J Occup Health 2018; 60: 410-418

Journal of Occupational Health

Field Study

A health behavior screening tool for non-specific neck pain in office workers: a 1-year prospective cohort study

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Abstract: Objective: One effective strategy for management of musculoskeletal disorders is self-management based on the biopsychosocial model. Self-management requires patients to have adequate health literacy, defined as the individual's ability to seek, understand, and utilize health information. Recently, the neck pain-specific health behavior for office workers (NHBOW) questionnaire was developed based upon a conceptual framework of health literacy. The content in the NHBOW relates to the work and exercise behaviors of office workers. The primary aim of this study was to evaluate the predictive validity of the NHBOW. **Methods:** At baseline, 342 healthy participants filled out a series of questionnaires, including the NHBOW. The incidence of neck pain was prospectively recorded every month over a 12-month period. Sensitivity, specificity, positive predictive value, negative predictive value, and the area under the receiver operating characteristics curve (AUC) were calculated. **Results:** There were 103 (30.7%) incidents of non-specific neck pain among 335 office workers during the 12-month period, and seven participants were lost to follow-up. For the NHBOW, a cut-off score of less than or equal to 8 points (lower scores indicate poorer health behavior) had a sensitivity of 57.3% and a specificity of 96.6%. The positive and negative predictive values were 88.1% and 83.6%, respectively. The AUC was 0.769 (95% CI: 0.706 to 0.832). **Conclusion:** The NHBOW was an acceptable screening tool for predicting non-specific neck pain in office workers during the 1-year follow-up period, and can be used in occupational and primary care settings.

(J Occup Health 2018; 60: 410-418)
doi: 10.1539/joh.2018-0001-FS

Key words: Health literacy, Office worker, Predictive validity, Screening tool

Introduction

Neck pain is a common health problem among office workers[1)], with 42%-69% of office workers reporting neck pain in the preceding 12 months[2,3)]. The 1-year incident rates for neck pain in office workers range from 34%-49%[4,5)]. Chronic neck pain in the working population has also been found to be high, with 60%-80% of workers reporting neck pain one year later[6)]. Neck pain causes significant personal suffering due to pain, disability, and impaired quality of life and work, which can pose a great socio-economic burden for both patients and society[1,7)]. In the Netherlands, the total cost of neck pain was estimated at 686 million US dollars in 1996, and in 2004 32% of office workers with neck/shoulder symptoms reported productivity loss due to sickness absence[7,8)]. In Thailand, the cost of neck pain among office workers was approximately 500 million US dollars in 2006[9)].

One effective management strategy for musculoskeletal disorders (MSDs) is self-management based on the biopsychosocial model[10,11)]. The model is widely accepted for the treatment of chronic MSDs[12)]. Self-management requires patients to have adequate health literacy, which is the individual's ability to seek, understand, and utilize

Received January 11, 2018; Accepted March 22, 2018
Published online in J-STAGE May 9, 2018
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Supplementary materials (Appendices) are available in the online version of this article.

health information in order to make judgments and decisions regarding health care, disease prevention, and health promotion to maintain and improve quality of life[13,14]. Notably, a link has been established between limited self-management abilities, poorer knowledge and state of health, and sub-optimal health literacy in patients suffering from chronic conditions (including diabetes, asthma, and rheumatoid arthritis)[10,11,15]. Thus, health literacy carries substantial implications regarding health programs and health service delivery models, particularly within the management of chronic health conditions[10,11].

Recently, a study was conducted to identify the domains of health literacy that were able to differentiate office workers with non-specific neck pain from those without non-specific neck pain. The results were then used to develop a questionnaire, based upon a conceptual framework of health literacy, to differentiate between office workers with and without neck pain. The findings indicated that the ability to utilize health information was the single most important component of health literacy that differentiated between office workers with and without non-specific neck pain. The Neck pain-specific Health Behavior in Office Workers (NHBOW) questionnaire was then developed, which comprises six questions concerning the behaviors of office workers during work and neck-related exercises (see Appendix). A detailed description of the questionnaire development protocol is published elsewhere[31].

The NHBOW was primarily developed as a screening tool to assist health care providers in identifying office workers at risk of developing non-specific neck pain. Identifying at-risk individuals can enhance resource allocation by reaching those likely to gain the most benefit, rather than providing unnecessary interventions to a large number of individuals due to a lack of an appropriate screening tool[16,17]. Of further advantage is that instead of a full clinical examination, which is impractical in terms of personnel and time, a screening tool allows for the examination to take place in primary health care and workplace settings[18]. Previously, Paksaichol et al. (2014) developed a screening tool to identify office workers at risk for developing non-specific neck pain, called the Neck pain Risk score for Office Workers (NROW). The screening tool consisted of three items related to the risk factors for neck pain in office workers. The NROW had a sensitivity of 82% and specificity of 48% for detecting non-specific neck pain in office workers[19].

Therefore, the aim of this study was twofold: 1) to evaluate the predictive validity of the NHBOW on non-specific neck pain in office workers during a one-year follow-up period, and 2) to compare the predictive validity of the NHBOW to the predictive validity of the NROW, as well as a combination of the NHBOW and NROW.

Materials and Methods

Study population and procedures

A prospective cohort study with a one-year follow-up was conducted to evaluate the predictive validity of the NHBOW, the NROW, and a combination of the NHBOW and NROW questionnaires on non-specific neck pain in office workers. Healthy participants with no neck pain were evaluated at baseline and followed every month for a 12-month period.

A convenience sample was recruited from office workers in ten large-scale enterprises in Bangkok. The enterprises participating in this study were two banks, three public utility companies, and five ministry head offices. An office worker was defined as an individual working in an office environment with their main tasks involving use of a computer, participation in meetings, giving presentations, reading, and phoning[20]. Inclusion criteria were individuals aged between 18 and 55, working full-time, with at least five years of experience as an office worker. Exclusion criteria were individuals reporting neck pain in the previous six months with pain intensity greater than 30 mm on a 100-mm visual analog scale (VAS), reporting pregnancy or a plan to become pregnant in the next 12 months, or having a history of trauma, accidents, or surgery in the neck region. Those who had been diagnosed with congenital anomaly of the spine, ankylosing spondylitis, spondylosis, spondylolisthesis, rheumatoid arthritis, osteoporosis, infection of the spine and discs, tumor, or systemic lupus erythymatosus were also excluded from the study. A self-administered questionnaire was used to screen potential participants for the study.

Office workers who accepted the invitation to participate in this study were informed about the objectives and details of the study and asked to provide informed consent upon agreement to participate. At baseline, participants completed the self-administered questionnaire, the NROW, and the NHBOW. Participants recorded any incidence of neck pain or any disability arising from neck pain in a provided self-administered diary. Diary entries were collected every month over the 12-month period. The study was approved by the Chulalongkorn University Human Ethics Committee.

Questionnaires

The self-administered questionnaire comprised three parts addressing individual, work-related physical, and psychosocial factors. Individual factors covered age, gender, education level, marital status, smoking habits, and frequency of regular exercise or sport. Work-related physical factors addressed current job position, number of working hours, years of working experience, frequency of using a computer, performing various activities during work, and rest breaks. Additionally, respondents self-

rated the ergonomics of their workstations (desk, chair, and position of monitor) and work environment conditions (ambient temperature, noise level, light intensity, and air circulation). The final part, psychosocial factors, used the Job Content Questionnaire[21]. In total there were 54 items covering six areas in the questionnaire: psychological demands (12 items), decision latitude (11 items), social support (8 items), physical demands (6 items), job security (5 items), and hazards at work (12 items). Four-point Likert-type response options ranging from 1 - strongly disagree, to 4 - strongly agree were used in rating each item.

The NHBOW questionnaire comprises six items. Items 1-4 involve the behaviors of office workers during work, while Items 5-6 concern neck-related exercise. Each item was rated on a five-point Likert-type response scale ranging from 0 - never perform, to 4 - always perform, with the total possible NHBOW score ranging from 0 to 24. Higher scores indicate better health behavior.

The NROW comprised three items: history of neck pain (0 [no] or 1 [yes]), chair adjustability (0 [yes] or 1 [no]), and perceived muscular tension with a score on a scale of 0 (low), 1 (medium), and 2 (high). The total NROW score ranges from 0 to 4, with higher scores indicating higher risk of non-specific neck pain[19].

The NHBOW and NROW combined questionnaire comprised nine items. For this combination, the previously described NROW scoring was reversed. Thus, the total score of the combined questionnaire ranges from 0 to 28, with higher scores indicating a lower risk of developing non-specific neck pain.

Outcome measures

The incidence of neck pain was collected by using a diary. The area of the neck was defined according to the picture of the body from the standardized Nordic questionnaire[22]. Participants answered the yes/no question "Have you experienced any neck pain lasting more than 24 hours during the past month?" If they answered "Yes", follow-up questions about pain intensity were measured using a VAS, and participants were asked about the presence of weakness or numbness in the upper extremities. Participants with reported neck pain were also required to rate their disability level as measured by the neck disability index (NDI) (Thai version)[23]. This index is composed of 10 items with a five-point Likert scale, and the total score of the NDI ranges from 0 to 50. Higher scores indicate more severe disability.

Non-specific neck pain is neck pain (with or without radiation) without any specific systematic disease being detected as the underlying cause of the complaints[24]. In this study, if participants answered "Yes" to the first question, reported pain intensity > 30 mm on a 100-mm VAS, and had no numbness or weakness in the upper extremities, they were identified as suffering from the onset of non-specific neck pain. The study that developed the NROW used this definition to identify those experiencing the onset of neck pain[19]. Thus, for the purpose of comparison, we adopted the same definition of non-specific neck pain in this study. In addition, only considering neck pain with pain intensity > 30 mm on a 100-mm VAS ensures that workers had neck pain with a sufficient level of severity, while a sign of numbness or weakness in the upper extremities would indicate neurological involvement. Participants were followed until they became symptomatic, withdrew from the study, or completed the 12-month follow-up.

Statistical analyses

Participants' characteristics were described using means or proportions. The percentage of missing data for the individual, work-related physical, and work-related psychosocial factor categories were 0.3%. The "hot-deck imputation" procedure was used in managing missing data to ensure the robustness of the database. This involves the random selection of a respondent from the total study sample, with the value for that person being assigned to the case with missing data. The dataset was complete after this procedure was repeated for each missing value[25].

The one-year incidence rate of non-specific neck pain was calculated as the proportion of new cases, which was defined as those having no neck pain at baseline but reporting it during the 12-month follow-up.

The predictive validity of the NHBOW, NROW, and the combination of the NHBOW and NROW was examined. Each questionnaire was examined with its baseline total score as the predictor variable and the new case of non-specific neck pain at the 12-month follow-up as the outcome variable. The receiver operating characteristic (ROC) curve analyses and the area under the receiver operating characteristics curve (AUC) were calculated to evaluate the discriminatory ability of the NHBOW, NROW, and the combination of the NHBOW and NROW. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated for several cut-off scores. The optimum cut-off score was the cut-off score that gave the maximum sum of sensitivity and specificity. The predictive validity of the NHBOW, NROW, and the combination of the NHBOW and NROW was compared.

Univariate analysis was carried out to determine significant differences in the onset of neck pain with various biopsychosocial characteristics. A multivariable logistic regression analysis was then performed to assess the associations between the onset of neck pain and the NHBOW score at baseline. Any factors with a p-value ≤ 0.2 in the univariate analysis were eligible for addition into the modelling procedures. Adjusted ORs and 95% confidence intervals for the final models are presented. All statistical

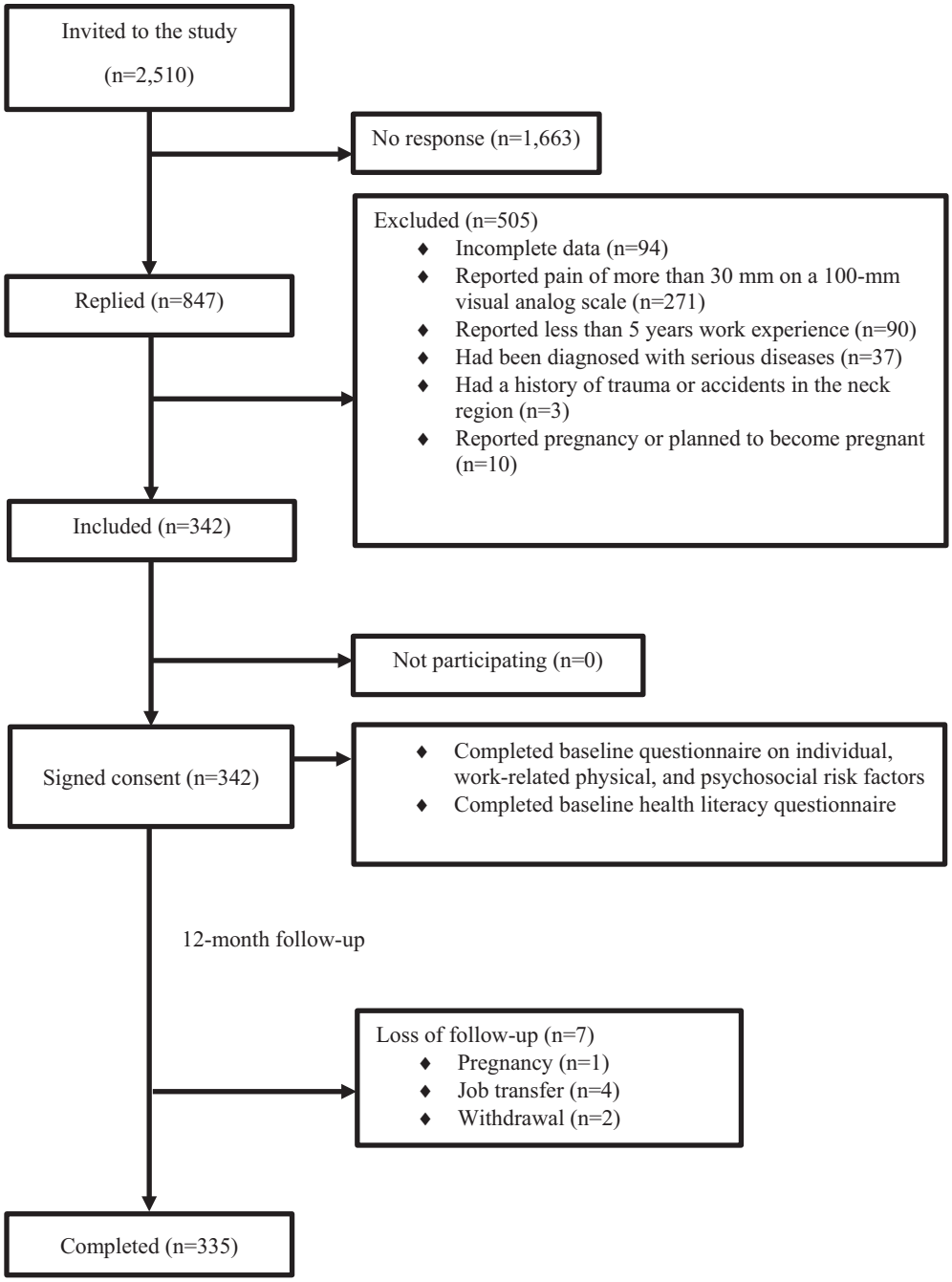

Fig. 1. Flowchart of participants for the study.

analyses were performed using SPSS for Windows Version 17.0 (SPSS Inc, Chicago, IL).

Results

Of the total 2,510 workers who received the invitation, 847 responded (response rate, 33.7%). Of these, 505 were excluded using the inclusion and exclusion criteria, yielding an eligible population of 342 workers, all of whom agreed to participate in the study (Fig. 1). Of these participants, 335 were successfully followed for one year, and seven (2%) were lost during the follow-up period due to pregnancy (n=1), job transfer (n=4), and withdrawal (n=2). Almost half of the participants (46.4%) were between 30 and 39 years of age. Three-quarters of the participants (74.6%) were female and most of the participants (90.3%) graduated with at least a bachelor's degree. Table 1 presents the baseline characteristics of the study population. Over the 12-month follow-up period, 30.7% (103/335) of participants in the sample population reported non-specific neck pain with mean (SD) VAS and NDI scores of 44.3 (11.8) mm and 6.7 (3.8), respectively.

Table 1. Characteristics of the study population at baseline* (n=342)

Characteristic	N (%)	Mean ± SD
Demographic characteristics		
Gender		
Male	87 (25.4)	
Female	255 (74.6)	
Age (years)		
20-29	20 (5.9)	
30-39	159 (46.4)	
40-49	115 (33.5)	
≥50	48 (14.2)	
Education		
Lower than a Bachelor's degree	23 (6.7)	
Bachelor's degree	195 (57)	
Higher than a Bachelor's degree	124 (36.3)	
Exercise frequency in the past 12 months		
Never	66 (19.3)	
Occasionally	203 (59.4)	
Regularly	71 (20.8)	
Not sure	2 (0.6)	
History of neck pain		
Yes	146 (42.7)	
No	196 (57.3)	
Occupational-related characteristics		
Duration of employment (years)		14.34 ± 7.48
Working hours per day (hours per day)		7.69 ± 1.07
Working days per week (days per week)		5.0 ± 0.5
Psychosocial characteristics		
Job control		36.0 ± 4.53
Psychological demands		32.32 ± 4.78
Physical demands		12.89 ± 2.68
Job security		17.01 ± 1.1
Social support		37.57 ± 5.2
Hazards at work		15.73 ± 3.36

*Baseline is the time point when office workers accepted the invitation to participate in the study and completed the self-administered questionnaires.

Table 2. The sensitivity and specificity of each NHBOW score cut-off value

Cut-off value	Sensitivity	Specificity	PPV	NPV
≤ 5	4.9	100	100	70.3
≤ 6	17.5	99.6	94.7	73.1
≤ 7	31.1	97.8	86.5	76.2
≤ 8	57.3	96.6	88.1	83.6
≤ 9	57.3	83.6	60.8	81.5
≤ 10	57.3	70.7	46.5	78.8
≤ 11	65.0	56.0	39.6	78.3

PPV, positive predictive value; NPV, negative predictive value

To investigate the effect of missing data, we compared the results before and after the 'hot-deck imputation' procedure. No ascertainable difference was observed between the two sets of data. Thus, the results following the 'hot-deck imputation' procedure are given below.

In order to predict the non-specific neck pain of office workers, the optimal cut-off score for the NHBOW was less than or equal to 8 (sensitivity, 57.3%; specificity, 96.6%; PPV, 88.1%; and NPV, 83.6%) (Table 2). The AUC was 0.769 (95% CI, 0.706-0.832). The optimal cut-off score for the NROW was greater than or equal to 2 (sensitivity, 55.3%; specificity, 76.3%; PPV, 50.9%; and NPV, 79.4%) (Table 3). The AUC was 0.658 (95% CI, 0.593-0.724). The optimal cut-off score for the combina-

tion of the NHLOW and NROW was less than or equal to 11 (sensitivity, 53.4%; specificity, 91.4%; PPV, 73.3%; and NPV, 81.9%) (Table 4). The AUC was 0.724 (95% CI, 0.659-0.789). The NHBOW showed better sensitivity and specificity compared to the NROW and the combination of the two screening tools. Additionally, the positive and negative predictive values of the NHBOW were higher than those of the NROW and the combination of the NHBOW and NROW. The NHBOW also showed a better AUC value than either the NROW or the combination of the two screening tools (Table 5).

According to univariate analyses, factors showing *p*-value ≤ 0.2 were age, gender, previous history of neck pain, psychological demands, and physical demands. Thus, these factors were selected for further analysis. Multivariable logistic regression analyses revealed that the baseline NHBOW score was associated with onset non-specific neck pain (Table 6).

Discussion

The purposes of this study were to evaluate the ability of the NHBOW to predict and identify office workers at risk of developing non-specific neck pain, and to compare the predictive validity of the NHBOW to the NROW and the combination of the NHBOW and NROW. We found that the NHBOW demonstrated an acceptable ability to predict incidents of non-specific neck pain in office workers, and that the NHBOW predicted incidents of non-specific neck pain more accurately than the NROW and the combination of the NHBOW and NROW. The NHBOW is easy to use and can be carried out within a short space of time (approximately 5 min) because it comprises only six questions. Therefore, it is suitable for application in primary health care and workplace settings, where full clinical examinations are not practical due to limited personnel and time.

This study found the 1-year incidence of non-specific neck pain in office workers was 30.7%, regardless of disability level. Previous studies found that the 1-year incidence of non-specific neck pain in office workers was between 26.7% and 28%[19,26]. We used the same incident definition as these previous studies: reported neck pain

Table 3. The sensitivity and specificity of each NROW score cut-off value

Cut-off value	Sensitivity	Specificity	PPV	NPV
≥ 1	85.4	40.9	39.1	86.4
≥ 2	55.3	76.3	50.9	79.4
≥ 3	25.2	93.5	63.4	73.8
≥ 4	1.9	99.1	50.0	69.5

PPV, positive predictive value; NPV, negative predictive value

Table 4. The sensitivity and specificity of each cut-off value of the NHBOW and NROW combination score

Cut-off value	Sensitivity	Specificity	PPV	NPV
≤ 8	17.5	100	100	73.2
≤ 9	31.1	100	100	76.6
≤ 10	40.8	96.6	84.0	78.6
≤ 11	53.4	91.4	73.3	81.9
≤ 12	58.3	83.6	61.2	81.5
≤ 13	60.2	70.7	47.7	80.0
≤ 14	70.9	59.5	43.7	82.1

PPV, positive predictive value; NPV, negative predictive value

Table 5. The predictive validity of the best cut-off value for each screening tool

Screening tool	Sensitivity	Specificity	PPV	NPV	AUC (95% CI)
NHBOW	57.3	96.6	88.1	83.6	0.769 (0.706-0.832)
NROW	55.3	76.3	50.9	79.4	0.658 (0.593-0.724)
Combined NHBOW and NROW	53.4	91.4	73.3	81.9	0.724 (0.659-0.789)

PPV, positive predictive value; NPV, negative predictive value; AUC, the area under the receiver operating characteristics curve

Table 6. Logistic regression for the association between the baseline NHBOW score and onset of non-specific neck pain with odd ratios (OR) and 95% confidence intervals (95% CI)

Variable	Unadjusted		Adjusted[a]	
	OR (95% CI)	P value	OR (95% CI)	P value
NHBOW score at baseline	0.766 (0.70 to 0.84)	<0.001	0.791 (0.72 to 0.87)	<0.001

[a] Adjusted for age, gender, a previous history of neck pain, psychological demands, and physical demands

longer than one day in duration, with pain greater than 30 mm on a 100-mm VAS, and without any numbness or weakness in the upper extremities. The discrepancy between our study and previous studies may be due to the different years of experience as office workers. This study required participants to have at least five years of experience as office workers, but previous studies only required one year of experience. Côté et al. (2009) suggested that duration of employment was a potential risk factor for experiencing neck pain[1]. Consequently, it is possible that a greater number of participants experienced symptomatic neck pain over the course of our study.

An optimal cut-off point is generally selected based on the purpose of the screening tool, and requires knowledge of the sensitivity, specificity, PPV, and NPV. In this study, a cut-off score of ≤ 8 provided the maximum sum of sensitivity and specificity. The sensitivity was 57.3%; thus the false-negative rate was 42.7%. By failing to identify high-risk workers, a high false-negative rate would ultimately incur higher medical expenses. On the other hand, the specificity of the NHBOW was 96.6%, indicating that only 3.4% of low-risk office workers would be falsely identified as high-risk. The result of a high false-positive rate among office workers with low-risk is that they would be identified as high-risk for developing non-specific neck pain, and therefore unlikely to benefit from any preventive intervention they receive. This would further lead to higher expenses and time loss. However, one needs to weigh the expected consequences of missing a person at risk (false-negative) against including a person receiving an intervention who is not at risk (false-positive). For example, with limited resources, there is a greater need for a screening tool with a high probability of including those truly at risk of developing non-specific neck pain. Thus, the preferred screening option may be a tool with high specificity (a low false-positive rate) over high sensitivity (a low false-negative rate). On the other hand, if the primary aim is to ensure that as many workers receive preventive intervention as possible in order to achieve a significant reduction in the number of office workers with non-specific neck pain, a screening tool with high sensitivity (a low false-negative rate) would be the favored choice. The AUC is an index of the strength of the diagnostic scale. A perfect scale has an AUC of 1.0, while an AUC of 0.5 indicates no discrimination, 0.7 ≤ AUC < 0.8 indicates acceptable discrimination, 0.8 ≤ AUC < 0.9 indicates excellent discrimination, and AUC ≥ 0.9 indicates outstanding discrimination[27]. In this study, the AUC was 0.769 (95%CI, 0.706-0.832), demonstrating that the NHBOW has acceptable ability to discriminate between office workers likely and not likely to experience future non-specific neck pain.

As predictive values represent the probability that the result is correct, these may be of more practical use than the sensitivity and specificity rates when applying the screening tool to clinical decision making[28]. The results showed that the predictive value at the cut-off point of ≤ 8 was high for the PPV and low for the NPV. The PPV was 88.1%, indicating that 88.1% of office workers with a score of ≤ 8 are at risk of developing non-specific neck pain. The NPV was 83.6%, meaning that 83.6% of office workers with a score of ≥ 8 were not at risk for developing non-specific neck pain. These findings suggest that the NHBOW is more suited to identifying workers with a high risk of developing non-specific neck pain, rather than excluding healthy office workers with a low risk of developing non-specific neck pain. However, it should be noted that the PPV and NPV are highly dependent on the prevalence of the condition of interest within the sample. In samples with a high disease prevalence, the PPV will be higher and the NPV lower[28].

This study compared the ability of the NHBOW, NROW, and a combination of the NHBOW and NROW to predict non-specific neck pain in office workers. The NROW was developed by Paksaichol et al.[19] to identify office workers at risk of developing non-specific neck pain. They reported that the NROW had a sensitivity of 82%, a specificity of 48%, a PPV of 29%, and a NPV of 91%. Based on these results, they concluded that the NROW was suitable for ruling out office workers at low risk when the test was negative. Our results indicate that the NHBOW (PPV 88.1% and specificity 96.6%) is more suitable for identifying office workers at high risk than the NROW (PPV 50.9% and specificity 76.3%) and the combination of the two screening tools (PPV 73.3% and specificity 91.4%). The ROC analysis also showed that the NHBOW explained significantly more variance under the curve than both the NROW and the combination of the NHBOW and NROW. These findings support the notion that an individual's health behavior is a stronger predictor of disease development than the exposure to risk factors, and suggest that effective interventions to prevent disease, particularly non-specific neck pain in office workers, may need to include behavioral modification.

One major strength of this study lies in its prospective design, which allowed us to evaluate the ability of health behavior to predict non-specific neck pain in office workers. Additionally, the majority of the sample was successfully followed throughout the year (98%), which enabled results that were robust enough to ascertain the model's goodness of fit. The high rate of follow-up may be explained by the monetary incentive for participation and face-to-face data collection. In this study, participants received a monetary incentive for their involvement. They were informed that they would receive 10 US dollars if they stayed in the study for 6 months and another 10 US dollars if they completed the 12-month follow-up. In addition, face-to-face encounters were used to collect the data (i.e. the diaries) from participants every month over a 12-month period. A face-to-face survey usually leads to a

high response rates and high degree of control over the data collection process[29]. However, three limitations should be noted. First, the external validity of this study is restricted by the use of a convenience sample, and the majority of participants were female. Gender may affect the predictive validity of the NHBOW for identifying office workers at risk of developing non-specific neck pain. This issue is beyond the scope of this study but warrants further investigation. Therefore, caution is needed when generalizing these results to other working populations or to male workers. Second, as the diagnosis of neck pain was subjective, there was a risk of under- or over-reporting disease incidence. Indeed, individual workers may have different sensitivities to any type of somatic disturbance, and self-reported information comes with the risk of overestimating exposure[30]. Future studies should consider physical examination. Finally, the cut-off score in this study could be very specific to the office worker population, and so extrapolation of these findings to other populations should be done with caution.

Conclusion

The NHBOW, which uses the work and exercise behaviors of office workers to predict development of non-specific neck pain, showed acceptable predictive validity in this study. The area under the ROC curve indicated an acceptable ability to discriminate between office workers likely and not likely to experience future non-specific neck pain. Further research should use the NHBOW questionnaire to identify office workers at risk of developing neck pain and provide guidelines for changing behavior.

Acknowledgments: This work was funded by the Thailand Research Fund through the Royal Golden Jubilee Ph. D. Program (Grant No. PHD/0221/2553) and the Ratchadaphiseksomphot Endowment Fund of Chulalongkorn University (RES560530271-AS).

Conflicts of interest: Prof. Allard van der Beek holds stock (< 4 hours/week) in Evalua Nderland B.V. (www.evalua.nl), but has never been sponsored by Evalua Nederland to carry out research. Evalua Nederland does not have the intention of commercially exploiting the health behavior screening tool for non-specific neck pain, and has never done so. Dr. Kantheera Areerak and Prof. Prawit Janwantanankul have no direct financial interest in the results of this research.

Contributions: Kantheera Areerak contributed to the concept/research design, data collection, data analysis, and manuscript writing. Allard J. van der Beek contributed to the concept/research design, data analysis, and manuscript writing. Prawit Janwantanakul contributed to the concept/research design, data analysis, and manuscript writing.

Supplementary material: This article contains supplementary material (Apendix), which is available in the online version (doi: 10.1539/joh.2018-0001-FS).

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