



# Anxiety Symptoms and Associated Psychological and Job-Related Factors Among Hospital Nurses

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**Objective** Recently, burnout and mental health issues regarding nurses are reported increasingly. This study aimed to investigate the prevalence of anxiety symptoms among hospital nurses and determine their association with psychological and job-related factors.

**Methods** Data on demographics, job-related characteristics, burnout, Type A behavior patterns, self-esteem, and happiness were collected from 515 nurses working at a university hospital in Korea. Anxiety symptoms were assessed using the anxiety subscale of the Hospital Anxiety and Depression Scale, with scores of 8 or higher indicating the presence of anxiety symptoms. Demographic, job-related, and psychological factors were compared according to the presence of anxiety. Logistic regression was conducted to identify factors associated with anxiety symptoms.

**Results** Two hundred and four (39.6%) participants had anxiety symptoms. Self-esteem and happiness were associated with a lower risk of anxiety symptoms, whereas burnout was associated with a higher risk of anxiety symptoms. Furthermore, being female, having a career of less than five years, and requiring counseling due to stress were associated with a higher risk of anxiety symptoms. Being younger, female, or a basic nurse; having a career of less than five years; partaking in shift work; experiencing job dissatisfaction; requiring counseling due to stress; being exposed to higher levels of burnout; and having lower levels of self-esteem and happiness were all found to be significantly correlated with anxiety symptoms.

**Conclusion** These findings suggest that promoting self-esteem and happiness while reducing burnout may be beneficial in preventing and managing anxiety symptoms among hospital nurses.

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**Keywords** Anxiety; Burnout; Happiness; Nurses; Self-esteem.

## INTRODUCTION

Anxiety is characterized by an unpleasant state of inner turmoil and includes physiological, cognitive, emotional, and behavioral components.<sup>1</sup> Anxiety is thought to be a normal reaction to a threat and can help one cope with a dangerous state. However, if high levels of anxiety persist, it becomes an anxiety disorder accompanied by psychological distress and various physiological symptoms, including breathlessness,

sweating, headache, and palpitations.<sup>1</sup> Anxiety disorders not only rank as the most prevalent psychiatric disorders in the United States<sup>2</sup> and Europe<sup>3</sup> but also stand out as one of the most common mental disorders in Korea. In a mental health survey among the Korean population, the lifetime prevalence of anxiety disorders was found to be 9.3%.<sup>4</sup> Anxiety symptoms are often comorbid with other psychiatric disorders, such as depressive and substance use disorders,<sup>2</sup> and could be a risk factor for coronary artery disease.<sup>5</sup> Furthermore, anxiety symptoms negatively affect an individual's quality of life and may lead to functional impairment.<sup>6</sup>

Nurses are an essential component of the healthcare system, and their job performance can affect the overall quality of care provided in hospitals. Unfortunately, nursing is considered one of the most stressful professions as nurses bear the immense responsibility of promoting health while facing challenges such as limited autonomy, insufficient job rewards,

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time constraints, inadequate resources, and understaffing; all these factors make them susceptible to occupational stress.<sup>7</sup> Owing to this stress, nurses are prone to experiencing burnout or depression. According to Maslach and Jackson,<sup>8</sup> burnout is defined as a response to excessive stress at work, which is characterized by feelings of emotional drainage (exhaustion), a detached response to other people (cynicism), and reduced feelings of personal accomplishment at work (reduced professional efficacy). Nurses have been reported to be at a higher risk of burnout among healthcare workers.<sup>9</sup> In addition, a previous study demonstrated that higher burnout scores are associated with higher scores for both trait and state anxiety.<sup>10</sup>

Specific behavioral patterns have long been implicated as health risk factors. The Type A behavior pattern or personality, as formulated by Friedman and Rosenman,<sup>11</sup> describes people as ambitious, competitive, impatient, aggressive and more susceptible to developing coronary artery disease. Type A individuals tend to experience difficulties in coping with job stress. A previous study revealed that Type A individuals are more likely to feel stressed than Type B individuals when their workload increases.<sup>12</sup> Jeung et al.<sup>13</sup> demonstrated a positive association between Type A personality and burnout, indicating that personality traits may operate as a modifier of burnout. In Tramill et al.'s study,<sup>14</sup> students with Type A behavior patterns have shown higher levels of anxiety than other personality types.

Self-esteem is defined as the direction of self-attitude, a favorable or unfavorable opinion of oneself. Individuals with high self-esteem respect and consider themselves worthy.<sup>15</sup> Low self-esteem is associated with anxiety symptoms in adolescents,<sup>16</sup> whereas high self-esteem predicts fewer anxiety symptoms.<sup>17</sup> Growing evidence suggests that low self-esteem may predict anxiety.<sup>16-18</sup> Happiness is thought to be a combination of the presence of positive affect, absence of negative affect, and satisfaction with life.<sup>19</sup> Much research on happiness has been led by positive psychology, which explores the factors that influence well-being.<sup>20</sup> Schiffrin and Nelson<sup>21</sup> found an inverse relationship between happiness and perceived stress, implying that happiness has a buffering effect on stress. Furthermore, happiness has been shown to be inversely associated with psychiatric symptoms, such as anxiety<sup>22</sup> and depressive symptoms.<sup>23</sup>

There is increasing evidence that many nurses are predisposed to anxiety.<sup>24</sup> Despite the high prevalence of anxiety symptoms, previous studies of nurses' mental health problems have mainly investigated depressive symptoms or burnout. Moreover, few studies have examined the association between psychological factors and anxiety symptoms among nurses. As mental health resources are limited, it is impor-

tant to identify risk factors for anxiety symptoms in nurses so that interventions can target those at higher risk. Thus, this study aimed to investigate the prevalence of anxiety symptoms and determine their association with burnout, Type A behavior, self-esteem, happiness, and job-related factors among hospital nurses.

## METHODS

### Participants

This study was conducted at Chosun University Hospital in Gwangju, Korea, during September 2017. At the time, Gwangju metropolitan city had a population of 1.4 million. Chosun University Hospital is a tertiary academic hospital with 849 beds. This study enrolled nurses working in the outpatient unit, general ward, intensive care unit, operating room, emergency room, and others. Written informed consent was obtained after the purpose and procedures of the study were explained by a researcher who had no relationship with nurses. Participants were made aware of the voluntary nature of the survey and that their information was completely anonymous and confidential. The questionnaires were distributed to them in person by head nurses; subsequently, they completed a self-report questionnaire that inquired about age, sex, job-related characteristics (department, career, position, shift work, and job satisfaction), need for counseling and mental health service use due to stress, anxiety symptoms, and psychological factors, including burnout, Type A behavior pattern, self-esteem, and happiness. This study was approved by the Institutional Review Board of the Chosun University Hospital (Ref. No.: 2017-08-007).

### Assessment of anxiety symptoms and psychological factors

Anxiety symptoms were assessed using the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A), which consists of seven items rated on a 4-point Likert scale (from 0 to 3).<sup>25</sup> The total score ranges from 0 to 21, with higher scores representing more severe anxiety symptoms. The validity and reliability of HADS-A have been previously confirmed in a Korean population, and a cutoff score of 8 for anxiety has been suggested.<sup>26</sup> Thus, participants with a score of 8 or above were regarded as having anxiety symptoms.

Burnout was measured using the Maslach Burnout Inventory-General Survey (MBI-GS) which includes three subscales: exhaustion, cynicism, and professional efficacy.<sup>27</sup> The exhaustion subscale measures physical and emotional resource depletion induced by workplace stress. The cynicism subscale rates impersonal and distant attitudes toward work. The professional efficacy subscale assesses feelings of achievement at

work. Each item was rated from 0 (never) to 6 (every day). Higher scores on the exhaustion and cynicism subscales and lower scores on the professional efficacy subscale indicate a higher level of burnout. This study used the exhaustion and cynicism subscales of the MBI-GS. The Korean version of the MBI-GS has been validated previously.<sup>28</sup>

Type A behavioral patterns were measured using the Framingham Type A Scale (FTAS).<sup>29</sup> The FTAS consists of five Likert types and five true-false items. Each Likert item is rated as follows: 0 (Not at all), 0.33 (Somewhat), 0.67 (Fairly well), and 1 (Strongly agree). This study used the five Likert-type items of the FTAS to assess the level of Type A behavior patterns, with a higher score indicating a higher Type A behavior pattern. The Korean version of the FTAS has been validated previously.<sup>30</sup>

The Rosenberg Self-Esteem Scale (RSES) is a 10-item self-administered questionnaire with five positive and five negative items reflecting high and low self-esteem, respectively.<sup>15</sup> Each item was rated from 0 (strongly disagree) to 3 (strongly agree); however, negative items were reverse-rated. The Korean version of the RSES has been previously validated.<sup>31</sup> The Brief Rosenberg Self-Esteem (BRSES) consists of items 3, 5, 8, 9, and 10 of the RSES, and its reliability and validity were previously confirmed.<sup>32</sup> The present study used the BRSES to assess self-esteem levels, with higher scores indicating higher self-esteem.

Happiness was measured using the Positive Psychotherapy Inventory (PPTI) which consists of 21 items with subscales designed to assess pleasant, engaged, and meaningful lives.<sup>33</sup> The respondent is asked to choose how much he or she has agreed upon each proposed area dealing with pleasant life, engaged life, and meaningful life on a 4-point scale ranging from 0 to 3. The items are summed to obtain a total score, with higher scores indicating higher levels of happiness. The validity of the PPTI has been confirmed in Korea.<sup>34</sup>

### Statistical analysis

Participants were grouped into either an anxiety symptom group or a non-anxiety symptom group based on their HADS-A scores, using a cutoff score of 8. Continuous variables were checked for normal distribution using the Kolmogorov-Smirnov test. As all continuous data were non-normally distributed, nonparametric tests were applied for the analysis. Group comparisons of age, sex, job-related characteristics, counseling need, use of mental health services due to stress, and mean MBI-GS, FTAS, BRSES, and PPTI scores were performed using the Mann-Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. Spearman's rank correlation was used to identify significant correlations between anxiety symptom severity and psychological factors. Multivariate logistic regression analyses using the backward-conditional method were

performed to identify factors associated with anxiety symptoms. Factors that were significantly different between the groups in univariate analyses were selected as independent variables for the regression model. All statistical analyses were performed using SPSS software (version 27.0; IBM Corp., Armonk, NY, USA). Significance was set at  $p < 0.05$  (two-tailed) for all tests. To control for type I errors, Bonferroni correction for multiple comparisons was applied.

## RESULTS

### Prevalence of anxiety symptoms and related demographic/job-related characteristics

A total of 551 nurses participated in this study. Thirty-six invalid questionnaires (those with >20% unanswered questions) were excluded, and 515 completed questionnaires were analyzed. Of the 515 nurses included in the analysis, 29 (5.6%) were male and 486 (94.4%) were female. The prevalence of anxiety symptoms was 39.6%. Participants who were younger, female, had a career of less than five years, were basic nurses, worked rotating shifts, were dissatisfied with their jobs, and needed counseling due to stress had significantly higher rates of anxiety symptoms ( $p < 0.05$ ). However, there were no significant differences in department or mental health service use between the two groups. Age, sex, job-related characteristics, need for counseling, and mental health service use due to stress of the participants, as well as comparisons by anxiety symptom status, are presented in Table 1.

### Psychological characteristics according to anxiety symptoms

With regard to burnout, MBI-GS scores were significantly higher in the anxiety symptom group than in the non-anxiety symptom group ( $p < 0.001$ ). It was also found that both subscale scores of the MBI-GS were significantly higher in the anxiety symptom group than the non-anxiety symptom group ( $p < 0.001$ ). Conversely, both the BRSES and PPTI scores were significantly lower in the anxiety symptom group than in the non-anxiety symptom group ( $p < 0.001$ ). In addition, the anxiety symptom group exhibited significantly lower scores on all three PPTI subscales than the non-anxiety symptom group ( $p < 0.001$ ). However, there were no significant differences in FTAS scores between the anxiety and non-anxiety symptom groups. The results of the group comparisons of burnout, Type A behavior patterns, self-esteem, and happiness are presented in Table 2.

**Table 1.** Group comparisons of demographic and job-related factors according to anxiety symptoms

Variables	Anxiety symptoms			$\chi^2$	p
	No (HADS-A<8) (N=311 [60.4%])	Yes (HADS-A≥8) (N=204 [39.6%])	Total (N=515 [100.0%])		
Age (yr)	32.8±9.6	29.7±7.6	31.6±9.0		<0.001
Sex				11.00	0.001
Male	26 (8.4)	3 (1.5)	29 (5.6)		
Female	285 (91.6)	201 (98.5)	486 (94.4)		
Department				3.89	0.566
General ward	168 (54.2)	111 (54.4)	279 (54.3)		
Outpatient unit	32 (10.3)	22 (10.8)	54 (10.5)		
Intensive care unit	48 (15.5)	41 (20.1)	89 (17.3)		
Emergency room	28 (9.0)	13 (6.4)	41 (8.0)		
Operating room	23 (7.4)	13 (6.4)	36 (7.0)		
Others	11 (3.5)	4 (2.0)	15 (2.9)		
Career				12.96	<0.001
Less than 5 years	128 (41.2)	117 (57.4)	245 (47.6)		
More than 5 years	183 (58.8)	87 (42.6)	270 (52.4)		
Position					0.005
Basic nurse	256 (82.3)	189 (92.6)	445 (86.4)		
Charge nurse	29 (9.3)	10 (4.9)	39 (7.6)		
Head nurse	23 (7.4)	4 (2.0)	27 (5.2)		
Over director	3 (1.0)	1 (0.5)	4 (0.8)		
Shift work				7.23	0.007
Yes	224 (72.0)	168 (82.4)	392 (76.1)		
No	87 (28.0)	36 (17.6)	123 (23.9)		
Job satisfaction				20.14	<0.001
Satisfaction	56 (18.0)	12 (5.9)	68 (13.2)		
Moderate	195 (62.7)	130 (63.7)	325 (63.1)		
Dissatisfaction	60 (19.3)	62 (30.4)	122 (23.7)		
Need for counseling due to stress				18.26	<0.001
Yes	64 (20.6)	77 (37.7)	141 (27.4)		
No	247 (79.4)	127 (62.3)	374 (72.6)		
Mental health service use due to stress					0.165
Yes	3 (1.0)	6 (2.9)	9 (1.7)		
No	308 (99.0)	198 (97.1)	506 (98.3)		

Data are presented as mean±standard deviation or N (%). HADS-A, Anxiety subscale of the Hospital Anxiety and Depression Scale

### Correlations between anxiety symptoms and psychological factors

HADS-A scores were significantly positively correlated with MBI-GS ( $\rho=0.353$ ,  $p<0.01$ ) and FTAS ( $\rho=0.124$ ,  $p<0.01$ ) scores. In contrast, the BRSES ( $\rho=-0.436$ ,  $p<0.01$ ) and PPTI ( $\rho=-0.428$ ,  $p<0.01$ ) scores had a significant negative correlation with the HADS-A scores. Spearman's  $\rho$  for anxiety symptoms with burnout, Type A behavioral patterns, self-esteem, and happiness are shown in Table 3.

### Impact of demographic, job-related, and psychological factors on anxiety symptoms

Age, position, shift work, and job satisfaction had no statistically significant effect on anxiety symptoms in the first model tested, and were thus removed from the final model. Table 4 presents the final analytical model. The Hosmer-Lemeshow goodness-of-fit test confirmed the accuracy of the logistic model ( $\chi^2=12.470$ ,  $df=8$ ,  $p=0.131$ ). In the final model, female nurses (odds ratio [OR]=5.750, 95% confidence inter-

**Table 2.** Group comparisons of psychological factors according to anxiety symptoms

Variables	Anxiety symptoms			p*
	No (HADS-A<8)	Yes (HADS-A≥8)	Total	
Burnout				
MBI-GS	29.9±7.6	34.6±7.3	31.7±7.8	<0.001
Exhaustion	18.8±4.9	21.8±4.1	20.0±4.8	<0.001
Cynicism	11.0±4.2	12.8±4.6	11.7±4.4	<0.001
Type A behavior pattern				
FTAS	2.1±0.8	2.2±0.8	11.4±2.5	0.083
Self-esteem				
BRSES	9.8±1.7	8.5±1.9	9.3±1.9	<0.001
Happiness				
PPTI	34.6±8.5	28.7±7.6	32.3±8.7	<0.001
Pleasant life	11.4±3.2	9.0±3.0	10.5±3.3	<0.001
Engaged life	11.8±3.2	9.6±3.0	10.9±3.3	<0.001
Meaningful life	11.4±3.0	10.0±2.7	10.9±3.0	<0.001

Data are presented as mean±standard deviation. \*statistical significance was adjusted to p<0.006 using the Bonferroni correction. HADS-A, Anxiety subscale of the Hospital Anxiety and Depression Scale; MBI-GS, Maslach Burnout Inventory-General Survey; FTAS, Framingham Type A Scale; BRSES, Brief Rosenberg Self-Esteem Scale; PPTI, Positive Psychotherapy Inventory

**Table 3.** Correlations among anxiety symptoms, burnout, type A behavior pattern, self-esteem, and happiness

Variables	1	2	3	4	5
1. HADS-A	1				
2. MBI-GS	0.353**	1			
3. FTAS	0.124**	0.102*	1		
4. BRSES	-0.436**	-0.221**	-0.068	1	
5. PPTI	-0.428**	-0.311**	0.146**	0.442**	1

\*p<0.05; \*\*p<0.01. HADS-A, Anxiety subscale of the Hospital Anxiety and Depression Scale; MBI-GS, Maslach Burnout Inventory-General Survey; FTAS, Framingham Type A Scale; BRSES, Brief Rosenberg Self-Esteem Scale; PPTI, Positive Psychotherapy Inventory

**Table 4.** Logistic regression results on factors associated with anxiety symptoms

Variables	B	OR	95% CI	p
Sex				
Male		1.0		
Female	1.749	5.750	1.525–21.677	0.01
Career				
More than 5 years		1.0		
Less than 5 years	1.063	2.894	1.866–4.489	<0.001
Need for counseling due to stress				
No		1.0		
Yes	0.561	1.753	1.087–2.828	0.021
Burnout				
MBI-GS total	0.073	1.076	1.043–1.109	<0.001
Self-esteem				
BRSES total	-0.207	0.813	0.719–0.919	0.001
Happiness				
PPTI total	-0.058	0.944	0.918–0.971	<0.001

χ<sup>2</sup> of model=140.827, df=8, Nagelkerke R<sup>2</sup>=0.324. OR, odds ratio; CI, confidence interval; MBI-GS, Maslach Burnout Inventory-General Survey; BRSES, Brief Rosenberg Self-Esteem Scale; PPTI, Positive Psychotherapy Inventory



val [CI] 1.525–21.677,  $p=0.01$ ) had higher odds of having anxiety symptoms than male nurses. Nurses with a career of less than five years (OR=2.894, 95% CI 1.866–4.489,  $p<0.001$ ) showed a higher risk of anxiety symptoms than those with a career of more than five years. Nurses who needed counseling because of stress (OR=1.753, 95% CI 1.087–2.828,  $p=0.021$ ) had a higher risk of anxiety symptoms than those who did not need counseling. Burnout (OR=1.076, 95% CI 1.043–1.109,  $p<0.001$ ), self-esteem (OR=0.813, 95% CI 0.719–0.919,  $p<0.001$ ), and happiness (OR=0.944, 95% CI 0.918–0.971,  $p<0.001$ ) were independently associated with anxiety symptoms.

## DISCUSSION

Identifying psychological and job-related characteristics that influence anxiety symptoms is important for preventing and managing mental health problems among nurses. We examined the prevalence of anxiety symptoms and their association with psychological and job-related factors among hospital nurses. Nurses with higher burnout were more likely to experience anxiety symptoms, whereas those with higher self-esteem or happiness were less likely to experience anxiety symptoms. Furthermore, being female, being in the earlier stages of career, and the need for counseling due to stress were associated with anxiety symptoms.

The prevalence of anxiety symptoms was 39.6%. This rate is similar to that of previous studies conducted among nurses in Hong Kong<sup>7</sup> and China.<sup>24</sup> However, the rate was higher than that found in samples from Singapore, where it was 20.7%.<sup>35</sup> In the United States, 18% of intensive care unit and 22% of general care nurses exhibit symptoms consistent with anxiety.<sup>36</sup> These differences across studies may be because of differences in instruments, cutoff points, work environments, and cultural differences regarding anxiety. A meta-analysis showed that the overall incidence of anxiety symptoms among nurses during the coronavirus disease 2019 pandemic was 29%.<sup>37</sup> The prevalence of anxiety symptoms in our study was approximately four times higher than that in the general population,<sup>4</sup> suggesting that hospital nurses may be particularly vulnerable to anxiety symptoms. In the present study, 27.4% nurses needed counseling because of stress, whereas only 1.7% nurses used mental health services. This difference in proportions may be associated with the stigmatization of mental disorders. Furthermore, the necessity for counseling was found to be a significant predictor of anxiety symptoms. Given these findings, hospital management should take proactive measures to screen for anxiety symptoms and provide confidential counseling to affected nurses.

Burnout is a state of emotional exhaustion that is dysfunc-

tional for employees and results in turnover, absenteeism, and reduced job performance.<sup>38</sup> These impacts have become a serious problem for healthcare workers because inadequate job performance has a direct adverse effect on patients' health.<sup>39</sup> Furthermore, the impact of burnout is highlighted by its association with mental health problems.<sup>40</sup> The present study revealed that burnout was associated with a higher risk of anxiety symptoms, suggesting that greater attention should be paid to burnout among hospital nurses. Consistent with our findings, emotional exhaustion has been associated with mental health problems, such as anxiety and depression.<sup>41</sup> Meanwhile, in Choi et al.'s<sup>42</sup> study, anxiety was found to be a predictor of emotional exhaustion. A meta-analytic review noted that burnout and anxiety are distinct concepts; however, their causal relationships remain unclear.<sup>40</sup> Thus, prospective studies are required to determine the causal relationship between burnout and anxiety.

Regarding Type A behavior patterns, a positive correlation between anxiety symptoms and Type A behavior was observed, which is consistent with previous studies.<sup>14,43</sup> However, this association was not statistically significant. Interestingly, Type A behavior patterns have been shown to reduce the risk of occupational stress on anxiety symptoms among pilots, implying that pilots with Type A personalities were less likely to experience anxiety symptoms.<sup>43</sup> This may be because they were enthusiastic about working. Type A personality has been shown to have a significant impact on burnout.<sup>13</sup> However, the influence of Type A behavior patterns on anxiety symptoms in nurses has not yet been studied. Our results indicate that Type A behavior may not affect anxiety symptoms in nurses. A previous study identified two factors (competitive drive and impatience) of the FTAS using factor analysis.<sup>44</sup> Impatience is related to anxiety symptoms, whereas competitive driving is not. This psychological heterogeneity in Type A behaviors could have affected the results. Additionally, because our study used only five Likert-type items, the total FTAS scores may not reflect the overall Type A behavior patterns. Future research using the FTAS subdomains is needed to clarify the associations between the different dimensions of Type A behavior and anxiety symptoms.

Nurses with anxiety symptoms showed lower self-esteem compared to those without anxiety symptoms, and an inverse correlation was found between self-esteem and anxiety symptoms. The logistic regression model indicated that nurses with higher self-esteem had a decreased probability of experiencing anxiety symptoms. There is converging evidence that high self-esteem serves an anxiety-buffering function.<sup>45</sup> In a longitudinal study of Li et al.,<sup>16</sup> low self-esteem and anxiety symptoms bidirectionally predicted each other at the within-person level, suggesting the reciprocal relationship. Our results

are consistent with these findings. To date, little research has been conducted on the association between self-esteem and anxiety symptoms among nurses. Individuals with low self-esteem tend to hesitate rather than trust their decisions when faced with stressful situations, which may worsen anxiety symptoms. Our findings suggest that high self-esteem buffers anxiety symptoms in hospital nurses.

To the best of our knowledge, this is the first study to reveal an inverse association between happiness and anxiety symptoms among Korean nurses. The three PPTI subdomains were significantly associated with anxiety symptoms. These results indicate that the major aspects of well-being (pleasure, engagement, and meaning) may have protective effects against anxiety symptoms. Consistent with our findings, happiness and life satisfaction have been found to be negatively related to anxiety symptoms.<sup>22</sup> Positive psychology interventions (PPI), which aim to promote well-being, have shown advantages in anxiety symptoms when applied with cognitive behavioral therapy over cognitive behavioral therapy alone.<sup>46</sup> A previous meta-analytic study revealed that PPI was more effective in reducing anxiety symptoms than control conditions in medically ill patients.<sup>47</sup> Furthermore, a randomized clinical trial by Ghazavi et al.<sup>48</sup> showed that a happiness educational program significantly reduced the level of stress, anxiety, and depression in nurses caring for patients with cancer. Taken together, our findings suggest that a program focusing on improving overall happiness could contribute to the prevention and reduction of anxiety symptoms among hospital nurses.

The prevalence of anxiety symptoms was significantly higher in female nurses than in male nurses. Additionally, female sex was found to be the strongest predictor of anxiety symptoms, which is in accordance with the higher lifetime prevalence of anxiety disorders found in women in the general population.<sup>2</sup> However, a previous study did not find sex differences in the prevalence of anxiety symptoms among hospital nurses.<sup>7</sup> Most of our sample was female (94.4%), which may have influenced our results. In a study conducted in China, there were no significant differences in the length of employment in comparison to anxiety symptoms.<sup>24</sup> However, in the present study, a career of less than five years was revealed to be a predictor of anxiety symptoms. Given that early career nurses experience more job stress than middle- or late-career nurses in Korea,<sup>49</sup> this is not surprising. Although the impact of age and position on anxiety symptoms was not significant in our logistic regression analysis, anxiety symptoms were significantly higher in younger and basic nurses than charge or head nurses. Thus, special attention should be paid to anxiety symptoms in basic nurses with early careers.

Among other job-related factors, job dissatisfaction and

shift work were correlated with anxiety symptoms, although the impact was not significant. In our study, the prevalence of anxiety symptoms in nurses who were dissatisfied with their jobs was much higher than in nurses who were satisfied, which is in line with previous findings.<sup>24</sup> Shift work is also associated with depression, anxiety, insomnia, and chronic fatigue,<sup>50,51</sup> and nighttime shift has been found to be inversely related to psychological well-being among nursing students.<sup>52</sup> These results support the view that shift work negatively affects health. However, no association has been observed between night work and anxiety symptoms among Swedish and Norwegian nurses.<sup>53,54</sup> These inconsistent results may be because of differences in the sample and applied instruments. Further prospective research is needed to elucidate the impact of shift-work on anxiety symptoms among hospital nurses.

Despite its significant implications, this study had some limitations that must be addressed. First, because our study employed a cross-sectional design, the results should be interpreted with caution. Prospective longitudinal studies could provide a better understanding of the effects of psychological and job-related factors on anxiety. Second, there is a potential for bias due to convenience sampling. Third, because the sample size was small and the sample was limited to nurses at one university hospital, it is difficult to generalize our findings. Fourth, we did not conduct diagnostic interviews regarding anxiety disorders or comorbid psychiatric conditions. Clinical interviews with those scoring a HADS-A cutoff score would be helpful in elucidating the current state of anxiety disorders among hospital nurses. Fifth, the present study did not assess job stress and related issues, such as nurse-patient relationships. Sixth, considering the relatively low explained variance of psychological and job-related factors, other factors such as the hierarchical culture of nursing, alcohol use, and social conflict need further investigation. Finally, the findings of our study should be interpreted with caution, owing to the nature of self-reported measures.

In conclusion, our study demonstrated the prevalence of anxiety symptoms and their relationship with psychological and job-related factors among nurses at a university hospital. Our results suggest that promoting self-esteem and happiness and decreasing burnout contribute to the prevention and management of anxiety symptoms among hospital nurses. Furthermore, female sex, earlier career stage, and the necessity of counseling due to stress were found to be associated with anxiety symptoms. Our findings provide insights into possible interventions to address these psychological and job-related characteristics, thereby reducing anxiety symptoms among hospital nurses.

## Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

## Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

## Author Contributions

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