) measures the frequency of anxiety symptoms experienced by an individual. The inventory is a self-report assessment instrument, which is scored on a three-point Likert scale (0–3) and consists of 21 items. It is developed by Beck et al. [16]. Scores in the range of 0 and 7 indicate a minimal level of anxiety, 8 and 15 mild anxiety, 16 and 25 moderate anxiety, and 26 and 63 indicate severe anxiety. The higher the score, the higher the level of anxiety experienced by the individual.

2.6. Statistical method

The findings of the present study were evaluated using the statistical analysis software, SPSS 22 (Statistical Package for Social Sciences) for Windows. Frequency (f), percentage (%), arithmetic mean (X), standard deviation (Sd) were calculated for the analysis of the data. Parametric tests were applied based on the number of samples. The existence of a statistically significant difference between the independent groups, based on the expressions in the scales, was analyzed via t-test for independent samples, when the number of independent groups was two and via one-way analysis of variance (One-Way ANOVA) when the number of independent groups was more than two. Pearson correlation analysis was conducted to examine the relationship between the scales. Statistical significance was defined by a value of p < 0.05.

3. Results

A total of 140 participants, 30 physicians, 70 nurses, and 40 assistant healthcare staff working in pandemic services or pandemic outpatient clinics, were included in the study. The number of female participants was 61 (44%) and the number of male participants was 79 (56%). The average age for female participants was 30.7 ± 6.2 and the average age for male participants was 35.6 ± 8.7. The average age of the physician participants was 30.4 ± 5.9, the average age of the nurse participants was 30.9 ± 5.9 and the average age of the assistant healthcare staff was 40.2 ± 8.9. Sociodemographic data of the participants were presented in Table 1.

It was determined that the number of participants without anxiety was 41 (29%), with mild anxiety was 53 (38%), with moderate anxiety was 28 (20%) and the number of participants with severe anxiety was 18 (13%).

Of the fifteen participants, who reported alcohol use, 4 increased their consumption due to the pandemic, 5 participants had a decreased alcohol consumption and 6 reported no change in consumption. The number of participants, who reported tobacco use, was 45 and 12 of them had an increased smoking rate due to the pandemic, 13 reported a decrease and 21 reported no change in their smoking habits. Suicidal history was observed in one participant and active suicidal ideation was present in three participants.

Gender-based comparison of the scale scores for the participants indicated increased scores of PSQI, BAI, and PSI for the female participants when compared to male participants, however, there existed no statistically significant difference. The quality of life scores of the female participants (87.3 ± 18.3) was lower than that of male participants (921 ± 22.4). However, the difference was not statistically significant (p = 0.174). Marital status did not cause any statistically significant difference.

It was determined that 8 participants worked in a pandemic or emergency outpatient clinic, 76 worked in a pandemic department and 56 worked both in a pandemic outpatient clinic and the pandemic department, based on the evaluation of participants' place of service. Anxiety levels and sleep disturbance scores were found to be the highest for the participants who worked in the pandemic outpatient clinic + pandemic department, and lowest for those who only worked in the pandemic outpatient clinic. There was a statistically significant difference between the groups based on both scales (p = 0.000, p = 0.043). Quality of life scores was lowest for the participants who worked in the pandemic outpatient clinic + pandemic department and was highest for those who only worked in the pandemic outpatient clinic. There existed a statistically significant difference between the groups (p = 0.001). The lowest level of problem-solving skills was observed in the group of healthcare workers, who provided services in the pandemic outpatient clinic + pandemic department, and the highest level of problem-solving skills was observed in the group of participants who worked only in the pandemic outpatient clinic. There was a statistically significant difference between the groups (p = 0.012). Living separate from the family, having a pregnant family member or one with a chronic disease at home, and a newborn baby at home did not affect the anxiety levels of the participants. However, anxiety levels (15.9 ± 10.4) were significantly higher in individuals with a family member at the age of or older than 65 years (p = 0.05) compared to those, who lived together with individuals of lower ages (12.2 ± 9.8).

It was determined that there was a positive correlation between the BAI scores and the PSQI and PSI scores of the participants and a

Table 1
Comparison of the sociodemographic characteristics of the participants.

		Physician group N = 30		Nurse group N = 70		Assistant healthcare staff group N = 40	
		n	%	n	%	n	%
Gender (female)		10	33	40	57	11	27
Marital status (married)		16	53	43	61	28	70
Place of residence (center)		29	96	53	75	30	75
Economic status (low)		–	–	–	–	10	25
Alcohol use		9	30	6	8	–	–
Tobacco use		9	30	21	30	15	37
Present medical disorder		1	3	13	18	6	15
Psychiatric treatment in family		2	6	10	14	5	12
Living separate from family		11	37	28	40	10	25
Having a pregnant family member at home		–	–	5	7	–	–
Having a family member with a chronic illness at home		12	40	24	34	21	52
Having a family member at the age of or older than 65 years at home		6	20	19	27	14	35
Education	Primary School	–	–	–	–	9	22
	High School	–	–	6	8	18	45
	University	30	100	64	91	13	32
Place of Service	Outpatient clinic	3	10	3	4	2	5
	Department	11	37	43	61	22	55
	Outpatient clinic + Department	16	53	24	34	16	40
Year of experience in profession	<1 year	3	10	8	11	–	–
	1 to 5 years	4	13	17	24	7	17
	>5 years	23	77	45	64	33	82

negative correlation between the WHOQOL-BREF (quality of life) scores and the PSQI and PSI scores of the participants (p = 0.000, r = 0,508; p = 0.029, r = 0,184; p = 0.000, r = −0,360) (Table 2).

The participants were group based on their professions, as physicians, nurses, and assistant healthcare staff, and their average scores of the scales were compared. No statistically significant difference was observed for the BAI scores between the groups. A statistically significant difference between the groups was determined for the scores of PSQI, PSI Confidence, PSI Approach-Avoidance, PSI Total, and Quality of life scores (Table 3). It was established that nurses had higher PSQI and PSI scores compared to those of physicians and assistant healthcare staff (p = 0.002; p = 0.04). The quality of life scores of the nurse participants was also lower (p = 0.04) (Table 3).

4. Discussion

The present study identified the rate of clinically significant anxiety symptoms among the healthcare workers, who provided service in pandemic outpatient clinics and departments as 33%. The problem-solving inventory scores (higher scores indicated that individuals had a self-perception of insufficiency in problem-solving) of the participants were positively correlated with their anxiety scale and sleep disorders scale scores and were negatively correlated with quality of life scale scores. The present study also established that sleep disturbances were more prevalent with the nurse participants when compared to physicians and assistant healthcare staff, thus the quality of life scores was lower for the nurses. Furthermore, it was determined that, among all healthcare workers, problem-solving skills of nurses were the most negatively affected due to the pandemic.

It is anticipated that the majority of the individuals, who encounter a life-threatening health problem or disaster, might initially feel desperate and in need. In such crises, which lead to intense stress experience, as well as the patient, healthcare workers could also be negatively affected. In outbreaks, such as pandemics, that affect most of the population, the frontline individuals that encounter the infected patients are healthcare workers, thus, they have the greatest risk of exposure.

In times of outbreak, the health system capacity, resources, and requirements may suffer unpredictable imbalances [17]. The workload and responsibilities of healthcare workers increase due to an epidemic. Healthcare workers must inform the public on the infectious disease and the means to prevent spread, respond to patients most rapid and effective way, should have the necessary knowledge and experience to save the lives of and treat more individuals and should appropriately and accurately use the medical equipment and resources. Along with such challenges, healthcare workers should be able to take the necessary measures to protect themselves and their families against the risk of disease transmission.

For healthcare workers, crises might result in extended working hours, being in contact with individuals with the risk of death, and the increased expectation of the families and patients. Therefore, stress, as one of the psychosocial consequences of traumatic events, such as an epidemic affecting the entire society, might become challenging for the healthcare workers who constantly attempt to care for various sensitive aspects related to patients and to meet their needs and expectations.

Lai et al. conducted a study with 1257 healthcare workers from 34 hospitals in China, intending to evaluate the mental health of healthcare professionals who worked with COVID-19 patients. The researchers reported that healthcare workers who were responsible for the diagnosis, treatment, and care of patients with COVID-19 exhibited higher levels of depression, sleep disturbance, and distress symptoms compared to other healthcare workers. The same study emphasized that a significant portion of the participants, as 50.4%, presented symptoms of depression, where 44.6%

Table 2
Correlation analysis between the scale scores.

		Age	PSQI Total	PSI Total	WHOQOL-BREF	BAI
Age	r	1	−,158	−,187*	,062	−,089
	p		,063	,027	,470	,298
PSQI Total	r	−,158	1	,412**	−,430**	,508**
	p	,063		,000	,000	,000
PSI Total	r	−,187*	,412**	1	−,402**	,184*
	p	,027	,000		,000	,029
WHOQOL–BREF	r	,062	−,430**	−,402**	1	−,360**
	p	,470	,000	,000		,000
BAI	r	−,089	,508**	,184*	−,360**	1
	p	,298	,000	,029	,000	

PSQI = Pittsburgh Sleep Quality Index; **PSI =** Problem Solving Inventory; **WHOQOL-BREF =** World Health Organization Quality of Life-BREF; **BAI =** Beck Anxiety Inventory.
* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 3
Comparison of the scale scores for physician, nurse and assistant healthcare staff participants.

	PSI Confidence	PSI ApproachAvoidance	PSI Personal Control	PSI Total	BAI	WHOQOL-BREF	PSQI Total
Total n = 140	33.7 ± 8.8	36.9 ± 10.9	20.1 ± 3.5	90.4 ± 18.2	13.17 ± 10.1	90.0 ± 20.8	5.1 ± 3.8
Physician n = 30	28.4 ± 8.6	32.7 ± 9.3	19.8 ± 3.4	80.6 ± 16.6	13.9 ± 8.7	92.8 ± 13.7	4.9 ± 3.0
Nurse n = 70	37.2 ± 7.9	41.2 ± 10.9	20 ± 3.07	97.9 ± 17.2	13.8 ± 11.2	85.7 ± 20.2	6.1 ± 4.07
Healthcare Staff n = 40	31.4 ± 7.6	32.5 ± 9.04	20.7 ± 4.2	84.6 ± 15.7	11.5 ± 8.9	95.5 ± 24.7	3.5 ± 3.4
p	**p = 0.000**	**p = 0.000**	p = 0.484	**p = 0.000**	p = 0.0473	**p = 0.04**	**p = 0.002**

p < 0.05: significance level.
PSQI = Pittsburgh Sleep Quality Index; **PSI =** Problem Solving Inventory; **WHOQOL-BREF =** World Health Organization Quality of Life-BREF; **BAI =** Beck Anxiety Inventory.

had anxiety symptoms, 34% had insomnia and 71.5% reported distress [6]. The findings based on the participants of the present study indicated that only 33% exhibited clinically significant symptoms of anxiety. There exist several factors that explain that a lower level of anxiety detected in healthcare workers in Turkey when compared to rates reported for other countries. Essential regulations, such as isolation, filiation, and treatment of the disease, were set in action since the initial diagnosis of the disease in Turkey, and medical devices and equipment were provided in collaboration with healthcare workers. Efforts were set in the direction of the appropriate use of resources and towards the provision of protective equipment for healthcare workers. Furthermore, financial and moral support was provided with the intent to increase the morale and motivation of healthcare workers. The fact that the healthcare workers providing service with perseverance at their own risk during these difficult times was highly appreciated by both the state and the public. Given that there existed no problem with the employment figures of healthcare workers in Turkey, the regulations of 4- to 8-hour work shifts were set in action based on work intensity. Adequate provision of protective equipment might have reduced the risk of transmission of the disease and transmission-related anxiety among the healthcare workers, especially the anxiety to spread the virus to their family members. Moreover, working hour regulations, shorter shift working system and salary increases could have reduced burnout and fatigue levels, and increased morale and motivation.

It was reported that female healthcare workers, especially the nurses could suffer psychological problems during the COVID-19 pandemic [6]. It was emphasized that there was a positive correlation between the stress in Chinese nurses in coronavirus infection service in Wuhan and their workload and intense working hours during the week [18]. In the present study, it was determined that there was no significant difference between different professions in healthcare workers, based on anxiety levels. The present study did not report different levels of anxiety for nurses when compared to other healthcare workers. However, nurses had clinically significant figures based on sleep disturbances, whereas, the high scores required to diagnose sleep disorders were not met by physicians and assistant healthcare staff. Restful sleep provides several benefits to an individual, in terms of physical, emotional, cognitive, and social domains. Therefore, a disorder in a part of sleep might trigger disruptions in the daily functions of an individual [19]. It was found that individuals, who were exposed to stress, might develop sleep disorders, independently from whether they developed mental symptoms at the level of a disorder [20]. The finding of the present study, which indicated frequent sleep problems in nurses despite their not-high anxiety levels, was compatible with such argument in literature. Yet, nurses are the healthcare workers who are together with the patients for the longest durations, who respond to all requirements of the patients and patients' families and play a key role in establishing communication within the medical team. Such an intense pace is an expected cause of sleep disturbance symptoms for this profession.

In the present study, a positive relationship between the quality of life and anxiety levels and sleep disorders was determined. The attempt to cope with stressful life events might cause the development of psychiatric disorders. Such mental health problems could affect the attention, comprehension, and decision-making capacity of healthcare workers and have a long-term effect on their well-being levels and negatively affect the quality of life [7]. Bastiaansen et al. determined a significant relationship between low quality of life and psychiatric symptoms, low self-esteem, low social competence, unhealthy functioning in the family, low social support, and stressful life events [21]. The finding of the present study, which indicated decreases in quality of life due to increased levels of anxiety, was consistent with the findings reported in the literature.

It is acknowledged that there is a direct relationship between workload and stress in the work environment [18,22]. Based on the findings of the present study, anxiety levels were higher among healthcare professionals who worked both in outpatient clinics and departments, when compared to those who worked only in departments or only in outpatient clinics. Furthermore, the findings of the present study indicated that anxiety levels were significantly higher in healthcare workers who had a family member at or over the age of 65 when compared to those who lived with a family member below this age threshold. Such finding corresponds to the findings in the literature, which report health and family-related concerns of the healthcare workers in service for the COVID-19 pandemic [23].

Another significant finding of the present study was that the problem-solving skills of the healthcare worker participants decreased concerning to the increased anxiety levels. Healthcare workers utilize their problem-solving skills to provide care services to patients with various health problems, to determine the priority of and make an attempt to solve patients' problems, to evaluate results and to make decisions to improve the quality of the health services provided to patients [24]. However, studies indicated that stress impaired prefrontal cortex function and caused a decrease in cognitive abilities, thus problem-solving performance was negatively affected [10,25,26]. In Turkey, a study was conducted in 2007 on medical doctors to investigate the effects of stress on cognitive functions using neuropsychological tests. In the study, it was reported that calculation period of the employees increased and their attention span decreased with an increase in stress, and high stress and anxiety levels had negative effects on cognitive functions [27]. It is essential to reduce the stress factors in the work environment to the highest extent possible since setbacks in health services might be experienced as a result of decreased problem-solving skills due to increased stress symptoms in healthcare workers.

Healthcare workers are responsible for interventions that directly affect human life and have no room for mistakes. Therefore, it is essential for healthcare workers to take all protective measures against the disease, to plan for reducing the indirect effects of trauma, to organize necessary information and training activities, to decrease workload, and to increase social support mechanisms. Higher professional satisfaction and motivation of healthcare workers, improvement in the conditions that negatively affect the quality of life, acknowledging and recognizing expectations yield the chance of increased scope and quality in provided services.

5. Limitations of the study

The present study has several limitations. In the present study, questionnaires were used for the assessment of mental status, therefore, it is not possible to mention diagnoses, the study rather focused on the level of symptoms. The Problem Solving Inventory, used in the present study, is a self-report assessment instrument that resorts to self-perceived effectiveness of the problem-solving methods of an individual. Evaluations of an external observer on the problem-solving skills of individuals might conclude to a more subjective perspective. Although the number of participants included in the present study provided a sufficient sample size for evaluations, studies in healthcare facilities with different characteristics and with larger sample sizes will further contribute to the research domain.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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