SELF-REPRESENTATIONS OF QUALITY OF LIFE AND ANXIETY OF BLUE-COLLAR WORKERS, KHON KAEN, THAILAND

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ABSTRACT:

Background: Blue-collar workers can be exposed to hazardous conditions and other psychosocial pressures in the workplace. However, research on anxiety in the work environment remains limited in Thailand and other developing nations. The aims of this study were to measure level of anxiety and quality of life (QOL) among blue-collar workers exposed to occupational hazards in Khon Kaen Province, Thailand.

Methods: This cross-sectional study included 187 adults working in manual labor industry with exposure to occupational hazards in Khon Kaen Province, Thailand. Participants completed the State-Trait Anxiety Inventory (STAI) to measure anxiety and WHOQOL-BREF-THAI to measure QOL. Data were analyzed using bivariate analyses and descriptive analysis.

Results: The findings reveal that over half of workers (51.3% ± 8.0%) in the sample reported symptoms of high anxiety (STAI-S ≥ 45). Participants with high anxiety were younger than those with low anxiety ($p = 0.03$). Gender, marital status, and education level did not show a statistically significant difference between low and high anxiety ($p > 0.05$). QOL ($p < 0.001$) and its four sub-domains were lower in participants with high anxiety compared to low anxiety, with psychological and environmental domains having the most significant differences.

Conclusions: The findings illuminate the need to increase attention towards improving and promoting self-management of anxiety problems. Moreover, future research should explore which hazardous conditions are most associated with worker anxiety.

Keywords: Anxiety, Mental health, Occupational health, Quality of life, Thailand

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INTRODUCTION

Blue-collar workers in the manufacturing industry are an important component of the Thai economy. According to the National Statistics Office (NSO), over 6 million workers were employed nationwide in the manufacturing industry in 2013, which is 16% of the workforce and the leading source of employment behind agriculture [1]. The manufacturing industry has grown substantially over the past decade as Thailand transitions from an agricultural to an industrial and service economy [2]. The number of factory workers nationwide increased 21% from 2004 to 2013. The growth of factory workers has been even stronger in Khon Kaen province and surrounding provinces in the Northeast region, where many unskilled laborers have transitioned from the agricultural sector to the manufacturing sector. The number of factory workers in the Northeast has increased 28% over the same period [3].

The relatively rapid transition of Thailand's economy has historically outpaced government regulation. While increased focus on occupational health and safety, such as the 1998 Labor Protection Act and 2011 Occupational Safety, Health and Environment Act, has led to improvements, Thailand still had a high accident rate of 15.8 occupational accidents per 1000 workers in 2011 [1]. The majority of reported occupational accidents occur in the manufacturing industry [4]. Thus, blue-collar work in the manufacturing industry is still dangerous with exposure to hazardous conditions. Ergonomics, chemical exposures, and excessive

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dust and light are common problems, as reported by factory workers in data collected by the NSO [3].

Beyond the physical risks posed to blue-collar workers, working conditions may also affect mental well-being. Potential psychosocial work stressors include increased workload, displeasure, conflicts at work, role stress, and social seclusion [5]. Shift work, long hours, and hazardous work environments have been shown to be associated with poor mental health in blue-collar workers in China [6-9].

One significant form of poor mental health is anxiety. Prolonged anxiety at above-normal levels defines anxiety disorder. Several subtypes of anxiety disorder exist, including agoraphobia, generalized anxiety disorder (GAD), obsessive-compulsive disorder (OCD), panic disorder, social phobia, and specific phobia. Globally, anxiety disorder is one of the leading types of mental disorders. In a large multinational survey (14 countries), the 12-month prevalence of anxiety disorder, as defined by Diagnostic and Statistical Manual of Mental Disorder, Fourth Edition (DSM-IV), was estimated at 3.3% in Nigeria, lowest among the surveyed countries, and as high as 18.2% in the United States [10]. A more recent meta-analysis reported the global current prevalence at 7.3%, with 11.6% of people globally experiencing anxiety disorder in a given year [11]. Prevalence rates in emerging (upper middle income) countries, such as Thailand, tend to be lower than developed (high income) countries; however, more research is conducted on anxiety in developed countries [10, 11].

In Thailand, anxiety disorder ranks second among psychiatric disorders. In 2010, 1.5 million people in Thailand were treated for mental illnesses. Studies estimate between 15 and 16.5% of those patients had anxiety disorder, or about 300,000 people [12]. However, it has been shown that a large proportion of anxiety disorder patients go untreated, especially in undeveloped and emerging nations [10, 13, 14]. In Thailand, the true number of people with anxiety disorder is estimated at over 2 million, making the current prevalence of anxiety disorder, treated and untreated, around 3% [12].

Limited research exists on differentiating between anxiety disorder and work-related anxieties [15]. Studies in work environments typically focus on work stress. Anxiety is often neglected, but growing evidence suggests the workplace plays a role in developing anxiety problems and disorders [15-21]. The role of factory working conditions in anxiety is not well understood; however a recent study of front line assembly workers in small- and medium-sized enterprises in China found that exposure to a hazardous work environment was associated with a 26% increased risk of reduced psychological well-being [22].

Regardless of the cause, anxiety disorders can interfere with the ability of employees to work [15, 23-25]. Olatunji and colleagues [26] reported in a meta-analysis of anxiety patients that the work subscale of quality of life was the most affected subscale behind mental health and social, with a statistically significant effect size (Cohen's d) of 0.94. Reduced quality of work life is associated with increased absenteeism, reduced productivity and may increase risk of accidents [27]. Mental ill-health disproportionately increases absenteeism in blue-collar workers compared to white-collar workers [28].

Despite growing interest in work-related anxiety, little research exists on the prevalence of anxiety in blue-collar workers, particularly in emerging or undeveloped nations. The primary objective of this study was to measure self-reported anxiety symptoms and quality of life in blue-collar workers within large enterprises of Khon Kaen province, Thailand. The secondary purpose of this study was to explore the association of quality of life with the anxiety symptoms of blue-collar workers in Northeast Thailand.

MATERIALS AND METHODS

Study setting

This cross-sectional study was conducted between November 2013 and June 2014 in Khon Kaen province, Thailand using a stratified random sampling method. A total of 10 large enterprise factories (i.e., employees > 300) manufacturing fishing net, electronics, or sugar cane were first

identified from a provincial factory database maintained by the Ministry of Industry [29]. These industries were chosen to be studied because they contain the most-reported physical occupational hazards (i.e., ergonomics, chemical exposures, and excessive dust and light) and are the main manufactured products of Khon Kaen province. One factory from each industry was randomly selected, totaling three factories (i.e., stratification by industry). Finally, assembly-line workers (blue-collar workers) were recruited from the sampled factories for participation.

Sample size estimation

Using the estimate of the prevalence of anxiety disorder in Thailand of 3%, a 95% confidence level, and an absolute sampling error of 3%, a minimum of 124 workers is necessary. Assuming a 80% inclusion and completion rate, the needed sample size was 155.

$$n = \frac{z^2 p(1-p)}{e^2}$$

p = 0.03, z= 1.96 at 95% CI, e = 0.03

Participants

This study was approved by the Office of Khon Kaen University Ethics Committee in Human Research (KKUEC), IRB Approval Code HE562253, and all participants signed an informed consent form. Participants were recruited through advertisements at selected factories in Khon Kaen province. All workers had an equal opportunity to access the advertising media. Participants had to be Thai citizens, 18 to 60 years old, be able to read and communicate in Thai, and have been employed at the same location more than two years. Participants had to be blue-collar industrial employees who worked in environments that included at least one of the following indoor or outdoor physical hazards: (1) loud noise, (2) uncomfortably high temperatures, (3) vapors/fumes/dust, (4) handling dangerous/ chemical products, and (5) working with sparks or bright light. Responses from non-blue collar workers, such as administrators or engineers, were not included as participants.

Exclusion criteria excluded participants from the study who reported any of the following: (1) a history of, or current, severe psychiatric illness (e.g., bipolar disorder, schizophrenia), except depressive and anxiety disorders, (2) mental retardation, or any other pervasive developmental disorder, (3) use of an illicit drug. A total of 187 participants consented; however, 31 eligible subjects were not included in analyses due to incomplete questionnaires. Therefore, 156 were included in our data analyses. The relatively high proportion of incomplete questionnaires may be due to the length of time required to complete the three surveys and low education level of participants resulting in a misunderstanding of some questions. The 156 included participants included 50 participants from the fishing net factory, 52 participants from the electronics factory, and 54 participants from the sugar can factory. Analyses between industries were not completed, however, due to confidentiality agreements with the companies.

Measurements

Responses from participants were recorded on three primary forms to collect information on levels of anxiety, quality of life (QOL), and demographics.

The State-Trait Anxiety Inventory (STAI; [30]) was used to collect data regarding anxiety. Measuring anxiety can be difficult, especially in the absence of clinical diagnosis. Therefore, research relies primarily on self-report instruments to measure anxiety symptoms. Widely-accepted self-report instruments for anxiety symptoms include the State-Trait Anxiety Inventory (STAI) [30], Penn State Worry Questionnaire (PSWQ)[31], Beck Anxiety Inventory (BAI)[32] , and Social Phobia and Anxiety Inventory (SPAI)[33]. STAI has been translated to Thai and has been proven valid and reliable [34, 35]. Thus, from the author's experience, STAI is most widely-accepted self-report anxiety instrument by Institutional Review Boards in Thailand. The translated Thai version by T. Nonthasak In Techakomol [36]. STAI contains two subscales: STAI-State (STAI-S), which measures state anxiety (anxiety about an event or situation), and STAI-Trait (STAI-T), which measures trait anxiety (anxiety level as a personal characteristic) [37]. Each subscale can have a score ranging from 20 to 80. Higher scores indicate a positive correlation with higher levels of anxiety. Internal consistency coefficients for the scale have ranged from 0.86 to 0.95; test-retest reliability coefficients have ranged from 0.65 to 0.75 over a 2-month interval [30]. In practice, a cut-off point is used to categorize a score as exhibiting symptoms of anxiety disorder or not. Published cut-off points applicable for STAI-S and STAI-T are 39/40 and 44/45 [12, 38-41]. STAI-S has been shown to have higher sensitivity and specificity than STAI-T in older adults [41].

In this study, the STAI-S subscale with a cut point of 44/45 was chosen to categorize high and low anxiety symptoms, because STAI-S was shown to significantly correlate with job-related anxiety [15] and this cut point had higher accuracy for categorizing diagnosable anxiety disorder [41].

Quality of life was recorded using the WHOQOL-BREF-THAI. WHOQOL-100 was a generic cross-cultural quality of life instrument developed by the World Health Organization (WHO), and it has been translated and used among 15 countries, including Thailand [42]. The tool is based on a clear definition of quality of life, which includes physical, psychological, social, and environmental domains. WHOQOL-BREF is the 26-item abbreviated version of the WHOQOL-100 instrument [43]. The Thai version of the WHOQOL-BREF has been tested and retested for its psychometric properties in a number of populations including general population, the elderly, and cancer patients [44-46]. The content validity index of the Thai version was 0.65. The overall Cronbach's alpha value was 0.84 [44]. The tool uses a five-point Likert scale, in which 1 point is "strongly disagree" and 5 points is "strongly agree". When interpreting the

Table 1. Characteristics of the participants

Characteristic	Frequency (n=156)	%
Gender		
Male	66	42.3
Female	90	57.7
Age (years)		
18-20	6	3.8
21-30	36	23.1
31-40	63	40.4
41-50	42	26.9
51-65	9	5.8
Marital status		
Single	35	22.4
Married	107	68.6
Widowed	14	9.0
Highest level of education		
Primary school	59	37.9
High school	28	17.9
Diploma	34	21.8
Undergraduate or higher	35	22.4
Hazardous conditions*		
Working with sparks, bright light	39	25.0
Vapors/fumes/dust	59	37.8
Loud noise	72	46.2
Handling dangerous/chemical products	36	23.1
Uncomfortably high temperatures	55	35.3
Anxiety symptoms		
Low (STAI-S <45)	76	48.7
High (STAI-S ≥45)	80	51.3

*Participants answered yes/no to each hazardous condition and could respond yes to more than one category

WHOQOL-BREF-THAI and its sub-scales, the higher the score, the better quality of life. The possible total score ranges from 26 points to 130 points. Scores can be classified into three levels of quality of life: poor, moderate, and good, with parallel ranges for each subscale.

Finally, a Demographic and Working Form was developed expressly for this study. It included questions regarding age, sex, marital status, education, ethnicity, occupation, first language, and anxiety treatment history. Besides demographic data, it included questions regarding workplace environment, shift, duration of work, and characteristics of work.

Statistical analysis

The data were analyzed using a statistical software package. Descriptive statistics (e.g., means, standard deviations) were computed to describe the data. The STAI-S score was calculated according to established procedure and categorized as high anxiety (STAI-S ≥ 45) or low anxiety (STAI-S < 45). In terms of statistical significance, the confidence interval level was set at 95% ($p \leq .05$). The distribution of individual characteristics and work-related psychosocial and QOL were presented by numbers and percentages or means and standard deviations, as appropriate. Bivariate analyses (independent t test or chi-squared) were conducted to analyze associations between factors and anxiety.

RESULTS

Characteristics of participants

Table 1, the participant group included more females (57.7%) than males (42.3%), and participants were primarily between the ages of 31 and 40 years old (40.4%). Most participants (68.6%) were married. The education level, as expected among blue-collar factory workers, was generally low, with 55.7% not having graduated high school and 22.4% with some amount of university-level education. Loud noise (46.2%) and vapor, dust, and fumes (37.9%) were the most commonly reported hazardous conditions by workers.

Based on results from the STAI-S, participants were categorized as having high anxiety symptoms (STAI-S ≥ 45) or low anxiety symptoms (STAI-S < 45). More than half of participants (51.3%) were categorized as having high anxiety symptoms. The mean level of anxiety, as measured by STAI-S, in the sample (M = 44.4; 95% CI [43.3, 45.4]; SD = 6.74) reflected moderate to high levels of anxiety.

Table 2 Bivariate analyses showing association of individual and work-related factors with anxiety symptoms (n = 156)

Domain	Low anxiety (n=76)			High anxiety (n=80)			$p^{\dagger}$
	Range	Mean or Frequency (95% CI or %)	SD	Range	Mean or Frequency (95% CI or %)	SD	
Individual characteristics							
Age (years)	18-58	37.8 [35.7 – 39.9]	9.0	18-53	34.7 [32.7 – 36.7]	9.0	0.03*
Gender							0.627
Male		34 [51.5]			32 [48.5]		
Female		42 [46.7]			48 [53.3]		
Educational level							0.476
Primary school		29 [49.2]			30 [50.8]		
High school		14 [50.0]			14 [50.0]		
Diploma		14 [44.1]			19 [55.9]		
Undergraduate or higher		18 [51.4]			17 [48.6]		
Marital status							0.403
Single		14 [40.0]			21 [60.0]		
Married		56 [52.3]			51 [47.7]		
Widowed		6 [42.9]			8 [57.1]		
Physical work conditions							
Working with sparks, bright light (yes)		16 [41.0]			23 [59.0]		0.355
Vapors/fumes/dust (yes)		25 [42.4]			34 [57.6]		0.249
Loud noise (yes)		33 [45.8]			39 [54.2]		0.524
Handling dangerous/chemical products (yes)		15 [41.7]			21 [58.3]		0.350
Uncomfortably high temperatures (yes)		23 [41.8]			32 [58.2]		0.242

*Statistically significant difference at the 0.05 level

† p calculated using independent t test for age and chi-squared test for other variables

Table 3 Bivariate analyses showing association of individual and work-related factors with anxiety symptoms (n = 156)

Domain	Low anxiety (n=76)			High anxiety (n=80)			$p^{\dagger}$
	Range	Mean or Frequency (95% CI or %)	SD	Range	Mean or Frequency (95% CI or %)	SD	
Quality of life							
Physical	19-35	26.41[25.66-27.16]	3.26	13-34	24.71[23.87-25.56]	3.80	0.003**
Psychological	16-30	24.55[23.74-25.35]	3.49	6-30	21.30[20.47-22.13]	3.75	<0.001**
Social	8-15	11.23[10.81-11.64]	1.80	7-15	10.53[10.12-10.93]	1.80	0.016**
Environment	19-37	28.29[27.36-29.23]	4.06	15-40	25.26[24.29-26.23]	4.36	<0.001**
Overall	35-120	96.88 [93.82-99.94]	13.39	53-129	88.23[85.48-90.97]	12.34	<0.001**

**Statistically significant difference at the 0.01 level

† p calculated using independent t test

Quality of life

The mean level of QOL, as measured by WHOQOL-BREF-THAI, in the sample (M = 92.81; 95% CI [90.79, 94.84]; SD = 12.76) reflected moderate QOL. The mean of physical domain (M = 25.54; 95% CI [24.96, 26.11]; SD = 3.64), psychological domain (M = 22.87; 95% CI [22.24, 23.50]; SD = 3.96), social domain (M = 10.86; 95% CI [10.57, 11.15]; SD = 1.83), and environmental domain (M = 26.73; 95% CI [26.02, 27.44]; SD = 4.47) reflected moderate QOL.

Comparative analyses

Bivariate comparisons of individual characteristics of participants showed that younger workers had higher levels of anxiety (Table 2). Gender, marital status, and education level did not show a statistically significant difference between low and high anxiety. Physical domain (p = 0.003), psychological domain (p < 0.001), social domain (p = 0.016), and environmental domain (p < 0.001) were significantly different between high and low anxiety (Table 3).

DISCUSSION

This study sought to assess level of anxiety and quality of life in blue-collar workers in Khon Kaen province and found that 51.3% of the sample was categorized as high anxiety (STAI-S $\geq$ 45) while the sample was reported as having moderate QOL. Although, the study did not seek to explore the work-related physical and psychosocial factors associated with anxiety, previous studies showed that working conditions, including exposure to hazardous conditions, could contribute to anxiety disorder and work-related anxieties [15, 22].

Plant and machine operators and assemblers earn less (8,151 baht, or $263, per month) than the average income in Thailand (9,927 baht, or $320, per month), while working longer hours (48.2 hours per week) than the average Thai work week (44.7 hours per week) [3]. Increased exposure to hazardous conditions, low pay, and long working hours are stressors that may increase anxiety in workers, which may explain the high prevalence of anxiety symptoms in this group. Several other confounding factors exist to possibly explain the high prevalence of self-reported anxiety in this group beyond exposure to occupational hazards. First, the population generally has a low education level and socioeconomic status, which are social determinants of anxiety [47]. Traumatic life effects and other environmental determinants are also unknown in this study.

The study also confirmed that a negative relationship between anxiety and QOL exists in the sample group. Although, we did not measure quality of working life among our sample of population, previous studies have demonstrated the relationship between poor working conditions and depression and anxiety [48-52]. A negative relationship between anxiety and home-work interface was also supported by several studies [53, 54]. MacDermid and Harvey cited in Kossek et al [55] found that anxiety and depression were positively correlated with work-family conflict (similar to a negative version of home-work interface).

Finally, the study examined factors associated with anxiety. Increasing age was associated with lower levels of anxiety. Previous studies have shown that mental well-being improves through age [56, 57]. Younger workers may have more uncertainty in family and work and may be tasked with the more dangerous tasks in a factory setting. However, this result identifies an important need for more research on working conditions' role in anxiety and other mental burdens. The working conditions surrounding these participants are physically straining and highly sensory (loud noises, bright lights, high temperatures). With a fairly equal distribution between types of hazardous conditions, it is unclear which may be more associated with elevated anxiety. We cannot disregard poor working conditions, since they may affect health and safety and employee QOL.

This study has several limitations. First, the study was intended as a focused sentinel survey to examine anxiety only within workers exposed to hazardous conditions. Resources for the study were limited and receiving access to collect data at private factories was difficult. Furthermore, an increased sample size would have enhanced the significance of the results. Finally, the STAI score cut point for high anxiety significantly affects the prevalence result. This study followed existing guidance for the cut point, but the results do not imply diagnosis of anxiety disorder.

CONCLUSIONS

This study shows that a blue-collar workers exposed to occupational hazards in industrial factory settings may have a high prevalence of self-reported anxiety symptoms. Thus, employers should focus on improving particularly health and safety, to reduce anxiety in these factory workers. Reduced anxiety is associated with improved quality of work life and overall quality of life, which are beneficial to employers and employees through increased productivity and reduced absenteeism.

The limited sample size caused by limited access to workers and costs, as well as the possibility for self-reported and selection biases, warrant additional research on this topic. Further research is needed to understand the causal relationship between anxiety and working conditions, as well as to differentiate the role of interpersonal causes of anxiety from work environment causes of anxiety in these work settings. Furthermore, determining the validity of the STAI cut point value's association to diagnosable anxiety disorder would help confirm whether the prevalence of anxiety is truly higher in this population.

CONFLICTS OF INTEREST

The authors have no competing interests to report. This article is original and has not been submitted for consideration elsewhere.

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