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https://doi.org/10.15017/1785358

出版情報：九州大学, 2016, 博士（看護学）, 課程博士
バージョン：

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ABSTRACT

Objectives: This study aimed to develop the Career Anchors Scale among Occupational Health Nurses (CASOHN) and evaluate its reliability and validity.

Methods: Scale items were developed through a qualitative inductive analysis of interview data, and items were revised following an examination of content validity by experts and occupational health nurses (OHNs), resulting in a provisional scale of 41 items. A total of 745 OHNs (response rate 45.2%) affiliated with the Japan Society for Occupational Health participated in the self-administered questionnaire survey.

Results: Two items were deleted based on item-total correlations. Factor analysis was then conducted on the remaining 39 items to examine construct validity. An exploratory factor analysis with a main factor method and promax rotation resulted in the extraction of six factors. The variance contribution ratios of the six factors were 37.45, 7.01, 5.86, 4.95, 4.16, and 3.19%. The cumulative contribution ratio was 62.62%. The factors were named as follows: Demonstrating expertise and considering position in work (Factor 1); Management skills for effective work (Factor 2); Supporting health improvement in groups and organizations (Factor 3); Providing employee-focused support (Factor 4); Collaborating with occupational health team members and personnel (Factor 5); and Compatibility of work and private life (Factor 6). The confidence coefficient determined by the split-half method was 0.85. Cronbach's alpha coefficient for the overall scale was 0.95, whereas those of the six subscales were 0.88, 0.90, 0.91, 0.80, 0.85, and 0.79, respectively.

Conclusions: CASOHN was found to be valid and reliable for measuring career anchors among

OHNs in Japan.

Key words: Occupational health nurse, Career anchor, Career development, Scale development

Introduction

Due to rapid changes in industrialized society, occupational health concerns extend beyond the prevention of occupational disease; they also pertain to the prevention of lifestyle-related disease, overwork and mental health assessments, and the globalization of labor. In the 2014 fiscal year in Japan, the Occupational Health and Safety Law was revised, and stress checks for workers became mandatory, expanding the roles and duties of occupational health nurses (OHNs)[1)]. The Occupational Health Nursing Research Center indicated that while approximately 70% of OHNs have both registered nurse (RN) and public health nurse (PHN) qualifications, the other 30% have only an RN qualification[2)]. OHNs with only RN qualifications were intermingled; some OHNs had an RN qualification and were educated by the Japan Society for Occupational Health, whereas other OHNs had not received an RN qualification. OHNs with a PHN qualification are educated in not only personal support (e.g., health consultations, health checks, and reinstatement support) but also public health (e.g., group education, precautionary practices, and population health approaches). The undergraduate education of occupational health nursing in Japan significantly differs among nursing universities. Consequently, significant differences exist in the qualifications and undergraduate education of OHNs in Japan[3)]. Furthermore, approximately 30% of OHNs work alone without occupational health physicians (OHPs) and colleague OHNs, thereby limiting opportunities for on-the-job training and role expansion. The majority

of OHNs work full-time, whereas most OHPs work part-time. Approximately 50% of OHNs are supervised by non-healthcare staff, who may not fully understand the OHN role and may not value continuing professional development, the importance of being promoted, and hired as full-time staff[2]. As a result, OHNs in Japan may find it difficult to plan and develop their careers[4,5].

Major previous studies on career orientations have examined three areas: organization and professional orientations[6], generalist and specialist orientations[7], and diverse orientations that capture professional life, including the individual's personal life[8]. However, all targeted male employees, and were conceptualized and scaled. Furthermore, previous studies on career orientations in nursing have focused on administrative public health nurses (APHNs)[9,10] and hospital nurses (HNs)[11-14]; there are no studies of OHNs, and concepts and scales that match the characteristics of duties of OHNs are lacking. Therefore, it is important to reconsider career orientations specific to OHNs.

A foundational model for understanding individuals' careers is Schein's career anchor theory. Schein defined a career anchor as a person's self-concept consisting of aspects pertaining to the career such as self-perceived talents, values, and an evolved sense of motives[8]. This theory is based on the premise that congruence between an individual's career orientation and work environment will result in job satisfaction and increased commitment, while incongruence will result in job dissatisfaction and turnover. Career anchor clarifications and work assignments are consistent with job satisfaction. A career

anchor reflects the direction in which a worker wants to go and important work within a career[15]. Reflection on career anchors and career development management is essential to researching OHNs[11]. Furthermore, in order to develop careers of health care workers, career anchors are the foundation, leading to the acquisition of competency, knowledge, and improvement of one's technique[16].

Therefore, this study was focused on career anchors as an important factor in career development. Although some previous studies have developed effective scales, career anchor characteristics among OHNs were not considered. Consequently, in order to promote career development among OHNs, an evaluation scale for career anchor characteristics among OHNs is needed. This study primarily developed and validated a career anchor scale for consideration of career anchor characteristics among OHNs, to promote career development and career crisis prevention.

In addition, previous studies about nursing have shown career anchors to be associated with career length, position, and marital status[9-11,14]. Therefore, various factors (e.g., education level, qualifications, type of employment, supervisor, career length, position, and marital status) are associated with career anchors among OHNs. Consequently, career anchors were examined in light of personal characteristics and work environment in this study.

In this paper, careers were considered to relate to attitudes and actions developed through objective aspects such as job title, status, and employment history, as well as

through the processes of employment-related experience and activities. Thus, careers were defined as life-long self-realization, while career anchoring was defined based on Schein's conceptualization as incorporating individual lifestyles, and referring to an OHN's self-concept consisting of self-perceived talents, values, and an evolved sense of motives pertaining to one's career. Finally, occupational health nursing was defined as nursing jobs affiliated with companies, health insurance associations, and occupational health agencies, which provide health support to workers.

Materials and Methods

Design

This study employed three phases: 1) content development through qualitative interviews, 2) determination of content validity, and 3) psychometric testing of items using factor analysis and criterion validity[17].

Development of scale items[18]

First, qualitative semi-structured interviews were conducted individually with 16 OHNs to identify items for the new instrument. The inclusion criteria for OHNs were as follows: (1) having worked as an OHN for over ten years; (2) recommended by six councilors affiliated with the Japan Society for Occupational Health, the Japan Association of Public Health Nurses for Occupational Health, and the Japan Academy of Occupational Health Nursing, three well-respected organizations for occupational

health in Japan; (3) having understood the aims of the study and providing consent to participate; and (4) data saturation had not yet been reached. We asked participants: (1) their reason for selecting occupational health nursing as a career; (2) whether the content of their work felt rewarding and satisfying, and their reasons for this; (3) whether the content of their work felt distressing and/or unpleasant, and their reasons; and (4) whether they regarded the content of their work as an OHN as important in their life at the present time and in the future. Interviews were digitally audio-recorded and transcribed verbatim. Transcripts were then checked by the investigator for accuracy.

Data analysis was conducted using descriptive qualitative methods[19]. After carefully reading the transcripts of the digitally recorded interviews, qualitative coding was used to identify specific important practices, philosophies, values, and career anchors among the OHNs. All of the extracted data and codes were compared to identify similar content areas. Final codes with similar content were grouped together as sub-categories. Sub-categories with similar content were grouped into categories, which were consequently grouped as main categories. Each category was named using a content-characteristic word. Research members carefully discussed whether the names accurately reflected the career anchors observed in the data. Data processing involved creating potential codes, wording and clarifying the codes, and subsequently generating categories and constructive analysis[20]. Further processes to refine the categories included comparing codes that were applicable to each category, integrating categories

and their properties, and performing a thorough literature review. To verify confirmability, two experts in qualitative research were consulted about the data's accuracy, relevance, and meaning. Moreover, they confirmed that the findings reflected participants' voices and the condition of inquiry, rather than the researchers' biases. To ensure credibility, all participants were asked to review and comment on the study findings (main categories, sub-categories, and final codes). Finally, research members discussed and chose categories and codes that took into account the results of peer debriefing conducted by two experts in qualitative research with all participants. While conducting this study, 41 final codes were generated to describe career anchors among OHNs. Thus, based on the literature review and expert consultation, 41 items formed the first draft of the Career Anchors Scale among Occupational Health Nurses (CASOHN).

Content validity of scale items

Next, these 41 items were evaluated for content validity by a panel of experts. Fifteen reviewers with occupational health expertise participated in this part of the study: 10 occupational health activists and five occupational health researchers.

A content validity index test was used to compute and analyze content validity at the item level (I-CVI) and scale level (S-CVI)/average (Ave)[21]. The experts were asked to score each of the 41 items on a 4-point scale (1 = unimportant, 2 = neither unimportant nor important, 3 = important, 4 = highly important) and to provide

comments or suggestions to improve clarity. An I-CVI of less than 0.8 was the exclusion criterion. An S-CVI/Ave of more than 0.9 was the standard for establishing excellent content validity[21]. I-CVIs ranged between 0.83 and 1.0. None of the 41 items was deleted based on the exclusion criterion. The S-CVI/Ave was 0.94. Thus, the 41-item CASOHN achieved the standard for establishing excellent content validity.

Pilot test

Participants

This study was performed with OHNs affiliated with the Japan Society for Occupational Health. First, OHNs were selected a half number through random sampling by the secretariat of the Japan Society for Occupational Health. Next, those not currently working as OHNs were excluded. Finally, 745 anonymous questionnaires were distributed by mail in May 2015 with a letter describing the aims and procedure of the study, and assuring participants that no individual would be identified during the analysis and reporting of data. A total of 337 questionnaires were returned in sealed envelopes (response rate = 45.2%). After excluding OHNs with at least one missing data point on the study measures (CASOHN or Career Anchors: Self-Assessment Scale [CASAS]), 325 questionnaires were included in the analysis.

Measurement

The measures used in this study were the (1) Career Anchors Scale among Occupational Health Nurses (CASOHN) and (2) Career Anchors: Self-Assessment Scale (CASAS)[22].

CASOHN

The CASOHN includes 41 items and was developed using descriptive qualitative methods. The CASOHN includes the following instruction: "Please select the response option that fits you regarding each career anchor item. Response categories are 1 ("never true"), 2 ("rarely true"), 3 ("sometimes true"), 4 ("mostly true"), and 5 ("always true") (range, 1–5).

CASAS

The CASAS is a 40-item measure for general male workers developed by Schein [8]; the Japanese version of the CASAS was translated by Kanai. The CASAS includes eight subscales: Technical/functional Competence (TF), General Managerial Competence (GM), Autonomy/independence (AU), Security/stability (SE), Entrepreneurial/creativity (EC), Service/dedication to a Cause (SV), Pure Challenge (CH), and Lifestyle (LS). Response options are 1 ("never true"), 2 ("sometimes true"), 3 ("mostly true"), and 4 ("always true") (range, 1–4).

Demographic variables such as gender, age, length of career as an OHN, educational level, qualification, position, affiliation, employment, and marital status were included as possible confounders in the analyses.

Statistical analysis

The ratio, distribution of responses, and overall scores were calculated. The overall score was analyzed with the Shapiro–Wilk test to confirm the normality of the distribution; all analyses used nonparametric tests because normality was not confirmed. Item analysis included analysis of ceiling and floor effects using the standard deviation and mean value, analysis of the item-total correlation and correlations between each item, and a good–poor analysis to examine the results of the multiple-choice questions. Items with a Pearson's correlation of 0.7 or higher were reviewed to exclude duplicated content. Through good–poor analysis, items were grouped into either a lower score group or higher score group according to participants' median score.

Construct validity was tested using factor analysis, and the analysis of criterion validity was done by calculating the correlation coefficients between the tool and each external variable. The exploratory factor analysis employed the main factor (or common) method. Items and factors with Eigenvalues over 1 were extracted. Items with factor loadings of more than 0.4 on only one factor were extracted. Factors were identified and named according to the items grouped within them. Reliability was tested using the split-half method, confidence coefficients, and Cronbach's alpha coefficients for each factor. SPSS Statistics Version 23.0 for Windows was used to perform all statistical analyses.

Ethical considerations

This study was approved by the ethical review board at the author's institution (ID number 7823). In addition, this study was approved by the Japan Society for Occupational Health. Participants were informed of the purpose, procedures, and potential publication of this study, as well as their rights of refusal and confidentiality. Written informed consent was obtained from participants.

Results

Characteristics of respondents

Table 1 shows the characteristics of respondents. The mean age of participants was 45.3 years (SD = 9.3). The mean length of career as an OHN was 15.3 years (SD = 9.1) and the median was 14 years (IQR = 15). Overall, 241 participants (74.2%) had PHN qualifications and 84 participants (25.9%) had only RN qualifications.

Insert Table 1 here

Item analysis of the CASOHN

Table 2 shows the results of the item analysis of the 41 items. Mean values ranged between 3.16 and 3.84, with standard deviations between 0.66 and 1.41. Neither a ceiling nor floor effect was shown for any item. The 41 items were examined using inter-item correlation analysis, item-total correlations, and good–poor analysis.

Each inter-item correlation coefficient was between -0.13 and 0.83. Eight item correlations had coefficients greater than 0.7: Items 7 and 8, 14 and 17, 15 and 16, 18

and 19, 24 and 25, 32 and 33, 33 and 34, and 36 and 37. The content of these highly correlated items were reviewed, and 8 items were retained because they had different meanings. Each item-total correlation coefficient was between 0.19 and 0.74. Item 40 (Working as an economic means to support one's own life) was deleted because the correlation coefficient was less than 0.2.

Next, a good–poor analysis and Mann–Whitney U test were performed to further confirm the appropriateness of the items. Among the 325 participants surveyed, the median score was 158 for the 41 items. Thus, we divided participants into subgroups of those with high scores (N = 169, scores of 158 and over) and those with low scores (N = 156, scores less than 158). There was a significant difference between the two groups for every item ($p < 0.01$).

Factor analysis was then conducted on the 40 remaining items to examine construct validity with a main factor method and promax rotation. Item 41 (Reduction of anxiety and uncertainty about the future provided by economic security) was deleted because the factor loading was less than 0.4.

Insert Table 2 here

Factor analysis of the CASOHN

Factor analysis was then conducted on the 39 remaining items to examine construct validity. An exploratory factor analysis with a main factor method and promax rotation resulted in the extraction of six factors. Table 3 shows the results of the factor analysis. The variance contribution ratios of the six factors were 37.45, 7.01, 5.86, 4.95, 4.16, and

3.19%, respectively. The cumulative contribution ratio was 62.62%.

Each factor was summarized and named according to the contents of its items: Demonstrating expertise and considering position in work (Factor 1); Management skills for effective work (Factor 2); Supporting health improvement in groups and organizations (Factor 3); Providing employee-focused support (Factor 4); Collaborating with occupational health team members and personnel (Factor 5); and Compatibility of work and private life (Factor 6).

Insert Table 3 here

Reliability of the CASOHN

We then conducted reliability testing on the 6 factors and 39 items. The confidence coefficient, as determined by the split-half method, was 0.85 (Spearman Brown formula). Cronbach's alpha coefficient for the overall scale was 0.95, while Cronbach's alpha coefficients for the subscales were 0.88, 0.90, 0.91, 0.80, 0.85, and 0.79.

Concurrent validity of the CASOHN

Table 4 shows the results of the correlation analysis of the CASOHN with the external variable (the CASAS). There were weak correlations between Factor 1 and TF, Factor 2 and GM, Factor 3 and TF, Factor 4 and TF, Factor 5 and TF, and Factor 6 and LS.

Insert Table 4 here

Known-groups validity of the CASOHN and comparisons based on characteristics

Table 5 shows the results of a comparison of demographic variables regarding the CASOHN. There were significant differences on Factor 1 for nurse manager, education level (nursing junior college), and length of career as an OHN (15 years and over); on

Insert Table 5 here

Factor 2 for nurse manager, being licensed as a PHN, being a registered OHN of the society, full-time worker, and being married; on Factor 3 for nurse manager and being married; on Factor 4 for only being licensed as an RN; and on Factor 6 for being licensed as a PHN.

Discussion

Reliability and validity of the CASOHN

Internal consistency reliability of the scale was confirmed using the split-half method and Cronbach's α coefficient: the reliability coefficient was 0.79 or higher.

Validity was ensured through repeated examinations at the time of item selection. Content validity was additionally examined during scale development. Evaluations completed by 15 occupational health practitioners and researchers ensured objectivity in assessments of the appropriateness of each item.

Factor analysis was performed to examine factorial validity, and the factor structure was found to be similar to the initially planned phase structure[18]. With regard to the first factor, "Demonstrating expertise and considering position in work," Kono stated that balancing being both an expert and member of a company is important in the role of OHNs[23]. In addition, Igarashi stated that OHNs need to remember to be "good company people," as the foundation of being an expert in occupational health is within a company[24]. These factors are thought to represent this content.

The second factor, “Management skills for effective work” refers to managing organizations and systems so that one can act effectively, having taken into consideration the productivity of a company, from the perspective of occupational health. Using the known-groups method, data for management jobs and general staff were compared. The results showed that median values were higher for management compared to general staff for all items. Specifically, there was a six-point difference in the second factor; thus, it is considered to be a construct specifically valued by management.

The third factor, “Supporting health improvement in groups and organizations,” is defined by the Japan Society for Occupational Health Occupational Health Committee as follows: “occupational health is systematic health support activity for individuals, groups, and organizations based on nursing concepts, which is intended for both businesses and workers, in order to independently achieve the goals of occupational health by cooperating with business and workers[25].” Therefore, this is a career anchor factor not only for individuals, but also for groups and organizations.

As for the fourth factor, “Providing employee-focused support,” according to a previous study [2], 80% of the main duties of OHNs include “health consultation and guidance.” In addition, according to the Industrial Safety and Health Act, health guidance after a physical examination is clearly required; therefore, providing suitable support through health consultations and guidance is reflected in this factor.

The fifth factor, “Collaborating with occupational health team members and personnel,” is not limited to OHNs, and the foundation of nursing activity is a trust relationship with the subjects[26]. It is essential, therefore, to work as a team[27]. Unlike in the clinical medical environment, although individuals in the field of occupational health differ, relationships with workers, the occupational health team, and interested parties are important.

The sixth factor, “Compatibility of work and private life,” is not limited to OHNs; it also applies to the previous study of APHNs, in that finding a balance between working and private life is important[10].

Furthermore, in examining standard-related validity, correlations between Factors 1, 3, 4, and 5 and TF, between Factor 2 and GM, and between Factor 6 and Lifestyle were seen. Correlations with the existing career anchor scale (that targets general workers) were low. This is likely because career anchoring among OHNs involves occupation-specific characteristics.

With respect to existing groups’ validity, Factors 1–3 showed higher values among managers whose abilities were acknowledged by the affiliated institution, than among staff nurses. With regard to Factor 4, OHNs with only an RN qualification valued career anchors more than OHNs with a PHN qualification. The nursing educational curriculums were indicated by a law for training schools for public health nurses, midwives, and nurses indicated by the Ministry of Education, Culture, Sports,

Science, and Technology[28]. The law recommended that RN curriculum should be engaged in personal support. Therefore, OHNs with only an RN qualification valued the care of individuals at a higher level. Factor 5 did not show any significant differences; however, significant trends were observed in those with many years of experience as an OHN. As the years of experience increase, roles as a coordinator within the occupational health team and interested parties become more important; these nurses value career anchors more than do those with less experience. With respect to Factor 6, those with PHN qualifications had a tendency to value the balance between work and private life. In previous studies of APHNs[10], results were similar; therefore, when obtaining qualifications, they likely chose a career that offered a balance between work and private life. Though we hypothesized that marital status would be related to differences in scores on Factor 6, significant differences were not observed in this study.

Comparisons based on personal characteristics and work environment

With respect to education level, Factor 1 showed higher values among those with nursing junior college compared to university-level education. The nursing educational curriculum was revised in 2009[28]; however, it was possible to obtain both PHN and RN qualifications at many universities until that time. Moreover, PHN units were replaceable RN unites. Therefore, many universities increased the number of units for RN programs, while decreasing the number of units for PHN programs. As a result, less units were found to get PHN qualification in university than in junior college

according previous research[29]. Due to the rapid increase in the number of universities in recent years, a decline in the quality of education has been an important issue because of a lack of training facilities and teachers[30]. In addition, as mentioned previously, the undergraduate education of OHNs in Japan differs significantly across universities. Consequently, it is necessary to promote the improvement of occupational health nursing in undergraduate education.

With respect to qualifications, Factor 2 showed higher values for OHNs with a PHN qualification than OHNs with only an RN qualification. This can be explained based on the fact that those with a PHN qualification must study public health management theory in the nursing educational curriculum[28]. Moreover, Factors 2 and 3 showed higher values for OHNs registered with Japan society for Occupational Health compared to those not registered, reflecting higher values for those with a systematic education compared to those without one. Since receiving systematic education was associated with scores of career anchors among OHNs, we recommend that OHNs will actively learn to use the education system by Japan society for Occupational Health.

Our hypothesis that nurses' supervisors would affect career anchors among OHNs was not supported. In addition, with respect to employment, we hypothesized that employment of OHNs would also affect their career anchors; however, there was only one significant difference (for Factor 2).

Consequently, undergraduate education should be enhanced and the new

education system should be applied aggressively to improve career anchors among OHNs and ensure the quality of OHNs' activities.

Method of using the CASOHN

There are two ways of using the CASAS. In the first, OHNs employ it as a self-analysis tool to identify important components of occupational health nursing. In considering long-term career objectives, it is important that OHNs consider the question "How do I want to work?" rather than "What work do I want to do?" Therefore, the CASOHN can be used as a tool to reflect upon the question "How do I want to work as an OHN" to aid career design. With respect to the second use, the CASOHN is not only a self-analysis tool for career design of the individual, but can also be used with respect to staffing and effective training systems within an organization.

Limitations of the study and future issues

This study targeted OHNs who were members of the Japan Society for Occupational Health. Admittedly, we did study those with high levels of professional awareness. According to a survey by the Japanese Nursing Association, there are 12,300 nurses working in business offices, and thus, our study only covered a small fraction. Previous studies have targeted OHNs at companies listed on the Tokyo Stock Exchange and in the Teikoku Databank. All of these studies have had response rates of about 15%, with total numbers of participants around 400. When planning surveys of OHNs, it can be difficult to determine where they work; thus, surveys are often conducted among those

who are members of the Japan Society for Occupational Health. However, in this survey, the response rate was below 60%; therefore, subject-related bias is one potential limitation of the study.

In addition, with respect to standard-related validity, this study employed the CASAS with general male workers as developed by Schein, because no appropriate external standard from previous studies existed. Consequently, the correlation between the scale and external standard scores remained low. Furthermore, using the known-group methods, there was no significant difference among items.

In the future, we hope to examine the effects of the CASOHN on the formation of career anchors among OHNs and contribute to their career development.

Conclusion

In this study, we developed a 39-item six-factor career anchor scale among OHN. Although this scale requires further study regarding concurrent validity and known-groups validity, this study showed acceptable levels of reliability and validity of the CASOHN.

ACKNOWLEDGMENT

We gratefully acknowledge the very helpful participation of the OHNs. This work was supported by a Grant-Aid from The Jikei University and Japan Society of Private College and Universities of Nursing.

CONFLICT OF INTEREST

The authors declare that there is no financial support or relationships that may pose a conflict of interest.

AUTHOR CONTRIBUTION

YK, YH, TK, SS, JN, & BJB contributed to the conception and design of the study, as well as the statistical analysis and drafting of the manuscript. All authors read and approved of the final manuscript.

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Table 1. Demographic characteristics and work environment (N=325)

		N	(%)
Gender			
	Female	322	(99.1)
	Male	3	(0.9)
Age (yr)			
	≤29	14	(4.3)
	30–39	84	(25.8)
	40–49	107	(32.9)
	50–59	104	(32.0)
	≥60	15	(4.6)
	No response	1	(0.3)
Career as an occupational health nurse (yr)			
	≤5	44	(13.5)
	6–10	92	(28.3)
	11–20	99	(30.5)
	21–30	70	(21.5)
	≥31	20	(6.2)
Educational level			
	Technical school	134	(41.2)
	Nursing junior college	58	(17.8)
	University	100	(30.8)
	Graduate school	29	(8.9)
	Other	4	(1.2)
Qualification			
	Public health nurse	241	(74.2)
	Midwife	7	(2.2)
	Registered nurse	304	(93.5)
	Registered occupational health nurse of the society[1)]	196	(60.3)
	Occupational health consultant	7	(2.2)
Position			
	Nurse manager	38	(11.7)
	Staff nurse	257	(79.1)
	Other	24	(7.4)
	No response	6	(1.8)
Affiliation			
	Corporation	238	(73.2)
	Health insurance association	35	(10.8)
	Public office	5	(1.5)
	Industrial health organization	9	(2.8)
	Health check organization	7	(2.2)
	Hospital	13	(4.0)
	Educational organization	9	(2.8)
	Other	4	(1.2)
	No response	5	(1.5)
Employment			
	Full-time worker	253	(77.8)
	Contract worker	43	(13.2)
	Part-time worker	10	(2.5)
	Other	19	(5.8)
Supervisor			
	Occupational health nurse	56	(17.2)
	Occupational health physician	53	(16.3)
	Others	210	(64.6)
	No response	6	(1.8)
Marriage			
	Yes	234	(72.0)
	No	81	(24.9)
	Other	10	(3.1)

[1)]Previous education system

Table 2. Item analysis of the career anchors acale among occupational health nurses (41 items, N=325)

No.	Items	1	2	3	4	5	Mean	Standard deviation (SD)	Inter-item correlation	I-T correlation analysis	Good-poor analysis
		N (%)	N (%)	N (%)	N (%)	N (%)					
1	Acting as a familiar, informal adviser to employees	8 (3.2)	11 (4.4)	48 (19.1)	100 (39.8)	84 (33.5)	4.07	0.93	0.07–0.63	0.53	0.81
2	Knowing each employee personally	37 (13.5)	29 (10.6)	89 (32.5)	90 (32.8)	29 (10.6)	3.33	1.15	0.00–0.57	0.42	0.79
3	Being depended on by workers	8 (3.1)	14 (5.4)	85 (32.8)	117 (45.2)	35 (13.5)	3.73	0.85	0.05–0.63	0.53	0.73
4	Working with employees to consider their health and lifestyle	4 (1.7)	14 (5.8)	29 (12.0)	100 (41.5)	94 (39.0)	4.18	0.86	0.04–0.51	0.59	0.73
5	Practicing good teamwork	13 (5.0)	26 (10.0)	77 (29.5)	90 (34.5)	55 (21.1)	3.71	1.03	0.03–0.63	0.50	0.70
6	Speaking freely with one's boss and occupational physician	14 (5.7)	16 (6.5)	32 (13.1)	96 (39.2)	87 (35.5)	4.05	1.03	0.04–0.63	0.58	0.77
7	Support for employees in cooperation with managers and supervisors	11 (4.3)	27 (10.7)	55 (21.7)	95 (37.5)	65 (25.7)	3.86	1.04	0.07–0.73	0.74	1.20
8	Support for employees in cooperation with other departmental personnel within the organization	12 (4.7)	25 (9.8)	41 (16.1)	107 (42.1)	69 (27.2)	3.91	1.03	0.02–0.73	0.70	1.14
9	Support for employees in cooperation with personnel outside the organization	26 (9.7)	36 (13.4)	73 (27.1)	80 (29.7)	54 (20.1)	3.56	1.20	-0.03–0.62	0.54	0.46
10	Observing the rules as a member of an organization	1 (0.4)	4 (1.7)	17 (7.4)	58 (25.2)	150 (65.2)	4.57	0.68	0.00–0.63	0.40	0.68
11	Compatibility of professional and business-related responsibilities	2 (0.9)	5 (2.1)	24 (10.2)	87 (37.0)	117 (49.8)	4.41	0.75	0.11–0.63	0.58	0.46
12	Demonstrating expertise in work	1 (0.4)	4 (1.7)	32 (13.4)	88 (37.0)	113 (47.5)	4.37	0.74	0.15–0.62	0.63	0.68
13	Acting as an advocate for employees	12 (4.4)	29 (10.7)	113 (41.7)	89 (32.8)	28 (10.3)	3.49	0.95	0.08–0.51	0.54	0.72
14	Empowering employees	13 (4.9)	26 (9.8)	89 (33.7)	103 (39.0)	33 (12.5)	3.60	0.97	0.01–0.70	0.66	0.71
15	Providing support for preventative health	3 (1.3)	8 (3.4)	16 (6.8)	112 (47.9)	95 (40.6)	4.30	0.75	0.07–0.83	0.63	0.99
16	Providing support for long-term health	3 (1.2)	8 (3.3)	33 (13.7)	95 (39.4)	102 (42.3)	4.26	0.81	0.08–0.83	0.64	0.77
17	Supporting groups and organizations	8 (3.2)	13 (5.2)	57 (22.9)	94 (37.8)	77 (30.9)	4.01	0.95	0.04–0.70	0.72	1.12
18	Discovering and solving workplace health problems	11 (4.2)	20 (7.7)	78 (30.0)	97 (37.3)	54 (20.8)	3.78	1.00	0.04–0.75	0.74	1.21
19	Empowering groups and organizations	15 (5.5)	29 (10.7)	116 (42.6)	84 (30.9)	28 (10.3)	3.46	0.98	0.01–0.75	0.74	1.17
20	Preventing loss in human resources	15 (5.7)	33 (12.5)	85 (32.1)	97 (36.6)	35 (13.2)	3.56	1.03	0.05–0.63	0.65	1.11
21	Involvement in activities to enhance employee job satisfaction	14 (5.1)	33 (12.1)	107 (39.2)	95 (34.8)	24 (8.8)	3.44	0.95	0.04–0.67	0.73	0.96
22	Conducting activities in accordance with the management philosophy and policy	7 (2.8)	12 (4.8)	88 (34.9)	100 (39.7)	45 (17.9)	3.81	0.89	-0.13–0.51	0.55	0.65
23	Working with executives to draw up employee health and safety policies	15 (5.5)	19 (7.0)	119 (43.9)	88 (32.5)	30 (11.1)	3.51	0.96	-0.02–0.49	0.51	0.77
24	Supporting organizational health and safety practices	2 (0.8)	15 (6.1)	38 (15.5)	124 (50.6)	66 (26.9)	4.07	0.81	0.14–0.73	0.69	0.82
25	Working with risk management	4 (1.7)	13 (5.4)	37 (15.4)	121 (50.2)	66 (27.4)	4.06	0.82	0.08–0.73	0.67	0.77
26	Establishing the occupational health team	9 (3.5)	38 (14.8)	60 (23.3)	96 (37.4)	54 (21.0)	3.75	1.04	0.07–0.66	0.66	1.08
27	Coordinating jobs based on staff ability	21 (7.8)	44 (16.3)	97 (35.9)	74 (27.4)	34 (12.6)	3.41	1.12	0.11–0.67	0.63	0.94
28	Participating in training of occupational health staff	54 (19.4)	52 (18.7)	68 (24.5)	63 (22.7)	41 (14.7)	3.16	1.35	-0.06–0.63	0.54	1.07
29	Coordinating work to ensure satisfaction of the occupational health staff and personnel	15 (5.8)	27 (10.5)	73 (28.3)	105 (40.7)	38 (14.7)	3.64	1.01	0.07–0.67	0.60	0.83
30	Working to be evaluated for worker and organization	8 (3.1)	21 (8.3)	78 (30.7)	106 (41.7)	41 (16.1)	3.75	0.93	0.19–0.55	0.70	1.02
31	Developing the role of occupational health nurses in the workplace	4 (1.6)	11 (4.5)	67 (27.1)	108 (43.7)	57 (23.1)	3.96	0.85	0.14–0.63	0.66	0.83
32	Explaining the components and effects of occupational health nursing practices, both inside and outside the organization	13 (5.0)	24 (9.2)	85 (32.4)	100 (38.2)	40 (15.3)	3.66	0.99	0.06–0.76	0.70	1.04
33	Contributing to quality improvement of occupational health and nursing practices	7 (2.7)	23 (9.0)	73 (28.5)	108 (42.2)	45 (17.6)	3.77	0.92	0.10–0.76	0.71	0.98
34	Contributing to the improvement of social status for occupational health nurses	15 (5.4)	40 (14.3)	110 (39.4)	90 (32.3)	24 (8.6)	3.39	1.00	0.06–0.72	0.58	0.52
35	Gaining life experience through work	3 (1.3)	6 (2.5)	34 (14.2)	105 (43.8)	92 (38.3)	4.26	0.79	0.14–0.56	0.53	0.59
36	Striving for personal improvement	0 (0.0)	6 (2.6)	20 (8.6)	120 (51.5)	87 (37.3)	4.28	0.66	0.11–0.74	0.54	0.45
37	Taking advantage of personal strengths (e.g., qualifications, abilities, etc.)	0 (0.0)	6 (2.5)	29 (12.2)	117 (49.2)	86 (36.1)	4.27	0.70	0.14–0.74	0.61	0.63
38	Balancing work and private life	6 (2.5)	11 (4.5)	44 (18.0)	102 (41.8)	81 (33.2)	4.11	0.89	0.12–0.49	0.45	0.63
39	Working freely at one's own pace	6 (2.3)	23 (8.8)	76 (29.2)	100 (38.5)	55 (21.2)	3.79	0.93	-0.13–0.49	0.30	0.47
40	Working as an economic means to support one's own life	9 (3.5)	26 (10.1)	66 (25.7)	101 (39.3)	55 (21.4)	3.79	0.98	-0.06–0.32	0.19	0.19
41	Reduction of anxiety and uncertainty about the future provided by economic security	17 (6.3)	34 (12.5)	112 (41.3)	63 (23.2)	45 (16.6)	3.49	1.09	0.06–0.30	0.37	0.61

Table 3. Factor analysis of the Career Anchors Scale among Occupational Health Nurses (6 factors, 39 items, total overall alpha index=0.95, N=325)

		Factor loadings					
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1. Demonstrating expertise and considering position in work (α=0.88)							
	10 Observing the rules as a member of an organization	0.840	-0.145	-0.097	-0.133	0.101	-0.188
	36 Striving for personal improvement	0.800	0.165	-0.149	0.031	-0.137	0.053
	37 Taking advantage of personal strengths (e.g., qualifications, abilities, etc.)	0.723	0.158	-0.033	0.006	-0.088	0.189
	35 Gaining life experience through work	0.691	0.076	-0.125	0.084	-0.055	0.221
	11 Compatibility of professional and business-related responsibilities	0.673	-0.084	0.090	-0.022	0.155	-0.182
	12 Demonstrating expertise in work	0.659	-0.077	0.173	0.051	0.007	0.136
	24 Supporting organizational health and safety practices	0.457	0.094	0.179	-0.062	0.255	-0.036
	25 Working with risk management	0.450	0.199	0.160	-0.102	0.183	-0.032
Factor 2. Management skills for effective work (α=0.90)							
	28 Participating in training of occupational health staff	-0.240	0.848	0.093	-0.128	0.027	0.089
	29 Coordinating work to ensure satisfaction of the occupational health staff and personnel	-0.005	0.780	-0.062	-0.168	0.199	-0.044
	27 Coordinating jobs based on staff ability	-0.107	0.753	0.207	-0.265	0.100	0.151
	34 Contributing to the improvement of social status for occupational health nurses	0.067	0.669	-0.012	0.314	-0.277	0.008
	31 Developing the role of occupational health nurses in the workplace	0.371	0.644	-0.214	0.037	0.056	-0.118
	33 Contributing to quality improvement of occupational health and nursing practices	0.181	0.617	0.000	0.350	-0.209	0.046
	32 Explaining the components and effects of occupational health nursing practices, both inside and outside the organization	0.077	0.578	0.075	0.284	-0.083	0.005
	22 Conducting activities in accordance with the management philosophy and policy	0.253	0.496	0.107	-0.119	0.013	-0.442
	26 Establishing the occupational health team	0.056	0.479	0.138	-0.241	0.333	0.246
	30 Working to be evaluated for worker and organization	0.127	0.443	0.120	0.026	0.176	0.050
Factor 3. Supporting health improvement in groups and organizations (α=0.91)							
	19 Empowering groups and organizations	-0.068	0.105	0.835	0.080	-0.023	-0.092
	17 Supporting groups and organizations	0.272	-0.004	0.742	-0.024	-0.094	-0.014
	14 Empowering employees	-0.153	0.014	0.701	0.349	-0.043	-0.080
	18 Discovering and solving workplace health problems	0.125	-0.019	0.674	0.044	0.109	0.093
	16 Providing support for long-term health	0.527	-0.236	0.652	-0.083	-0.078	0.089
	20 Preventing loss in human resources	-0.240	0.225	0.636	0.175	0.043	-0.054
	15 Providing support for preventative health	0.599	-0.215	0.604	-0.093	-0.118	0.033
	21 Involvement in activities to enhance employee job satisfaction	-0.134	0.358	0.595	0.201	-0.092	-0.082
	23 Working with executives to draw up employee health and safety policies	-0.112	0.295	0.449	-0.154	0.129	-0.042
Factor 4. Providing employee-focused support (α=0.80)							
	2 Knowing each employee personally	-0.093	-0.053	-0.063	0.825	0.049	0.099
	1 Acting as a familiar, informal adviser to employees	-0.047	-0.166	0.125	0.780	0.126	0.067
	3 Being depended on by workers	0.002	-0.113	0.093	0.766	0.071	0.031
	4 Working with employees to consider their health and lifestyle	0.114	-0.027	0.131	0.492	0.175	-0.008
	13 Acting as an advocate for employees	-0.02	0.068	0.215	0.411	0.097	-0.039
Factor 5. Collaborating with occupational health team members and personnel (α=0.85)							
	6 Speaking freely with one's boss and occupational physician	0.044	0.052	-0.095	0.041	0.795	0.039
	5 Practicing good teamwork	-0.209	0.069	0.037	-0.009	0.773	0.240
	8 Support for employees in cooperation with other departmental personnel within the organization	0.166	-0.001	-0.059	0.203	0.734	-0.062
	7 Support for employees in cooperation with managers and supervisors	0.090	-0.052	0.120	0.232	0.675	0.028
	9 Support for employees in cooperation with personnel outside the organization	-0.019	-0.001	-0.119	0.456	0.551	-0.115
Factor 6. Compatibility of work and private life (α=0.79)							
	39 Balancing work and private life	-0.018	0.085	-0.055	0.041	0.164	0.756
	38 Working freely at one's own pace	0.376	0.013	-0.083	0.166	0.013	0.691
Contribution ratio (%)		37.45	7.01	5.86	4.95	4.16	3.19
Cumulative contribution ratio (%)			44.46	50.32	55.27	59.43	62.62
Factor correlation	Factor 1	-	0.774**	0.843**	0.849**	0.697**	0.768**
	Factor 2		-	0.403**	0.306**	0.240**	0.300**
	Factor 3			-	0.546**	0.560**	0.595**
	Factor 4				-	0.465**	0.457**
	Factor 5					-	0.625**
	Factor 6						-

**P<0.01 (two-tailed).

Factor extraction method: Main factor method, Rotation method: Promax method with Kaiser normalization.

Bold figures: Factor loadings above 0.4.

39 items from 41 initial items.

Table 4. Analysis of correlations with career anchors: the Self-Assessment Scale (CASAS) and the Career Anchors scale among Occupational Health Nurses (N=325)

	Spearman's correlation coefficient						
External variables	Overall	Factor 1 Demonstrating expertise and considering position in work	Factor 2 Management skills for effective work	Factor 3 Supporting health improvement in groups and organizations	Factor 4 Providing employee-focused support	Factor 5 Collaborating with occupational health team members and personnel	Factor 6 Compatibility of work and private life
Overall	0.824**	0.673**	0.725**	0.739**	0.531**	0.620**	0.373**
Technical/functional Competence (TF)	0.202**	0.324**	0.167**	0.256**	0.243**	0.203*	0.035
General Managerial Competence (GM)	0.172**	0.074	0.302**	0.152**	0.063	0.145**	-0.026
Autonomy/independence (AU)	0.068	0.059	0.086	0.016	0.051	0.069	0.203**
Security/stability (SE)	-0.091	-0.001	-0.034	-0.092	-0.103	-0.029	0.043
Entrepreneurial/creativity (EC)	0.159**	0.096	0.156**	0.225**	0.082	0.070	-0.02
Service/dedication to a Cause (SV)	0.166**	0.164**	0.133*	0.162**	0.231**	0.201**	0.045
Pure Challenge (CH)	0.172**	0.139*	0.142*	0.173**	0.081	0.144**	-0.028
Lifestyle (LS)	0.033	0.077	0.055	0.110*	-0.103	-0.024	0.206*

** $P<0.01$, * $P<0.05$ (two-tailed).

Table 5. Comparisons based on characteristics and work environment (N=325)

External Variables	Overall				Factor 1 Demonstrating expertise and considering position in work			Factor 2 Management skills for effective work			Factor 3 Supporting health improvement in groups and organizations			Factor 4 Providing employee-focused support			Factor 5 Collaborating with occupational health team members and personnel			Factor 6 Compatibility of work and private life		
	N	Median	IQR	*P*	Median	IQR	*P*	Median	IQR	*P*	Median	IQR	*P*	Median	IQR	*P*	Median	IQR	*P*	Median	IQR	*P*
Position [A]																						
Nurse manager	38	166	28	0.001**	36	5	0.019*	42	8	0.000***	37	6	0.006**	20	5	0.466	20	4	0.125	8	2	0.235
Staff nurse	257	157	25		35	5		36	8		34	8		19	4		19	5		8	2	
Educational level [B]																						
Technical school	134	156	26	0.154	34	6	0.020*	36	8	0.073	34	7	0.167	20	3	0.104	20	5	0.939	8	2	0.434
Nursing junior college	58	163	27		37	4		37	10		37	8		20	6		19	6		9	2	
University	100	158	24		35	6		37	6		35	9		18	3		19	6		8	3	
Graduate school	29	162	13		35	6		37	8		35	4		20	3		19	3		8	2	
National qualification [A]																						
Public health nurse	241	161	24	0.188	35	6	0.080	37	8	0.000***	36	8	0.932	19	4	0.013*	20	6	0.856	8	2	0.008**
Registered nurse	84	153	24		35	4		35	9		32	6		20	4		19	5		7	2	
Qualification [A]																						
Registered occupational health nurse of the society [1]																						
Yes	196	162	21	0.000***	35	5	0.224	38	7	0.000***	36	8	0.014*	20	4	0.080	20	5	0.211	8	2	0.874
No	129	153	29		34	7		34	10		33	8		19	4		19	4		8	2	
Length of career as an occupational health nurse (yr) [A]																						
≤14	185	158	23	0.198	35	6	0.027*	36	7	0.099	34	8	0.720	19	4	0.199	19	4	0.053	8	2	0.578
>15	140	161	26		35	6		37	9		35	7		20	5		20	6		8	2	
Employment [A]																						
Full-time worker	253	159	23	0.063	35	6	0.801	37	7	0.001**	35	8	0.169	19	4	0.647	19	5	0.282	8	2	0.108
Others	72	156	26		35	5		34	11		33	10		20	4		20	5		9	1	
Supervisor [B]																						
Occupational health nurse	56	158	29	0.420	35	5	0.763	37	7	0.126	35	10	0.906	35	10	0.073	19	5	0.330	8	2	0.904
Occupational health physician	53	161	26		35	6		38	6		36	7		36	7		20	6		8	2	
Others	210	158	24		35	6		36	8		34	9		34	9		19	4		8	2	
Marriage [A]																						
Yes	234	161	20	0.010*	35	6	0.057	37	7	0.030*	35	8	0.025*	20	4	0.007*	20	5	0.055	8	2	0.264
No	81	153	32		34	6		35	10		34	10		18	4		18	6		8	2	

IQR: Inter-quartile range

[1] Previous education system

[A] Mann-Whitney U test

[B] Kruskal-Wallis test, hypostasis test

***P<0.001, **P<0.01, *P<0.05