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Occupational Neck Pain Prevention Behaviors Questionnaire: Development and psychometric evaluation

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ABSTRACT

Aims: Neck pain is a common problem among teachers. This study aimed to design and evaluate an instrument for measuring occupational neck pain preventive behaviors among teachers.

Method and Materials: This study was conducted from August to December 2020 among high school teachers in Tehran, Iran. In the qualitative phase, a purposeful sample of teachers (30 participants) was interviewed to generate an item pool. The content and face validity were performed, and an initial questionnaire was sent to 25 teachers of the target community to be examined in terms of simplicity, importance, relevance, and clarity. Then, a cross-sectional study with 146 teachers with a mean age of 36.7 ± 8.92 years was conducted, by which exploratory factor analysis was done to obtain the factor structure of the questionnaire. Internal consistency (Cronbach's alpha) was calculated to assess reliability, and the Intra Class Correlation Coefficient (ICC) to assess stability.

Findings: Based on analysis of the exploratory factor, 8 factors with 43 substances, that together accounted for 65,25% variance, were obtained. 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 the internal consistency method (Cronbach's alpha) showed excellent compatibility (0.87). The ICC reliability assessment showed that the questionnaire has satisfactory stability (0.92).

Conclusion: This instrument could be applied to evaluate unhealthy behavior due to neck pain and so improve these risky behaviors.

Keywords: Instrument Development, Occupational Neck Pain, Health Belief Model, Preventive Behaviors, Teachers

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Introduction

Neck pain is one of the most common Musculoskeletal Disorders (MSDs) among the working population, especially among teachers. The disorder is one of the costliest health challenges in the workplace and might lead to several unpleasant consequences[1,2]. These include reduced productivity due to absenteeism, early leave, and retirement, missed working days, financial losses due to medical expenses, and work-related discomfort among the workforce, especially teachers [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 interventions to eliminate and correct adverse health behaviors and promote preventive behaviors for neck pain in teachers is essential and inevitable.

Any effort to understand and measure preventive behaviors among teachers is very important. Several questionnaires, such as the Nordic Musculoskeletal Disorders Questionnaire[9], the McGill Pain Questionnaire (MPQ)[10, 11] The Chronic Pain Grad Scale (CPGS)[12] and the Roland–Morris Disability Questionnaire[10] have been designed to understand how

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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-preventing 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 preventive 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 individuals' evaluation of the benefits and barriers of preventive behaviors could be another reason (perceived benefits and barriers) [14].

One of the most effective models in promoting preventive behaviors is the Health Belief Model (HBM)[8]. The model is comprehensive and is based on the premise that preventive behaviors are after personal beliefs on 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 six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

Perceived susceptibility refers to a person's abstract belief about getting sick or being harmed as a result of engaging in certain behaviors. Perceived severity refers to a 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 refer to the benefits of practicing recommended behaviors to reduce the risk or worsening of a disease or harmful condition resulting from a particular behavior. Perceived barriers refer to a person's abstract belief about the actual and perceived costs of pursuing new behaviors. Cues to action refer to the accelerating forces that make one feel the need to perform a particular behavior, which can be internal (perception of a physical state) or external (interpersonal interactions, media communication). Self-efficacy refers to the ability that one could pursue a particular behavior [16, 17].

Based on the health belief model for adopting disease preventive behaviors, people must first feel threatened by the problem (perceived susceptibility), 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]. To this end, we thought this model could be an appropriate platform for designing a proper instrument to measure neck pain preventive behaviors. Thus, the purpose of this study was to develop and psychometrically evaluate an instrument for measuring preventive occupational neck pain behaviors in teachers. The overall aim was to assess how teachers react to neck pain and how to take preventive measures to prevent it. We thought the instrument could help identify areas that need attention for implementing possible interventions.

Method and Material

In order to design an instrument to evaluate neck pain preventive behaviors, this study was conducted From August to December 2020 among high school teachers in Tehran, Iran in two phases qualitative and quantitative in the first stage, a qualitative study was conducted to generate items and in the second stage, a cross-sectional study was performed to evaluate psychometric properties of the designed questionnaire.

In the first stage, which was a qualitative

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study to generate items, after a semi-structured interview with 30 teachers, a preliminary questionnaire was designed, and then, based on the opinion of 15 experts, the content and face validity were assessed. Internal consistency (Cronbach's alpha) was calculated to assess reliability. Furthermore, Intra Class correlation Coefficient (ICC) (the original ICC without bias, introduced by Fisher) was done to assess stability.

In the second stage, a cross-sectional study was conducted to evaluate the psychometric properties of the designed questionnaire. At this stage, based on simple random sampling, 146 teachers were selected from 26 schools in the 19th district of Tehran. The questionnaire designed by the first researcher (ZM) was sent to the participants through virtual social networks, and the required data was collected. Then, to evaluate the construct validity of the questionnaire, Exploratory Factor Analysis (EFA) and the item-scale correlation matrix were used to further evaluate the validity of the questionnaire.

Finally, the final questionnaire for evaluating preventive behaviors of neck pain in teachers was obtained with 43 items.

Phase 1: Item generation and developing a preliminary questionnaire through a qualitative study

Due to the Coronavirus pandemic, it was not possible to interview the participants in person. For this reason, 30 semi-structured interviews were conducted through telephone calls with 30 teachers from August to December 2020. The sample was selected from teachers working in District 19 in south Tehran, Iran, due to availability and having a mixed characteristic of the teachers. Interviews were conducted based on the HBM constructs and tape-recorded, and continued until data saturation. Participants were asked questions about the existence of occupational neck pain, the factors causing neck pain, and methods to prevent occupational neck pain. Furthermore, based on the 6 domains of HBM, a related explanation was requested from the participants. Since these deep interviews were done with teachers who suffered from neck pain for a long time, and also the interviewer requested deep explanations about all six domains of HBM, we obtained rich information from the participants. In this regard, each interview took about 45 minutes. However, after 30 interviews, the data saturation was achieved, and based on the interviews, the initial questionnaire with 77 items was designed. Then, the research team evaluated the items for relevance and content. Accordingly, 26 items were removed. At this stage, the questionnaire was subjected to content validity and face validity.

To determine the content validity of the questionnaire, 15 specialists (health education and health promotion, ergonomics, physiotherapist, and occupational health specialists) evaluated the items. Experts were asked to evaluate each item in terms of three criteria: relevancy, simplicity, and clarity to calculate the Content Validity Index (CVI) [18, 19]. The CVI for the questionnaire was 0.92, indicating adequate validity [20]. In addition to calculating the Content Validity Ratio (CVR), experts were asked to indicate whether an item was essential [21-23]. The responses were calculated based on the formula and matched to Lawshe's table (Lawshe, 1975) to estimate the content validity ratio (CVR). The CVR for the questionnaire was 0.85, well above the recommended value. At this stage, 26 items were removed.

To assess face validity, a questionnaire was sent to 25 teachers to examine the importance and calculate impact scores. The characteristics of teachers are presented in Table 1 (attached i). To establish face validity, all items with an impact score of 1.5 or above were retained. At this stage, none of the items were removed, and thus the preliminary questionnaire with 51 items was subjected to psychometric evaluation.

Phase II: Psychometric evaluation through a cross-sectional study

A cross-sectional study was conducted to evaluate the psychometric properties of the questionnaire. As such a sample of teachers working in high schools in District 19 in Tehran, Iran, completed the questionnaire.

To do a psychometry evaluation, for each item, there should be 3-5 subjects, so in this

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study, for 51 items, 153 subjects were needed. To do this sampling, a list of all schools in the region (number = 26) was prepared. Then, within each high school, six teachers were selected randomly through a random numbers table (n =156). In this regard, at first, coordination was done with the principals and officials of the Ministry of Education and high school principals in District 19, Tehran. Then, teachers were invited to participate in the study through social media, by sending a call message and explaining the benefits of the research. A Simple Random Sampling method was used to obtain the sample for the study. Inclusion criteria include having internet access through a mobile phone and being able to use it. Exclusion criteria include unwillingness to participate in the research, having a second job beyond teaching, suffering from congenital musculoskeletal disorders in their neck vertebra, history of surgery or neck vertebral fractures, and medical prohibition on doing the learned practice. However, 10 teachers were excluded from the study, and 146 participants were invited to study. Informed consent was obtained from all participants.

All items (perceived sensitivity, perceived severity, perceived barriers, perceived benefits, self-efficacy, cues to action, and behavior) were rated on a 5-point Likert scale, except items on knowledge, where the response categories were in the 'true = 1 and false = 0' format. The total score or scores for each dimension could be achieved by summing all row scores. In the knowledge item, the lowest score obtained was 0, and the highest score was 5; any teacher who gets a higher score has a higher level of awareness to perform the recommended behaviors.

In order to collect data, the designed questionnaire was sent to the participants online through the virtual network and was completed by the teachers and returned to the main researcher (ZM). To evaluate the construct validity, EFA and item-scale correlation matrix were employed. The Kaiser- Meyer- Olkin (KMO) Index for sampling adequacy and Bartlett's test of sphericity to test if there is a redundancy between variables that can be summarized with some factors [24]. The factor structure of the questionnaire was extracted using Varimax rotation, and loading values of 0.4 were considered acceptable (Table 2 attached i) [25]. The item scale correlation matrixed was examined using the Pearson correlation coefficient, and values of 0.4 or above were considered acceptable. Reliability was assessed by internal consistency and stability. Internal consistency was estimated by Cronbach's alpha coefficient, and stability was examined by estimating ICC (the original ICC without bias, introduced by Fisher).

Findings

In all, 146 teachers (119 female (81.51%) and 27 male (18.49%)) agreed to participate in the study. The mean age of participants was 36.7 years (SD = 8.92. The average work experience of the teacher was 12.04 (SD = 6.2) years, and the average score of neck pain based on the visual analog scale in the participants was 7.5 (Table 3 attached iii).

The adequacy of the sample based on the KMO and Bartlett Sphericity test (KMO = 0.833 and $\chi 2$ = 5030.743, p <.001) was confirmed. The exploratory factor analysis was performed and based on the dimensions of the health belief model and considering the factor loading (values greater than 0.4), 12 factors were obtained (Figure 1 attached vi). After removing factors 11 and 12 due to low loading at this stage, 8 factors, including (items 1,3,6,7,10 of knowledge) (item 7 of behavior) (item 2 of self-efficacy), and (item 1 of cues to action) were removed. Then, for the second time, factor analysis of the remaining items was performed, and finally, an eight-factor solution with 43 items was achieved.

The findings indicated a satisfactory correlation between items and their hypothesized subscale, lending support to the construct validity of the questionnaire. The correlation between items and their subscales is shown in Table 4 (attached v).

Reliability, as examined by internal consistency (Cronbach's alpha), showed excellent results (alpha = 0.87). Infraclass correlation coefficient assessment also indicated that the questionnaire has satisfactory stability (ICC = 0.92). The results

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are presented in Table 5 (attached v).
For instance, the frequency of answers to the knowledge items is shown in Table 6, and the final questionnaire is shown in Table 7.

Discussion

The purpose of this study was to design and evaluate the reliability and validity of an instrument for evaluating factors associated with neck pain prevention behaviors among teachers. The initial items of the questionnaire were generated based on the data of a qualitative study and quantitative studies on neck pain in teachers [3, 5, 22, 26]. In this study, the data gathering was through telephone calls. These teachers were suffering from pain, which became more severe during the pandemic period, and so they were interested in sharing their experience with their pain. Furthermore, they were interested in the preventive intervention that we would like to provide for them, and so they were fully cooperative in this study.
The health belief model consists of six concepts: perceived sensitivity, perceived severity, perceived benefits, perceived barriers, Cues to action, and self-efficacy. These concepts with environmental, social, and psychological factors can play a role in the formation of a healthy behavior or a health-threatening behavior. The two concepts of perceived sensitivity and perceived intensity are considered to be a perceived threat, and this concept, with educational resources, environmental support, internal and external motives (Cues to action), skill, and self-efficacy, can lead to change behavior [27,28].
The results showed that the questionnaire was appropriate in terms of validity and reliability. In addition to assessing knowledge, it also measures other dimensions, including attitude and self-efficacy. The questionnaire can measure knowledge, attitude, perceived sensitivity, perceived intensity, perceived benefits, perceived resources, self-efficacy, and behaviors, which 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. 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.
Although this study had several strengths, there were some limitations. The most important limitation was the outbreak of the coronavirus and the closure of schools, where teachers had to answer the questionnaire online, so it may have affected their responses. 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 seems valuable in assessing and measuring the factors associated with occupational neck pain among teachers. According to interviews with the participants based on HBM, the majority of the data were adopted with this model and the literature. On the other hand, these teachers were being visited by medical specialists and health care providers and were informed about preventive behaviors, but they had perceived barriers and limitations to practicing the healthy behaviors. Thus, what we obtained from the qualitative phase of the study matched with existing literature.

Conclusion

The Occupational Pain Neck Prevention Behavior Questionnaire is a reliable instrument for teachers and can be used by teachers in future studies in different schools. Thus, this study provides an instrument for evaluating occupational neck pain prevention behaviors among teachers. The instrument could be applied by teachers to evaluate their

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unhealthy behavior due to their neck pain and so improve these risky behaviors. Furthermore, by applying this instrument by researchers, they will be able to design and implement appropriate preventive interventions.

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Authors' Contribution

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, writing, and provided the final draft. All authors read and approved the final manuscript.

Conflict of Interest

There is no conflict of interest for this study.

Ethical Permission

In this study, all methods were performed according to the Declaration of Helsinki, and all participants completed a written consent form. The Ethics Committee of Tarbiat Modares University approved the study (IR.MODARES.REC.1399.163).

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Table 1) The characteristics of participants in the qualitative study (n=25)

Age (Years)	Gender	Level of education	Marital status	Work experience
39	Female	Bachelor	Married	11 years
54	Female	Bachelor	Married	26 years
43	Man	Bachelor	Married	17 years
41	Female	Bachelor	Married	18 years
36	Female	Bachelor	Married	15 years
38	Female	Masters	Married	10 years
50	Female	Masters	Married	24 years
57	Female	Bachelor	Married	28 years
47	Man	Bachelor	Married	19 years
43	Man	PhD	Married	14 years
38	Female	PhD	Married	12 years
30	Female	PhD	Married	1 years
34	Female	Masters	Married	8 years
58	Female	Bachelor	Married	27 years
39	Man	Bachelor	Married	17 years
33	Man	Masters	Married	4 years
36	Female	Bachelor	Married	9 years
45	Female	Masters	Married	13 years
28	Female	Bachelor	Married	2 years
38	Female	Bachelor	Married	11 years
49	Man	Masters	Married	20 years
40	Female	Bachelor	Married	19 years
33	Female	Bachelor	Married	8 years
57	Female	Masters	Married	25 years
41	Female	Bachelor	Married	14 years

Table 2) The result obtained from exploratory factor analysis with varimax rotation (n=146)

Item / Factors	1	2	3	4	5	6	7	8	9	10
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 an 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
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	.018	.072	.127	.773	.046	-.015	.221	-.033	.099	-.091

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the day, I am less likely to have neck pain.										
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
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
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 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 scientific and credible information about health behaviors that are effective in reducing work shifts.	.264	.063	.143	.164	.070	-.084	.805	-.016	.102	-.014
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 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 keeping 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 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
38. During the day and 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	.139	.194	-.232	-.150	.066	-.063	-.058	.474	.278	.434

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straight and straight.										
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 3) Item-scale correlation matrix for the Occupational Neck Pain Prevention Behaviors Questionnaire

	Knowledge	perceived sensitivity	perceived severity	perceived benefits	perceived barriers	Cues to action	Self-efficacy	Behavior
Neck pain may also be felt in the shoulders and upper chest.	.632	.457	-.780	.289	.283	-.693	.317	.281
Prolonged sitting or bending the neck too much while working can cause neck pain.	.637	-.715	-.686	.214	.319	.425	.136	.471
Lack of rest time between work shifts increases neck pain.	.549	-.842	.436	.358	.249	.139	-.694	.458
Neck pain can cause absenteeism.	.671	.469	.436	.368	.285	.365	.421	-.781
Neck pain causes early retirement.	.586	.368	-.698	.318	.412	.325	-.786	.438
I get neck pain due to bending my head and neck forward too much.	-.985	.730	.246	.358	.391	-.765	-.853	.129
I get neck pain due to sitting for a long time while working.	.421	.700	.358	.482	.172	.369	.401	.381
8. I may suffer from neck pain if I do not exercise regularly.	-.741	.671	.432	.369	-.689	.406	.342	.214
If I use an inappropriate posture during a work shift, I get neck pain.	-.869	.834	-.921	.356	.421	.239	.382	.394
10. If I use non-standard tables, chairs, and footrests during work shifts, I will suffer from neck pain.	.241	.810	-.892	-.963	.369	-.639	.346	.325
If I do not get enough rest during my work shift, I may experience neck pain.	.322	.795	.369	-.693	.359	.358	.452	.412
Having neck pain can reduce my productivity in daily activities and work.	.369	-.812	.827	-.369	.325	-.961	-.639	-.583
If I have neck pain, I cannot be present at work, and it will cause me to be absent from work.	.369	-.126	.683	-.569	-.348	.258	.483	-.625
If I have neck pain, I will incur heavy medical expenses.	-.706	.241	.676	.398	.452	.412	.102	.106
If I have neck pain, I may retire early.	.302	-.582	.712	-.136	.258	.159	.369	-.680
Having neck pain has negative effects on my social relationships with others.	.356	.421	.692	.328	.372	.241	.482	.436
By doing proper stretching during the day, I am less likely to have neck pain.	-.004	.015	-.019	.592	-.129	.217	.115	-.069
If I use standard chairs, tables, and footrests during the work shift, I am less likely to get neck pain.	.302	-.012	.009	.697	-.369	-.620	-.982	-.013
If I use the right posture during my work shift, I will have less neck pain.	-.026	.236	-.892	.829	-.361	-.002	-.901	-.839
If I get enough rest during my work shift, I am less likely to get neck pain.	.005	.109	.209	.826	-.692	-.709	.369	.258

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If I manage to use the computer during the day, my chances of getting neck pain will decrease.	.026	.395	.109	.830	-.692	-.026	-.309	.239
It is difficult for me to keep my neck straight and straight due to the students' homework.	.293	.103	-.925	-.804	.764	-.056	-.609	-.981
23. Lack of time during the day has made it impossible for me to exercise.	-.021	.201	.006	.070	.643	.214	-.010	-.036
Too much work during the day has made it difficult for me to control stress.	.069	-.015	-.012	-.801	.696	.091	.102	.001
Lack of rules for rest during work shifts has made it impossible to rest while working	.032	-.015	-.025	-.106	.668	-.901	-.036	-.120
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.	-.103	-.002	-.105	.006	.012	.588	-.590	-.980
School principals have an effective role in observing rest time during work shifts to reduce neck pain in school teachers.	.012	-.036	-.810	-.693	.001	.826	-.632	-.920
School principals have an effective role in performing appropriate sports activities by school teachers to reduce neck pain.	-.910	-.001	.036	.001	.325	.747	.063	.003
I can get scientific and credible information about health behaviors that are effective in reducing neck pain from the media and related experts.	.029	.302	.069	-.203	-.913	-.316	.673	-.601
I can do proper exercise during the day and work shifts.	-.903	.106	.003	.013	.239	.302	.792	-.013
I can use the appropriate posture for teaching tasks during my work shift.	-.603	-.901	-.709	.006	.012	.209	.762	-.369
I can manage my computer usage time during work shifts and prepare curricula.	.032	.006	.115	.103	-.112	.362	.727	.381
I can identify and use standard tables and chairs with suitable backs during work shifts.	.009	-.073	-.109	.369	.201	.369	.741	.119
I can bend my neck forward less while keeping students' homework and keeping my head and neck straight and straight.	-.026	-.069	-.015	-.069	-.920	.209	.758	-.853
I receive scientific and credible information about health behaviors that are effective in reducing neck pain from the relevant media and experts.	.026	.009	.309	.143	.251	.021	.109	.721
36. I control my stress during daily activities and work shifts.	-.018	-.092	.218	.109	.003	.119	.043	.581
I rest for a few minutes during the work shift to relieve fatigue.	-.696	-.320	-.801	.360	.139	-.692	.301	.713

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During the day and work shifts, I do proper sports and stretching activities.	-.601	-.002	.109	.352	.164	.328	.261	.744
During the work shift, I use the appropriate position to perform teaching tasks.	.265	.015	.119	.325	.306	.109	.111	.737
I manage my computer usage time during work shifts and to prepare curricula.	-.002	-.320	-.692	.010	-.006	-.289	-.920	.689
When doing homework, I bend my neck forward a little and keep my neck straight and straight.	-.326	.321	.201	.013	-.325	.269	.150	.611
I use the right pillow when I sleep.	-.260	.215	-.692	-.364	-.325	.359	.201	.759
I follow the correct way of sitting, standing, and sleeping.	-.326	.022	-.801	.214	.320	-.259	-.369	.711

Table 4) The frequency of answers to the knowledge items

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

Table 5) The final results questionnaire and scoring manual

Items	CVR	CVI	Impact Score
Neck pain may also be felt in the shoulders and upper chest.	0.57	1	1.5
Prolonged sitting or bending the neck too much while working can cause neck pain.	0.85	0.85	1.5
Lack of rest time between work shifts increases neck pain.	0.57	0.92	1.6
Neck pain can cause absenteeism.	0.71	0.92	1.6
Neck pain causes early retirement	0.85	0.85	1.6
I get neck pain due to bending my head and neck forward too much.	0.57	0.92	1.5
I get neck pain due to sitting for a long time while working.	0.57	1	1.5
I may suffer from neck pain if I do not exercise regularly.	0.57	1	1.5
If I use an inappropriate posture during a work shift, I get neck pain.	0.49	0.92	1.6
If I use non-standard tables, chairs, and footrests during work shifts, I will suffer from neck pain.	0.85	0.92	1.6
If I do not get enough rest during my work shift, I may experience neck pain.	0.71	0.92	1.5
Having neck pain can reduce my productivity in daily activities and work.	0.71	1	1.5
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
If I have neck pain, I will incur heavy medical expenses.	0.71	1	1.6
If I have neck pain, I may retire early.	0.85	0.92	1.5
Having neck pain has negative effects on my social relationships with others.	0.57	0.78	1.5
By doing proper stretching during the day, I am less likely to have neck pain.	0.57	0.92	1.7
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
If I use the right posture during my work shift, I will have less neck pain.	0.85	1	1.7
If I get enough rest during my work shift, I am less likely to get neck pain.	1	1	1.6
If I manage to use the computer during the day, my chances of getting neck pain will decrease.	0.71	0.92	1.7
It is difficult for me to keep my neck straight and straight due to the students' homework.	0.71	0.92	1.5
Lack of time during the day has made it impossible for me to exercise.	1	0.85	1.6
Too much work during the day has made it difficult for me to control stress.	0.57	0.92	1.8
Lack of rules for rest during work shifts has made it impossible to rest while working.	0.49	0.92	1.6
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
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
School principals have an effective role in performing appropriate sports activities by school teachers to reduce neck pain.	0.57	1	1.5
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
I can do proper exercise during the day and during work shifts.	0.57	0.85	1.5
I can use the appropriate posture for teaching tasks during my work shift.	0.71	0.92	1.5

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I can manage my computer usage time during work shifts and prepare curricula.	0.71	0.92	1.5
I can identify and use standard tables and chairs with suitable backs during work shifts.	0.85	1	1.6
I can bend my neck forward less while keeping students' homework and keeping my head and neck straight and straight.	0.92	1	1.8
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
I control my stress during daily activities and work shifts.	1	0.92	1.5
I rest for a few minutes during the work shift to relieve fatigue.	0.85	0.92	1.5
During the day and during work shifts, I do proper sports and stretching activities.	0.57	1	1.7
During the work shift, I use the appropriate position to perform teaching tasks.	0.85	0.92	1.6
I manage my computer usage time during work shifts and to prepare curricula.	0.85	0.85	1.5
When doing homework, I bend my neck forward a little and keep my neck straight and straight.	0.71	0.85	1.5
I use the right pillow when I sleep.	0.85	1	1.7
I follow the correct way of sitting, standing, and sleeping.	0.85	1	1.6

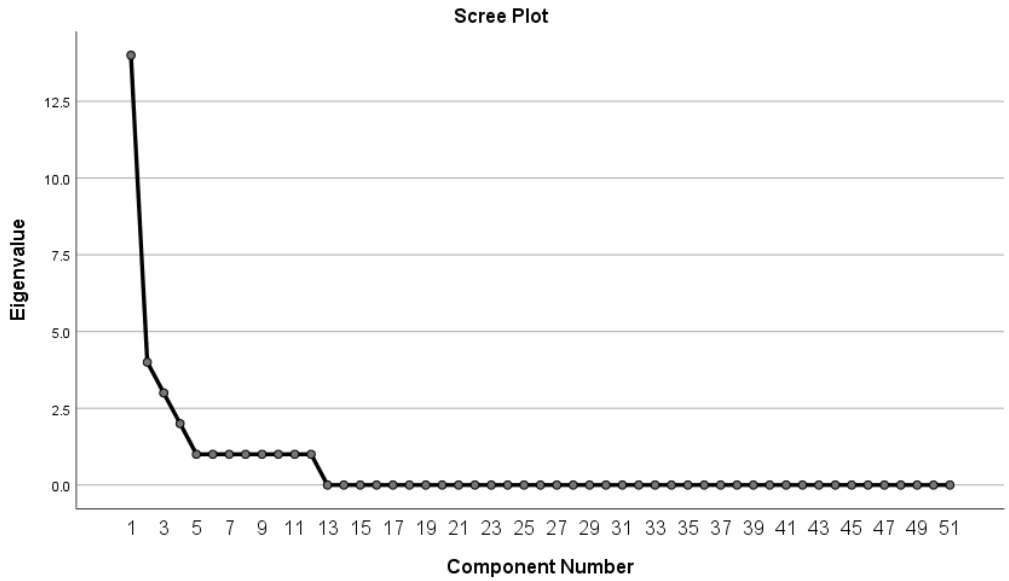

Figure1) The initial scree plot obtained from exploratory factor analysis for the questionnaire

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