Development and Psychometric Evaluation of an Instrument for Preventing Occupational Neck Pain Behaviors in Teachers

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Abstract

Background: Development and psychometrics of a questionnaire for preventive occupational pain behaviors in teachers.Quantitative and qualitative research plan in tool development and validation.

Method: A qualitative study was conducted in December 2020 with 25 participants to obtain the initial information of the questionnaire. Then content validity and face validity were performed. In the next stage, a questionnaire was distributed among the sample of teachers. In total, 146 teachers participated in this study (with a mean age 36.7; SD 8.92 years). Exploratory factor analysis was used to obtain the factor structure of the questionnaire. The correlation matrix in the case scale has been used to evaluate the validity of the structure. Internal stability (Cronbach's alpha) was calculated to assess reliability and internal correlation coefficient to assess stability.

Results: Based on analysis of the exploratory factor, 8 factors with 43 substances, that together accounted for 65,25% variances were obtained. Also, the correlation matrix in the case scale to establish the validity of the questionnaire showed satisfactory results. The results of face validity showed that 4 factors were not approved and were removed from the questionnaire. Reliability evaluation with internal consistency method (Cronbach's alpha) showed excellent compatibility (0.87). The Intraclass correlation reliability assessment showed that the questionnaire has satisfactory stability (ICC) (0.92).

Conclusion: This study provides the reliability and validity of the Occupational Pain Neck Preventive Behaviors Questionnaire. This study provides an instrument for evaluating occupational neck pain prevention behaviors among teachers. The instrument is useful for teachers and staff of administrative units and healthcare settings to implement appropriate interventions.

Background

Neck Pain is one of the common Musculo Skeletal Disorders (MSDs) associated with work in the working population especially in teachers. This Disorder is one of the costliest health challenges in the workplace [1,2].Significant socio-economic consequences such as reduced productivity due to absenteeism, early leave and retirement, missed working days, financial losses due to medical expenses and poor work ethic due to work-related discomfort for the workforce, especially for teachers, are followed for this profession [3,4]. According to the World Health Organization, neck pain is the fourth most common health problem among teachers, accounting for 44% to 61% of injuries [1,5-7]. Teachers have a higher percentage of work-related musculoskeletal disorders than other occupations (39 to 95%). It has been reported that 57.8% of occupational injuries among teachers are related to neck pain [5,8].Therefore, planning and implementing appropriate educational intervention to eliminate and correct adverse health behaviors and create ,promote preventive behaviors for neck pain in teachers is very necessary and inevitable. Any effort to understand and measure preventive behaviors among teachers is very important. Several questionnaires such as Nordic Musculoskeletal Disorders Questionnaire [9], McGill Pain Questionnaire (MPQ)[10,11], Chronic Pain Grad Scale (CPGS)[12],and the Roland–Morris Disability Questionnaire[10]. have been designed to understand how musculoskeletal disorders, including neck pain, affect a person's ability to perform normal activities. However, these questionnaires cannot assess the causes, benefits, and barriers to neck pain prevention behaviors. Because the source of neck pain at work is usually work-related behaviors. Therefore, in order to develop any intervention to prevent work-related neck pain among different occupations, especially teachers, we must understand the related causes. This is in the realm of educational planning models [13]. There are several reasons why neck pain prevention behaviors are not performed. The main reason is the lack of belief in the extent of the disease and the severity of the damage caused by the disease (perceived Sensitivity and severity). Furthermore, the lack of the individual evaluation from the benefits and barriers of health behavior (perceived benefits and barriers)[14]. One of the best effective models in promoting preventive behaviors is the Health Belief Model (HBM) [8]. This model is a comprehensive model and is based on the premise that preventive behaviors based on personal beliefs include a person's vulnerability to disease, the impact of disease on quality of life and the impact of health measures in reducing the sensitivity and severity of disease [15]. The health belief model has 6 structures: Perceived susceptibility, which refers to a person's abstract belief about getting sick or being harmed as a result of engaging in certain behaviors. Perceived severity as person's abstract belief about the extent of harm that can result from an illness or harmful condition resulting from a particular behavior. Perceived benefits the benefits of suggested behaviors to reduce the risk or worsening of a disease or harmful condition resulting from a particular behavior. Perceived severity as person's abstract belief about the actual and perceived costs of pursuing new behavior. Cues to action, the accelerating forces that make one feel

the need to perform a particular behavior, which can be of internal (perception of a physical state) or external (interpersonal interactions, media communication) and self-efficacy as ensuring that one has the ability to pursue a particular behavior [16,17].Based on the health belief model for adopting disease prevention behaviors, people must first feel threatened by the problem (perceived sensitivity), then understand the depth of the danger and the severity of its effects (perceived severity) with the positive symptoms they receive from their environment (Cues to action), useful and capable believe in the implementation of preventive behaviors (perceived benefits) And find the factors that prevent this behavior from being less costly than its benefits (perceived barriers) and also consider themselves capable of performing preventive behaviors (self-efficacy) to ultimately perform the correct function in preventing the disease [16]. Since, it seems that this model can be applied for designing a proper instrument to measure neck pain behavior, the purpose of this study is to develop and psychometric evaluation of an instrument for preventing occupational neck pain behaviors in teachers.

Methods

Aim

The purpose of this study is development and psychometric the questionnaire of preventive behaviors of occupational neck pain in teachers.

Design

This instrument was developed in a two-step study. In the first stage, a qualitative study was used to produce items and in the second stage, a cross-sectional study was used to do psychometric approach. At the second stage, the validity and reliability of the instrument was done. The reliability assessment was done by internal consistency method (Cronbach's alpha) and intra class correlation coefficient (ICC) were examined.

Item generation

Due to the pandemic of the Corona virus, it was not possible to interview the participants in person. For this reason, a qualitative study was conducted in December 2020 by main researcher through making telephone calls to 30 participants, based on the structures of the HBM to prepare questionnaire items. Participants were asked questions about the existence of occupational neck pain , the factors causing neck pain based on HBM and methods to prevent occupational neck pain. Based on the information obtained from the participants and the studies conducted, the initial questionnaire was designed with 77 items. Then, the questionnaire which was prepared by the research team (Moradi and et al.) was evaluated, in which 26 items were removed from the questionnaire. A total of 51 items remained at this stage.

Developing a preliminary questionnaire

At this stage, the questionnaire was subject to content validity and face validity. To determine the content validity of the questionnaire , the 15 specialists in the majors of health education and health promotion, ergonomics, physiotherapy and occupational health evaluated the items of the instrument through correcting grammar, use of appropriate words, item allocation and appropriate scoring and scaling and responding to cases of being essential, useful but unnecessary and useless items [18-20]. The responses were calculated based on the formula and
matched to the Law she's table (Lawshe, 1975) to estimate the content validity ratio (CVR) [21]. Experts were asked to evaluate each questionnaire in terms of three criteria: relevancy, simplicity and clarity to calculate the content validity index _ CVI [22,23]. The CVR for the questionnaire was (0.85) and the CVI for the questionnaire was (0.92) that were higher than the recommended values. However, 26 items were removed at this stage. Then, to assess face validity, a questionnaire was sent to 30 teachers to examine the items based on simplicity, importance, relevancy and clarity. Obtained data were analyzed by which the impact score for each item was calculated above 1.5 for all items and there was no change in the number of items. Therefore, at this stage, a preliminary questionnaire with 51 items was prepared.

Validity, reliability, and rigor

A cross-sectional study was performed to evaluate the psychometric properties of the questionnaire.

Sample, participants

The samples were teachers working in junior high schools, district 19 of Tehran , Iran. The selection of participants was based on the purpose of the study. A total of 30 participants were interviewed by telephone in order to obtain information about the existence of occupational neck pain and methods to prevent occupational neck pain. A cross-sectional study was done by 146 teachers. Initially, a list of all schools in district 19 was prepared and due to lack of cooperation, all non-profit schools were removed from the list. Therefore, only public schools were selected to estimate the sample size. The names of all schools were identified by code. The codes were then poured into a bag and randomly divided into two groups. Informed consent was obtained from all participants. (Table 1) shows the characteristics of the study participants.

Table 1: The characteristics of participants (N=144)

Gender (No, %)	
Female	119, (81.51)
Male	27, (18.49)
Marital status (No, %)	
Single	33, (22.6)
Married	110, (75.34)
Divorced	1, (0.69)
Widow	2, (1.36)
BMI (No, %)	
Underweight (<18.5)	1, (0.68)
Normal weight (18.5–24.9)	62, (42.46)
Overweight (25–29.9)	59, (40.41)
Obese (≥ 30)	24, (16.43)
Age (Mean, SD)	36.7, (8.92)
Work experience (Mean, SD)	12.04,(6.2)
Experience of pain (No, %)	
Yes	89, (60.96)
No	57, (39.04)

Data collection

The questionnaire was sent to the participants which completed by them and returned to the main investigator (Moradi).

Scoring

All items in the questionnaire (perceived sensitivity, perceived severity, perceived barriers, perceived benefits, self-efficacy, Cues to action and behavior) were ranked on a 5-point Likert scale. In the field of knowledge, the correct answers were formulated in two options (true, wrong). Any teacher who scores higher in the field of knowledge has a higher level of knowledge to perform the recommended behaviors. The average rating on the knowledge items by the study sample are shown in (Table 2).

Table 2: The frequency of answers to the knowledge items

	Wrong responses No. (%)	Correct answers No.(%)
1. Neck pain may also be felt in the shoulders and upper chest.	57, (39.04)	89, (60.95)
2. Prolonged sitting or bending the neck too much while working can cause neck pain.	27, (18.49)	119, (81.50)
3. Lack of rest time between work shifts increases neck pain.	45, (30.82)	101, (69.17)
4. Neck pain can cause absenteeism.	61, (41.78)	85, (58.21)
5. Neck pain causes early retirement.	110, (75.34)	38, (26.02)

Data analysis

To evaluate the construct validity, exploratory factor analysis (EFA) and scale correlation matrix were employed. The Kaiser_ Meyer_ Olkin (KMO) Index and Bartlett's test sphericity were used to evaluation [24]. The factor structure of the questionnaire was extracted using Varimax rotation. The presence of a case in a factor of approximately 0.4 was determined based on the recommendation (Bernstein & Nunnally, 1994) [25], For the correlation matrix in the case scale, Pearson correlation coefficient was used and values of coefficient 0.4 or above were considered acceptable. For KMO, the value of 0.5 is unacceptable factor analysis, 0.5 to 0.7 is moderate factor analysis 0.7 to 0.8 is balanced factor analysis and 0.8 to 0.9 is desirable and greater than 0.9 results i excellent factor analysis. In this study, the KMO value was 0.833, which shows a favorable factor analysis for the data (Table3). Reliability evaluation with internal consistency method (Cronbach's alpha) showed excellent compatibility (0.87). intraclass correlation coefficient (ICC) showed that the questionnaire has satisfactory stability (0.92).

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.833
Bartlett's Test of Sphericity	Approx. Chi-Square	5030.743
Df		1275
Sig		.000

Results

The sample characteristics

In all, 146 teachers agreed to participate in the study (mean age 36.7 years and SD 8.92). Of these, 119 (81.51%) were female and 27 (18.49%) were male. The average work experience of the participants was 12.04,(6.2 SD) years.

Factor structure

After confirming the adequacy of the sample based on KMO and Bartlett sphericity test (KMO = 0.833 and $\chi 2$ = 5030.743, $p < .001$), exploratory factor analysis was performed and 12 factors were obtained, (Fig. 1). Based on the dimensions of the health belief model and considering the factor load, factors with a coefficient value greater than 0.4 were acceptable and factor load less than 0.4 were eliminated. Therefore, factors 11 and 12 were removed. Also, at this stage, 8 items including (items 1,3,6,6,7,10 of knowledge) (item 7 of behavior) (item 2 of self-efficacy) and (item 1 of cues to action) that had low factor load were removed from the questionnaire. After factor analysis of the remaining items, 10 factors were obtained. Due to the fact that the coefficient of factors 9 and 10 was less than 0.4, these two factors were also removed. Therefore, the number of factors was reduced to 8 factors with 43 items. Table 4 shows the changes expressed by the factor analysis model for the 8 factors extracted. This criterion can be used to evaluate the adequacy of the model. Moreover, downloaded items include: knowledge (5 items), perceived sensitivity (6 items), perceived severity (5 items), perceived benefits (5 items), perceived barriers (4 items), Cues to action (3 items), self-efficacy (6 items) and behavior (9 items) The results of final questionnaire and scoring manual are shown in (Table 5).

Table 4
The result obtained from exploratory factor analysis with varimax rotation (N = 146)

Item	Factor1	Factors2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1. Neck pain may also be felt in the shoulders and upper chest.	**.0770**	− .004	.083	.123	− .056	.033	− .027	0.018	− .032	− .026
2. Prolonged sitting or bending the neck too much while working can cause neck pain.	**.653**	− .186	− .013	.349	.214	.036	− .070	. 164	− .014	.111
3. Lack of rest time between work shifts increases neck pain.	**.539**	− .122	.153	− .254	− .034	.126	.113	.190	− .080	.056
4. Neck pain can cause absenteeism.	**.696**	− .049	− .162	.019	.163	− .070	− .153	.272	− .021	− .261
5. Neck pain causes early retirement.	**.775**	− .092	.035	− .038	− .071	.018	− .200	.036	.026	.085
6. I get neck pain due to bending my head and neck forward too much.	− .174	**.651**	.067	.129	.423	− .028	− .091	.164	.177	.144
7. I get neck pain due to sitting for a long time while working.	− .093	**.642**	.187	.038	.215	− .027	.168	− .148	.068	.464
8. I may suffer from neck pain if I do not exercise regularly.	.083	**.723**	.053	− .029	− .024	.158	.179	.037	− .134	.036
9. If I use inappropriate posture during a work shift, I get neck pain.	.004	**.879**	.087	− .018	.165	.067	.085	− .104	− .015	.040
10. If I use non-standard tables, chairs and footrests during work shifts, I will suffer from neck pain.	− .062	**866**	.087	− .086	.023	− .034	.136	− .126	.052	− .003

Item	Factor1	Factors2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
11. If I do not get enough rest during my work shift, I may experience neck pain.	.041	**.801**	.177	.005	.232	.052	.148	− .125	− .073	.030
12. Having neck pain can reduce my productivity in daily activities and work.	.111	− .021	**.869**	− .050	.174	.091	.097	.019	− .068	− .110
13. If I have neck pain, I cannot be present at work and it will cause me to be absent from work.	.126	− .045	**.528**	− .029	.149	− .140	.565	.101	− .034	− .206
14. If I have neck pain, I will incur heavy medical expenses.	.100	.041	**.649**	− .200	.052	.216	.126	.130	− .179	− .005
15. If I have neck pain, I may retire early.	.343	.108	**.731**	− .199	.057	.047	.081	− .105	.037	.002
16. Having neck pain has negative effects on my social relationships with others.	.441	.053	**.628**	− .137	.070	.171	.095	− .067	.012	.163
17. By doing proper stretching during the day, I am less likely to have neck pain.	.018	.072	.127	**.773**	.046	− .015	.221	− .033	.099	− .091
18. If I use standard chairs, tables and footrests during the work shift, I am less likely to get neck pain.	− .268	− .009	.081	**.805**	.047	− .013	.107	− .099	.208	.050

Item	Factor1	Factors2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
19. If I use the right posture during my work shift, I will have less neck pain.	− .067	− .086	.148	**.860**	.060	.107	.168	.006	.069	.058
20. If I get enough rest during my work shift, I am less likely to get neck pain.	− .166	− .028	.033	**.816**	.218	.084	.079	.086	.191	.007
21. If I manage to use the computer during the day, my chances of getting neck pain will decrease.	− .092	− .051	.093	**.870**	.102	.123	.014	.091	.142	.045
22. It is difficult for me to keep my neck straight and straight due to the students' homework.	.333	− .051	.233	.008	**.774**	.149	− .064	.035	− .146	.005
23. Lack of time during the day has made it impossible for me to exercise.	.327	− .210	.060	.045	**.676**	.144	− .078	− .020	.129	.019
24. Too much work during the day has made it difficult for me to control stress.	.352	.047	.162	− .008	**.603**	.136	.212	− .030	− .312	− .016
25. Lack of rules for rest during work shifts has made it impossible to rest while working.	.254	.181	− .022	− .054	**.727**	.101	.141	.090	.100	.016

Item	Factor1	Factors2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
26. Specialists from the Ministry of Education and school principals have a very effective role in observing appropriate and standard conditions to reduce neck pain in teachers.	.169	.034	− .095	.003	.167	**.759**	.032	.036	.025	.093
27. School principals have an effective role in observing rest time during work shifts to reduce neck pain in school teachers.	.440	.038	.066	.239	.170	**.694**	− .038	.010	− .026	− .194
28. School principals have an effective role in performing appropriate sports activities by school teachers to reduce neck pain.	.490	− .077	− .090	.026	.248	**.553**	.089	.042	.253	− .241
29. I can get scientific and credible information about health behaviors that are effective in reducing neck pain from the media and related experts.	.435	.039	.439	.114	− .023	.085	**.492**	.031	.007	− .062
30. I can do proper exercise during the day and during work shifts.	.264	.063	.143	.164	.070	− .084	**.805**	− .016	.102	− .014

Item	Factor1	Factors2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
31. I can use the appropriate posture for teaching tasks during my work shift.	.518	.146	.084	− .045	.049	− .024	**.645**	.206	.044	− .044
32. I can manage my computer usage time during work shifts and to prepare curricula.	.470	.243	− .085	− .110	− .090	.132	**.539**	.209	.239	− .025
33. I can identify and use standard tables and chairs with suitable backs during work shifts.	.100	.102	.032	− .069	.068	− .045	**.843**	− .043	.035	.061
34. I can bend my neck forward less while keeping students' homework and keep my head and neck straight and straight.	.280	.264	.432	− .301	.052	.149	**.422**	.308	.021	− .195
35. I receive scientific and credible information about health behaviors that are effective in reducing neck pain from the relevant media and experts.	.036	.283	.299	.044	.089	.109	.069	**.750**	− .091	.116
36. I control my stress during daily activities and during work shifts.	.349	− .062	.230	− .049	.019	.181	− .025	**.568**	− .038	− .281
37. I rest for a few minutes during the work shift to relieve fatigue.	.035	.600	.066	− .233	.019	− .052	− .114	**.444**	− .091	− .312

Item	Factor1	Factors2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
38. During the day and during work shifts, I do proper sports and stretching activities.	− .385	− .272	.292	.130	− .118	.101	.057	**.603**	.010	.044
39. During the work shift, I use the appropriate position to perform teaching tasks.	− .219	− .048	− .024	− .004	− .056	.110	.169	**.737**	.161	.224
40. I manage my computer usage time during work shifts and to prepare curricula.	− .061	− .130	.111	.046	− .015	− .062	.015	**.825**	− .032	− .103
41. When doing homework, I bend my neck forward a little and keep my neck straight and straight.	.139	.194	− .232	− .150	.066	− .063	− .058	**.474**	.278	.434
42. I use the right pillow when I sleep.	− .051	.093	.034	− .147	.013	− .032	.010	**.732**	.114	.052
43. I follow the correct way of sitting, standing and sleeping.	.123	.293	.160	− .063	.013	.270	− .084	**.582**	− .162	.394
Eigenvalue	**14.393**	**4.756**	**2.713**	**2.078**	**1.532**	**1.375**	**1.369**	**1.193**		
Variance observed (%)	**27.397**	**8.899**	**7.159**	**5.037**	**4.886**	**4.066**	**3.993**	**3.821**		

Table 5
The results final questionnaire and scoring manual

Item	CVR	CVI	Impact Score
1. Neck pain may also be felt in the shoulders and upper chest.	0.57	1	1.5
2. Prolonged sitting or bending the neck too much while working can cause neck pain.	0.85	0.85	1.5
3. Lack of rest time between work shifts increases neck pain.	0.57	0.92	1.6
4. Neck pain can cause absenteeism.	0.71	0.92	1.6
5. Neck pain causes early retirement.	0.85	0.85	1.6
6. I get neck pain due to bending my head and neck forward too much.	0.57	0.92	1.5
7. I get neck pain due to sitting for a long time while working.	0.57	1	1.5
8. I may suffer from neck pain if I do not exercise regularly.	0.57	1	1.5
9. If I use inappropriate posture during a work shift, I get neck pain.	0.49	0.92	1.6
10. If I use non-standard tables, chairs and footrests during work shifts, I will suffer from neck pain.	0.85	0.92	1.6
11. If I do not get enough rest during my work shift, I may experience neck pain.	0.71	0.92	1.5
12. Having neck pain can reduce my productivity in daily activities and work.	0.71	1	1.5
13. If I have neck pain, I cannot be present at work and it will cause me to be absent from work.	0.57	1	1.6
14. If I have neck pain, I will incur heavy medical expenses.	0.71	1	1.6
15. If I have neck pain, I may retire early.	0.85	0.92	1.5
16. Having neck pain has negative effects on my social relationships with others.	0.57	0.78	1.5
17. By doing proper stretching during the day, I am less likely to have neck pain.	0.57	0.92	1.7
18. If I use standard chairs, tables and footrests during the work shift, I am less likely to get neck pain.	0.57	0.85	1.6
19. If I use the right posture during my work shift, I will have less neck pain.	0.85	1	1.7
20. If I get enough rest during my work shift, I am less likely to get neck pain.	1	1	1.6
21. If I manage to use the computer during the day, my chances of getting neck pain will decrease.	0.71	0.92	1.7
22. It is difficult for me to keep my neck straight and straight due to the students' homework.	0.71	0.92	1.5
23. Lack of time during the day has made it impossible for me to exercise.	1	0.85	1.6
24. Too much work during the day has made it difficult for me to control stress.	0.57	0.92	1.8
25. Lack of rules for rest during work shifts has made it impossible to rest while working	0.49	0.92	1.6
26. Specialists from the Ministry of Education and school principals have a very effective role in observing appropriate and standard conditions to reduce neck pain in teachers.	0.85	0.92	1.6
27. School principals have an effective role in observing rest time during work shifts to reduce neck pain in school teachers.	0.71	1	1.5
28. School principals have an effective role in performing appropriate sports activities by school teachers to reduce neck pain.	0.57	1	1.5
29. I can get scientific and credible information about health behaviors that are effective in reducing neck pain from the media and related experts.	0.85	1	1.6
30. I can do proper exercise during the day and during work shifts.	0.57	0.85	1.5
31. I can use the appropriate posture for teaching tasks during my work shift.	0.71	0.92	1.5

Item	CVR	CVI	Impact Score
32. I can manage my computer usage time during work shifts and to prepare curricula.	0.71	0.92	1.5
33. I can identify and use standard tables and chairs with suitable backs during work shifts.	0.85	1	1.6
34. I can bend my neck forward less while keeping students' homework and keep my head and neck straight and straight.	0.92	1	1.8
35. I receive scientific and credible information about health behaviors that are effective in reducing neck pain from the relevant media and experts.	0.85	0.85	1.7
36. I control my stress during daily activities and during work shifts.	1	0.92	1.5
37. I rest for a few minutes during the work shift to relieve fatigue.	0.85	0.92	1.5
38. During the day and during work shifts, I do proper sports and stretching activities.	0.57	1	1.7
39. During the work shift, I use the appropriate position to perform teaching tasks.	0.85	0.92	1.6
40. I manage my computer usage time during work shifts and to prepare curricula.	0.85	0.85	1.5
41. When doing homework, I bend my neck forward a little and keep my neck straight and straight.	0.71	0.85	1.5
42. I use the right pillow when I sleep.	0.85	1	1.7
43. I follow the correct way of sitting, standing and sleeping.	0.85	1	1.6

Item-scale correlation matrix

The correlation between its items and subscales is shown in (Table 6). The lowest amount of subscription for item 3 of the knowledge scale with a value of 0.549 and the highest amount of subscription for the item 21 is the perceived benefit scale with a value of 0.841.

Table 6
Item-scale correlation matrix for the Occupational Neck Pain Prevention Behaviors Questionnaire

Item	scale correlation matrix
Knowledge (true, no idea, wrong)	
1. Neck pain may also be felt in the shoulders and upper chest.	.632
2. Prolonged sitting or bending the neck too much while working can cause neck pain.	.637
3. Lack of rest time between work shifts increases neck pain.	.549
4. Neck pain can cause absenteeism.	.671
5. Neck pain causes early retirement.	.586
perceived sensitivity (Completely agree, agree, no idea, disagree, completely disagree)	
6. I get neck pain due to bending my head and neck forward too much.	.730
7. I get neck pain due to sitting for a long time while working.	.700
8. I may suffer from neck pain if I do not exercise regularly.	.671
9. If I use inappropriate posture during a work shift, I get neck pain.	.834
10. If I use non-standard tables, chairs and footrests during work shifts, I will suffer from neck pain.	.810
11. If I do not get enough rest during my work shift, I may experience neck pain.	.795
perceived severity (Completely agree, agree, no idea, disagree, completely disagree)	
12. Having neck pain can reduce my productivity in daily activities and work.	.827
13. If I have neck pain, I cannot be present at work and it will cause me to be absent from work.	.683
14. If I have neck pain, I will incur heavy medical expenses.	.676
15. If I have neck pain, I may retire early.	.712
16. Having neck pain has negative effects on my social relationships with others.	.692
perceived benefits (Completely agree, agree, no idea, disagree, completely disagree)	
17. By doing proper stretching during the day, I am less likely to have neck pain.	.697
18. If I use standard chairs, tables and footrests during the work shift, I am less likely to get neck pain.	.829
19. If I use the right posture during my work shift, I will have less neck pain.	.826
20. If I get enough rest during my work shift, I am less likely to get neck pain.	.830
21. If I manage to use the computer during the day, my chances of getting neck pain will decrease.	.841
perceived barriers (Completely agree, agree, no idea, disagree, completely disagree)	
22. It is difficult for me to keep my neck straight and straight due to the students' homework.	.764
23. Lack of time during the day has made it impossible for me to exercise.	.643
24. Too much work during the day has made it difficult for me to control stress.	.696
25. Lack of rules for rest during work shifts has made it impossible to rest while working	.668
Cues to action (Completely agree, agree, no idea, disagree, completely disagree)	
26. Specialists from the Ministry of Education and school principals have a very effective role in observing appropriate and standard conditions to reduce neck pain in teachers.	.588

Item	scale correlation matrix
27. School principals have an effective role in observing rest time during work shifts to reduce neck pain in school teachers.	.826
28. School principals have an effective role in performing appropriate sports activities by school teachers to reduce neck pain.	.747
self-efficacy (Always, most of the time, sometimes, rarely, Never)	
29. I can get scientific and credible information about health behaviors that are effective in reducing neck pain from the media and related experts.	.673
30. I can do proper exercise during the day and during work shifts.	.792
31. I can use the appropriate posture for teaching tasks during my work shift.	.762
32. I can manage my computer usage time during work shifts and to prepare curricula.	.727
33. I can identify and use standard tables and chairs with suitable backs during work shifts.	.741
34. I can bend my neck forward less while keeping students' homework and keep my head and neck straight and straight.	.758
Behavior (Always, most of the time, sometimes, rarely, Never)	
35. I receive scientific and credible information about health behaviors that are effective in reducing neck pain from the relevant media and experts.	.721
36. I control my stress during daily activities and during work shifts.	.581
37. I rest for a few minutes during the work shift to relieve fatigue.	.713
38. During the day and during work shifts, I do proper sports and stretching activities.	.744
39. During the work shift, I use the appropriate position to perform teaching tasks.	.737
40. I manage my computer usage time during work shifts and to prepare curricula.	.689
41. When doing homework, I bend my neck forward a little and keep my neck straight and straight.	.611
42. I use the right pillow when I sleep.	.759
43. I follow the correct way of sitting, standing and sleeping.	.711

Reliability

Reliability assessment with internal consistency (Cronbach's alpha) showed excellent compatibility (0.87). Intraclass correlation coefficient assessment (ICC = 0.92) also indicated that the questionnaire has satisfactory stability (Table 7).

Table 7: Cronbach's α coefficient and ICC for the Occupational Neck Pain Prevention Behaviors Questionnaire

	Number of Items	Cronbach's α coefficient (N=146)	ICC
knowledge	5	0.92	0.96
perceived sensitivity	6	0.87	0.9
perceived severity	5	0.86	0.93
perceived benefits	5	0.93	0.9
perceived barriers	4	0.85	0.87
Cues to action	3	0.78	0.85
self-efficacy	6	0.9	0.92
Behavior	9	0.85	0.93
Total scale	**43**	**0.87**	**0.92**

Discussion

The purpose of this study was to design and evaluate reliability and validity, of an instrument for evaluating effective factors associated with neck pain prevention behaviors among teachers. The initial items of the questionnaire were obtained based on the data of a qualitative study and quantitative studies and overview of neck pain in teachers. Also, in the production of items, psychological, social, economic factors related to neck pain in teachers were used [3, 5, 26, 27]. In the health belief model, there are four concepts, perceived sensitivity, intensity, practice guide and self-efficacy. That these concepts with environmental, social and psychological factors can play a role in the formation of a health behavior or health threatening behavior. The two concepts of perceived sensitivity and perceived intensity are considered to be a perceived threat that this concept with educational resources, environmental support, internal and external motives (Cues to action), skill and self-efficacy can lead to change behavior [16, 28, 29]. The results show that this questionnaire is appropriate in terms of validity and reliability. In addition to assessing knowledge, it also measures other dimensions, including attitude and self-efficacy. In fact, this questionnaire can measure knowledge, attitude, perceived sensitivity, perceived intensity, perceived benefits, perceived resources, self-efficacy, and behaviors that are all model-oriented constructs. In general, the effective factors causing neck pain include: personal and demographic factors, psychological and occupational factors, perceived sensitivity, perceived severity, perceived benefits, perceived barriers, Cues to action and self-efficacy in performing neck pain prevention behaviors [1]. Therefore, the various causes and complex nature of neck pain necessitate the use of a multidimensional instrument to assess neck pain. In fact, the Occupational Neck Prevention Behavior Questionnaire is a multidimensional instrument that includes structures that together can indicate reasons for performing or not performing occupational neck pain prevention behaviors. These reasons are very important in improving the health of occupational groups, especially teachers. Without understanding such reasons, the development of educational interventions is almost impossible.

Limitations

Although this study had several strengths, there were some limitations. The most important limitations were the outbreak of the coronavirus and the closure of schools, where teachers had to answer the questionnaire online, so it may affect their response. Also, due to the unavailability of teachers and their busy schedule, it was possible for someone else to respond instead of the actual respondent. In fact, the researcher called the participants and asked them to complete the questionnaire themselves. Therefore, conditions are provided for lifting the restriction. In addition, all data were self-reported and collected in Tehran. Therefore, care should be taken in generalizing the findings. Despite all the limitations, this instrument is statistically very valuable in assessing and measuring the factors associated with occupational neck pain among teachers.

Conclusion

The Occupational Pain Neck Prevention Behavior Questionnaire is a reliable instrument among teachers and can be used in future studies in different populations and environments. The model used in this instrument includes different structures that are: awareness, perceived sensitivity, perceived intensity, perceived barriers, perceived benefits, Cues to action, self-efficacy and behavior.

Declarations

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DATA AVAILABILITY STATEMENT

The data will be available from the corresponding author on request.

AUTHORS’ CONTRIBUTIONS

ZM was the main investigator who collected and analyzed the data and wrote the first draft. SST supervised the study and contributed to the writing process. SSK was the study advisor, contributed to analysis and interpretation, and provided the final draft. All authors read and approved the final manuscript.

CONFLICTS OF INTERESTS

No conflict of interest has been declared by the authors.

CONSENT FOR PUBLICATION

Not applicable.

ETHICAL CONSIDERATIONS

In this study, all methods were performed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Tarbiat Modares University(IR.MODARES.REC.1399.163).

CONSENT TO PARTICIPATE

All participants completed a written informed consent form.

CLINICAL TRIAL CODE: IRCT20210301050542N1

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Figures

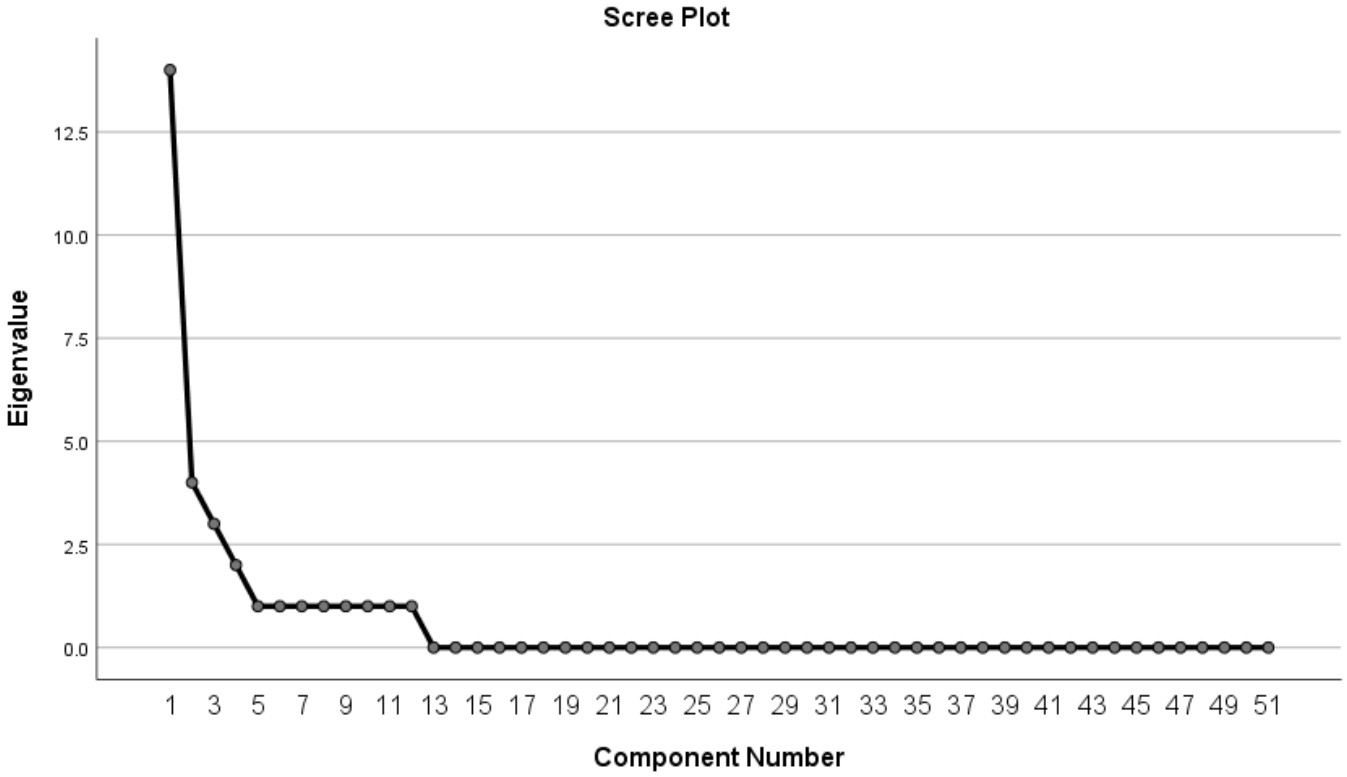

Figure 1

The scree plot obtained from exploratory factor analysis for the questionnaire