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ORIGINAL RESEARCH

Development and Feasibility of an Educational programme to mitigate Work-related musculoskeletal disorders

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Abstract

Background: Physiotherapists frequently suffer from work-related musculoskeletal disorders (WRMSDs), which have an adverse effect on their well-being, productivity, and quality of care. In Nigeria, structured educational initiatives targeting WRMSDs prevention are limited.
Objectives: To develop and evaluate the feasibility of an educational intervention designed to reduce the risk of WRMSDs among physiotherapists in Southwest Nigeria.
Methods: A two-round Delphi study involving 20 experts in Southwest Nigeria was conducted to achieve consensus on the content of the educational programme. Items were retained if they achieved ≥75% agreement and met the Lawshe content validity ratio (CVR) critical values of ≥0.42 (panel of 20) and ≥0.44 (panel of 18). Following content validation, a pilot feasibility study was conducted among practising physiotherapists (n = 6) to assess usability and acceptability. Feasibility outcomes were evaluated using the Usefulness, Satisfaction and Ease of Use (USE) questionnaire.
Results: Consensus was reached across all major domains, including physical, organisational, and psychosocial risk factors. In round two, agreement (agree + strongly agree) ranged from 50% to 94% with content validity ratio (CVR) values between 0.78 and 1.00. Most items achieved a median of 4 (strong agreement) with interquartile range (IQR) of (3-4), indicating a high expert consensus. Pilot findings demonstrated high feasibility, favourable usability scores on the USE questionnaire and strong engagement with both theoretical and practical components.
Conclusion: The programme demonstrated content validity, feasibility, and relevance, supporting its integration into physiotherapy practice, training and professional development in Southwest Nigeria.

***Keywords**: Educational programme, Ergonomics, Feasibility, Work-related musculoskeletal disorders*

Introduction

Musculoskeletal disorders (MSDs) are common among physiotherapists due to the physically demanding nature of their work.[1] Many are classified as work-related musculoskeletal disorders (WRMSDs), arising from repetitive clinical tasks such as hands on manual techniques, patient handling, and assisted transfers which place excessive strain on the musculoskeletal system.[2, 3] These conditions often present as pain or functional impairment affecting muscles, joints, tendons, and nerves.[4] Prevalence varies by body region, with high rates reported in the thumb (up to 83%), lower back (62% to 69.8%), neck (61%) as well as the shoulders and lower extremities. [5, 6]

Physiotherapists are exposed to multiple risk factors for WRMSDs that can be broadly categorised as physical, organisational, and psychosocial. Physical risk factors include repetitive manual techniques, [7] prolonged static postures, bending, twisting, reaching away from the body, and sustained trunk flexion, which are strongly associated with symptoms in the lower back, neck, and upper back.[8] Organisational risk factors encompass high patient volumes, heavy caseloads, and the routine management of dependent or bariatric patients, often in settings with limited staffing or equipment. [9, 10] Psychosocial risk factors, including work-related stress and reduced job control, further interact with physical and organisational demands to increase vulnerability to musculoskeletal symptoms. These domains directly informed the structure of the educational programme, with targeted modules addressing safe manual handling and posture, workload and task organisation, and strategies to manage psychosocial strain in clinical practice.

These risk factors have direct implications for work performance and occupational outcomes. Moreover, WRMSDs contribute to decreased productivity, as affected physiotherapists may limit the intensity or duration of treatment sessions due to pain or fatigue.[11] Furthermore, WRMSDs are a major cause of sickness absenteeism, work restriction and disability among healthcare workers. [12] Among Egyptian physiotherapists, 55.8% of those with WRMSDs lost at least a half-day of work, despite 73.9% not officially reporting injuries. [13] Evidence from a review shows that persistent WRMSDs may prompt physiotherapists to change specialty or leave clinical practice. [14]

Educational interventions are effective in preventing WRMSDs among physiotherapists by promoting ergonomics, safe patient handling, postural awareness, workload management, and early symptom recognition. [15] These programmes improve safe work practices and support behavioural change, reducing musculoskeletal risk. [16] Although WRMSDs are well documented, most studies focus on prevalence rather than prevention. [6, 11, 13] Evidence on context specific educational interventions in low- and middle-income countries such as Nigeria remains limited. Physiotherapists in Southwest Nigeria face high workloads and limited ergonomic support, yet no

standardised educational framework exists, highlighting the need for a locally relevant preventive intervention.

The Delphi method offers a systematic approach for achieving expert consensus in areas where empirical evidence is limited or professional judgement is essential. [17] In the development of educational programmes for preventing WRMSDs among physiotherapists, the Delphi technique enables structured collection of input from experienced clinicians, educators, and occupational health specialists. This approach is particularly valuable in the Nigerian context, where there is limited locally generated evidence on effective preventive interventions, and where expert insights can ensure that programmes are both culturally appropriate and practically feasible within clinical settings. This study aims to develop and evaluate the feasibility of an educational intervention designed to reduce the risk of WRMSDs among physiotherapists in Southwest Nigeria.

Methods

Study Design and Study Setting: This study adopted a two-phase mixed method design comprising a Delphi consensus study followed by a pilot feasibility study. The Delphi phase was undertaken to systematically develop and validate the content of an educational programme aimed at preventing WRMSDs among physiotherapists in Southwest Nigeria. The second phase involved a feasibility study designed to assess the usability, acceptability, and practicality of the developed programme prior to implementation in a full scale randomised controlled trial. The Delphi study involved experts from academic, clinical, and policy institutions across Southwest Nigeria. These experts represented professional areas related to musculoskeletal health, occupational safety, and education for health professionals. The pilot feasibility study was carried out at Olabisi Onabanjo university teaching hospital Sagamu Ogun state a facility in Southwest Nigeria chosen for its high patient volume and well-established physiotherapy services.

Study Population: The study involved two separate groups. The first group included experts who took part in the Delphi study. They were drawn from a range of professional backgrounds relevant to the prevention of WRMSDs and the education of physiotherapists. The second group comprised practicing physiotherapists who participated in the pilot feasibility study and were representative of the intended target population for future evaluation of the intervention.

Selection of Participants

Selection of Delphi Experts: A total of 20 experts [18] were purposively recruited to take part in the Delphi study. They were selected to ensure representation from multiple disciplines and came from five professional areas: four from the education sector, four orthopaedic surgeons, four ergonomists, four public health specialists, and four physiotherapists. To be eligible, participants needed at least five years of

professional experience in their field, active involvement in clinical practice, research, teaching, or policy related to occupational health or musculoskeletal disorders, and evidence of contributions to the field, such as peer-reviewed publications, leadership roles, or participation in guideline development. Of the 28 experts invited, 20 agreed to participate, giving a response rate of 71%. To preserve independence and reduce potential influence among panel members, responses were collected anonymously and individual identities were not disclosed. The 20 consented expert completed the first round of Delphi while only 18 of them were able to complete the second round, giving 10% attrition rate observed between rounds. Experts received email invitations containing a study information sheet, informed consent form, and secure survey link for each round.

Selection of Pilot Study Participants: Six physiotherapists for the pilot feasibility study were recruited from Olabisi Onabanjo University Teaching Hospital using convenience sampling. Inclusion criteria included active clinical practice, registration with the relevant professional regulatory body, and willingness to participate in the educational intervention. Physiotherapists with current severe musculoskeletal injury limiting participation were excluded.

Instrument Development: The Delphi questionnaire was developed following a comprehensive review of empirical studies [6, 18] and relevant guidelines on WRMSDs, ergonomic interventions, and educational programmes for health professionals**.** The instrument was made up mostly of closed-ended questions organized into key themes, including ergonomic awareness, workplace posture, patient handling and transfer techniques, exercise and stretching strategies, and preventive education. Open-ended questions were also included to give experts the opportunity to suggest additional items or improvements. Before it was circulated, the draft questionnaire was reviewed by senior academics with expertise in musculoskeletal health and research methods to ensure that it was clear, relevant, and appropriate.

During the Delphi rounds, experts rated each item on a Likert-type scale, indicating how relevant and feasible it was for inclusion in the educational programme. The ratings were evaluated using Lawshe's Content Validity Ratio, with a minimum threshold of 0.42 required for an item to be retained. Items above this threshold were kept, and suggested changes were incorporated into the next round. The overall content validity of the questionnaire was calculated as the average CVR across all items, providing a measure of the instrument's overall validity. Consensus was defined beforehand as at least 75 percent agreement in both rounds. This structured process ensured that the final set of items reflected expert agreement across disciplines and had strong content validity.

The Delphi process was conducted electronically in English between November 2024 and January 2025 over three months and involved two iterative rounds. Each round was open for four weeks, with a two-week period between rounds for analysis, synthesis of feedback, and revision of the

questionnaire. The survey was administered using Google Forms, and reminder emails were sent to participants at the end of the second and third weeks of each round to encourage completion. After the first round, a summary of the feedback was prepared and shared with all experts before the second round. This summary included statistics for each item, such as the median, percentage agreement, and content validity ratio, allowing experts to reconsider their responses based on the group's feedback. The process maintained anonymity, allowed for iterative refinement, and systematically incorporated expert suggestions, following standard Delphi methodology.

Delphi Round One: In the first round, experts were asked to rate each proposed item for relevance and feasibility of inclusion in the educational programme using a Likert type scale. Consensus for item inclusion was predefined as agreement by at least 75% of participants. [18] Responses were analyzed, and suggested items were reviewed and incorporated where appropriate.

Delphi Round Two: The revised questionnaire, containing items retained from Round One and newly suggested items, was redistributed to the same panel of experts. Eighteen of the 20 experts (90%) completed Round Two; the two non-respondents were unavailable due to professional commitments. Participants were provided with anonymized summary feedback from Round One, including item-level percentage agreement, and were asked to re-rate each item in light of the group responses. Consensus was also defined as at least 75% of experts rating an item as "agree" or "strongly agree," consistent with Round One. All retained items met this threshold, and no new items were proposed. The Delphi process was thus concluded, and the final set of items was used to develop the educational programme.

Development of the Educational Programme: The findings from the Delphi study were used to develop a structured educational programme that reflects the professional and practical realities of physiotherapy practice in Nigeria after showing the results to the experts. The programme included modules on ergonomic awareness and posture correction, safe patient handling and transfer techniques, exercise and stretching strategies to support musculoskeletal health, and preventive measures to reduce the risk of WRMSDs. The content was designed to be practical, context-specific, and directly relevant to the needs of practicing physiotherapists. Educational materials included printed pamphlets and multimedia resources to enhance engagement and facilitate flexible delivery. The educational programme was developed for physiotherapists in Southwest Nigeria. It was delivered as a 90-minute, face-to-face lecture, facilitated by the principal investigator and supported with projector-assisted presentation materials. This was followed by a live demonstration with guided simulation to reinforce practical skills. Educational pamphlet on how to mitigate WRMSDs was also distributed to the participants summarizing key concepts. The programme was implemented as planned in an institutional lecture setting.

Pilot and Feasibility Study: A pilot feasibility study was conducted to assess the usability, acceptability, and practical implementation of the educational programme among practising physiotherapists. A total of 6 (male=4; female=2) physiotherapists were recruited from a tertiary physiotherapy clinic in Southwest Nigeria using the convenience sampling. The USE questionnaire was used. The questionnaire consists of 30 items distributed across four domains: usefulness (8 items), ease of use (11 items), ease of learning (4 items), and satisfaction (7 items). Responses are rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher score indicating better perceived usability. In terms of psychometric properties, the instrument has demonstrated excellent internal consistency with reported Cronbach's alpha coefficients of 0.98. [35]

*Data Analysis:*Data from the Delphi rounds were analyzed descriptively. For each item, the percentage of experts selecting "Strongly Agree" or "Agree" was calculated. Items reached the predefined consensus threshold of ≥75% in both rounds. Content validity was assessed using Lawshe's Content Validity Ratio (CVR) for each item, with a minimum acceptable CVR of 0.42 for a panel of 20 experts and 0.44 for Round 2 (18 experts). The scale-level content validity index (S-CVI/Ave) was calculated by averaging the item-level CVR values across all 19 items, providing an overall measure of content validity. Additionally, median and interquartile range (IQR)were used to ascertain consensus. For the pilot feasibility study, participant responses on the Usefulness, Satisfaction, Ease of Learning and Ease of Use (USE) questionnaire were summarized descriptively using frequencies and percentages.

Ethical Considerations: The researchers obtained ethical approval from the Humanities and Social Sciences Research Ethics Committee, HSSREC, of the University of KwaZulu-Natal ethical committee (ethical approval number: HSSREC/00007376/2024) and Health Research Ethics Committee of the Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria (HREC) approval number: OOUTH/HREC/738/2023/AP. All participants received detailed information regarding the study objectives, procedures, potential risks, and voluntary nature of participation. Written informed consent was obtained prior to participation. Confidentiality and anonymity were strictly maintained throughout the study, with all data securely stored on password-protected computers and encrypted files, accessible only to the research team, and used exclusively for academic and research purposes. The participants also had the right to withdraw from the study at any time.

Results

Expert Demographics: According to Table I, the Delphi expert panel consisted of 20 participants, predominantly male (85%), and all were married. Experts were selected to ensure multidisciplinary representation, including physiotherapists (20%), orthopaedic surgeons (20%), educators (20%), ergonomics experts (20%), and public health specialists (20%). The majority

of the experts had extensive professional experience, with 85% having more than 20 years of practice, 10% with 16–19 years, and 5% with 11–15 years of experience. The panel represented diverse geographical regions across Nigeria and included practitioners from both public and private clinical and academic settings. The Round Two completion rate was 90%, with 18 experts participating in the final round, reflecting high retention and engagement throughout the Delphi process.

Table I: Demographic and Professional Characteristics of Delphi Experts (n=20)

Characteristic	Frequency	Percentage (%)
Gender		
Male	17	85
Female	3	15
Professional Designation		
Physiotherapist (Deputy Directors)	4	20
Orthopaedic Surgeons (1 Professor, 3 Senior Consultants)	4	20
Educators (1 Professor, 3 Directorate Level)	4	20
Ergonomics Experts (Professors)	4	20
Public Health Specialists (Consultants)	4	20
Years of Professional Experience		
11–15	1	5
16–19	2	10
≥20	17	85

Delphi Round One Results: In Round One of the Delphi process (Table II), 20 experts evaluated 19 items across eight thematic domains. Each item was assessed for content validity using Lawshe's Content Validity Ratio (CVR), which measures whether experts consider an item "essential" for inclusion. The minimum acceptable CVR for the panel size was 0.42. All items achieved CVR values between 0.80 and 1.00, indicating that the experts considered the items highly essential. The scale-level content validity index (S-CVI/Ave), calculated as the mean of all item-level CVRs, was 0.96, demonstrating excellent overall content validity for the questionnaire. Separately, Delphi consensus was determined as the percentage of experts who agreed that an item should be included in the educational programme. Using the predefined threshold of ≥75% agreement, over 90% of items achieved consensus in Round One. Items with lower agreement were clarified or reworded to better suit the local context. Additionally, most items achieved a median of 4 (strong agreement) with an interquartile range (IQR) of (3-4), which indicated high consensus among the experts. Experts also suggested additional items to enhance comprehensiveness, such as the inclusion of workplace exercise breaks, ergonomic workstation redesign, and continuous professional education on WRMSDs prevention. These suggested items were incorporated into the revised questionnaire for Round Two.

Delphi Round Two Results Round two (Table III) involved redistribution of a revised questionnaire comprising 43 items to the same expert panel, accompanied by a structured summary of Round One outcomes. This iterative feedback process resulted in consensus levels exceeding 80 percent across all items, with item level CVR values ranging from 0.78 to 1.00, while the S-CVI/Ave remained stable at 0.96, confirming consistency and robustness of content validity across rounds. Also, most items achieved a median of 4 (strong agreement) with an interquartile range (IQR) of (3-4), which indicated high consensus among the experts. The absence of further suggestions or requests for modification in Round Two indicated convergence of expert opinion and strong agreement on both the scope and structure of the programme. Consequently, the Delphi process culminated in the validation of four core educational modules, encompassing ergonomic awareness and posture correction, safe patient handling and transfer techniques, exercise and stretching for musculoskeletal health, and preventive self-care strategies tailored to physiotherapists. These findings demonstrate that the final programme content is theoretically grounded, contextually relevant, and supported by a high level of expert consensus.

Pilot Feasibility Study: The pilot involved a small proportion of the anticipated study sample, selected to assess implementation processes rather than effectiveness. A total of six practicing physiotherapists participated in the feasibility study, representing a range of professional grades, including one director, two deputy directors, one senior physiotherapist, one principal physiotherapist, and one entry-level physiotherapist. In terms of clinical experience, three participants had over 20 years of professional practice, two had between 5 and 10 years of experience, and one had less than 5 years of experience. Participants were exposed to the educational materials and programme content as intended for subsequent large-scale application. Programme usability was assessed using the Usefulness, Satisfaction, and Ease of Use (USE) questionnaire. Descriptive analysis indicated consistently high ratings across all domains. The parameter scores were 90.0% for usefulness, 87.5% for satisfaction, 85.0% for ease of learning and 92.5% for ease of use on the 7-point Likert scale, reflecting strong user approval and minimal usability concerns.

Table II: Round One Consensus Ratings for Delphi Questionnaire Items (n=20)

Domain	Item	SA n (%)	A n (%)	D n (%)	SD n (%)	SA+A	CVR	Mean	Median	IQR	Decision
Understanding WRMSDs and Their Causes	Definition and Prevalence	16 (80)	4 (20)	0	0	20	1	3.80	4.00	(4-4)	Retained
	Risk Factors	17 (85)	3 (15)	0	0	20	1	3.85	4.00	(4-4)	Retained
	Causes, Signs, Symptoms, Prevention and Management	14 (73.7)	5 (26.3)	0	0	19	0.9	3.74	4.00	(3-4)	Retained
Biomechanics and Ergonomics in physiotherapy Practice	Ergonomic Principles	14 (70)	6 (30)	0	0	20	1	3.70	4.00	(3-4)	Retained
	Body Mechanics and Movement Techniques	14 (70)	5 (25)	1(5)	0	19	0.9	3.68	4.00	(3-4)	Retained
	Environmental Modifications	11 (55)	9 (45)	0	0	20	1	3.55	4.00	(3-4)	Retained
Physical Conditioning and Self-Care Strategies	Strengthening and Flexibility Exercises	14 (70)	6 (30)	0	0	20	1	3.70	4.00	(3-4)	Retained
	Stretching and Micro-breaks	11 (55)	9 (45)	0	0	20	1	3.55	4.00	(3-4)	Retained
	Joint Protection Principles, do's and don't s	13 (65)	7 (35)	0	0	20	1	3.65	4.00	(3-4)	Retained
Safe Patient Handling and Transfer Techniques	Manual Handling Training	14 (70)	6 (30)	0	0	20	1	3.70	4.00	(3-4)	Retained
	Assistive Devices	10 (50)	10 (50)	0	0	20	1	3.50	3.50	(3-4)	Retained
Workplace Policies and Support Systems	Occupational Health and Safety Regulations	16 (80)	4 (20)	0	0	20	1	3.80	4.00	(3-4)	Retained
	Reporting and Monitoring Systems	13 (65)	7 (35)	0	0	20	1	3.65	4.00	(3-4)	Retained
Psychosocial Factors and Stress Management	Stress and WRMSDs	13 (65)	7 (35)	0	0	20	1	3.65	4.00	(3-4)	Retained
	Building Resilience	10 (50)	8 (40)	2 (10)	0	18	0.8	3.44	3.00	(3-4)	Retained
Case Studies and Practical Simulations	Hands-On Simulations	10 (50)	10 (50)	0	0	20	1	3.50	3.50	(3-4)	Retained
	Problem-Solving in Patient Handling	11 (55)	9 (45)	0	0	20	1	3.55	4.00	(3-4)	Retained
Assessment and Feedback Mechanisms	Self-Assessment Tools	14 (70)	6 (30)	0	0	20	1	3.70	4.00	(3-4)	Retained
	Feedback and Peer Support	11 (55)	8 (42.1)	0	0	19	0.9	3.58	4.00	(3-4)	Retained

Footnotes: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree;
Agreement (SA+A): Sum of experts who rated the item as "Strongly Agree" or "Agree" CVR (Content Validity Ratio): Calculated using Lawshe's formula: $\frac{ne-N/2}{N/2}$, CVR where
ne is the number of experts agreeing on an item, and N = total panel size. Minimum acceptable CVR for N=20 is 0.42.
Decision: Item retained if CVR ≥ 0.42 and SA+A ≥ 75%

Discussion

Experts rated items on the definition, risk factors, burden, and economic impact of WRMSDs very highly, with agreement levels between 72% and 94% and CVR values from 0.89 to 1.00. This suggests a clear awareness of how these disorders affect both individual physiotherapists and the health system. Physiotherapists in many countries, regardless of available resources, frequently experience WRMSDs in the lower back, shoulders, and wrists. [14] These problems are often associated with patient handling, repetitive movements, and long periods of sustained posture during clinical work. [11]

Experts also emphasized the professional challenges posed by these disorders, noting that they can affect daily functioning and overall quality of life. [2, 3, 6-8] Research from Nigeria and other regions supports this view, showing that WRMSDs can reduce the ability of physiotherapists to perform their work effectively. [6, 8]

The panel strongly supported interventions targeting physical risk factors and ergonomics. Between 55% and 83% of experts agreed on the importance of body mechanics, patient handling, and environmental modifications, with CVR values from 0.78 to 1.00. These factors influence the physical load during repetitive tasks, awkward postures, and patient lifting, which explains the consensus. Evidence shows that poor body mechanics and unsafe work environments are key contributors to musculoskeletal injuries in physiotherapists. [19] The agreement underscores the need to include ergonomic principles and environmental adjustments in training and professional development to reduce injury risk and improve safety and performance. [20,21]

The organisational environment in which physiotherapists work was recognized as a key factor influencing the risk of WRMSDs. Between 50% and 83% of experts agreed on the importance of occupational safety regulations, incident reporting systems, job control, workplace communication, departmental organisation, workload distribution, and formal risk assessment processes. Several of these items received CVR values as high as 1.00 reflecting strong consensus among the panel.

These endorsements are grounded in real and observable conditions. In Nigeria, physiotherapists routinely manage overwhelming patient loads with insufficient staffing support, a situation that almost certainly contributes to the recorded 12-month WRMSDs prevalence of 91% among this group. [6] What is happening in Nigeria is not altogether different from what researchers have found elsewhere. International evidence consistently demonstrates that when physiotherapists have little control over their working conditions, operate in environments where communication is fragmented, and lack accessible mechanisms to formally report injuries, the likelihood of sustaining musculoskeletal harm increases substantially. [22, 23]

Table III: Round Two Consensus Ratings for Delphi Questionnaire Items on Educational Programme Content (n = 18)

Domain	Item	SA n (%)	A n (%)	D n (%)	SD n (%)	SA+A (n)	CVR	Mean	Median	IQR	Decision
Understanding WRMSDs and their causes	Definition and prevalence	15 (83.3)	3 (16.7)	0 (0.0)	0 (0.0)	18	1	3.83	4.00	(4-4)	Retained
	Risk factors	17 (94.4)	1 (5.6)	0 (0.0)	0 (0.0)	18	1	3.94	4.00	(4-4)	Retained
	Signs and symptoms, prevention and management of WRMSDs	16 (88.9)	2 (11.1)	0 (0.0)	0 (0.0)	18	1	3.89	4.00	(4-4)	Retained
	Effects of WRMSDs on Physiotherapist's Quality of Life and Productivity	16 (88.9)	2 (11.2)	0 (0.0)	0 (0.0)	18	1	3.89	4.00	(4-4)	Retained
	Specific Effects on Activities of Daily Living (ADLs)	14 (77.8)	4 (22.2)	0 (0.0)	0 (0.0)	18	1	3.78	4.00	(4-4)	Retained
	Coping strategies	14 (77.8)	4 (22.2)	0 (0.0)	0 (0.0)	18	1	3.78	4.00	(4-4)	Retained
	Familial WRMSDs	13 (72.2)	4 (22.2)	0 (0.0)	0 (0.0)	17	0.89	3.76	4.00	(3-4)	Retained
	Sources of awareness	11 (61.1)	6 (33.3)	1 (5.6)	0 (0.0)	17	0.89	3.59	4.00	(3-4)	Retained
	Perception of WRMSDs	13 (72.2)	4 (22.2)	1 (5.6)	0 (0.0)	17	0.89	3.71	4.00	(3-4)	Retained
	Public health significance	13 (72.2)	4 (22.2)	1 (5.6)	0 (0.0)	17	0.89	3.71	4.00	(3-4)	Retained
	Cost of Management and Economic Burden	12 (66.7)	6 (33.3)	0 (0.0)	0 (0.0)	18	1	3.67	4.00	(3-4)	Retained
Biomechanics and Ergonomics in Physiotherapy Practice	Ergonomic principles	15 (83.3)	3 (16.7)	0 (0.0)	0 (0.0)	18	1	3.83	4.00	(4-4)	Retained
	Body Mechanics and Movement Techniques	14 (77.8)	4 (22.2)	0 (0.0)	0 (0.0)	18	1	3.78	4.00	(4-4)	Retained
	Ergonomic design	14 (77.8)	4 (22.2)	0 (0.0)	0 (0.0)	18	1	3.78	4.00	(4-4)	Retained
	Environmental Modifications and Work Space Optimization	15 (83.3)	3 (16.7)	0 (0.0)	0 (0.0)	18	1	3.83	4.00	(4-4)	Retained
	Individual and Task Factors During Practice	10 (55.6)	8 (44.4)	0 (0.0)	0 (0.0)	18	1	3.56	4.00	(3-4)	Retained
	Benefits of Ergonomic Compliance	11 (61.1)	7 (38.9)	0 (0.0)	0 (0.0)	18	1	3.61	4.00	(3-4)	Retained
	Barriers to Implementing Favourable Prevention Practices	12 (66.7)	6 (33.3)	0 (0.0)	0 (0.0)	18	1	3.67	4.00	(3-4)	Retained
Physical Conditioning and Self-Care	Strengthening and flexibility exercises	13 (72.2)	5 (27.8)	0 (0.0)	0 (0.0)	18	1	3.72	4.00	(3-4)	Retained
	Stretching and micro breaks	12 (66.7)	6 (33.3)	0 (0.0)	0 (0.0)	18	1	3.67	4.00	(3-4)	Retained
	Joint protection principles, hints, do's and dont's	13 (72.2)	5 (27.8)	0 (0.0)	0 (0.0)	18	1	3.72	4.00	(3-4)	Retained
	Aerobic exercise	9 (50.0)	9 (50.0)	0 (0.0)	0 (0.0)	18	1	3.50	3.50	(3-4)	Retained
	Back school	8 (44.4)	8 (44.4)	2 (11.2)	0 (0.0)	16	0.78	3.33	3.00	(3-4)	Retained
	Health literacy	12 (66.7)	5 (27.8)	1 (5.6)	0 (0.0)	17	0.89	3.65	4.00	(3-4)	Retained
	Essential Nutritional Support	6 (33.3)	10 (50.0)	2 (11.2)	0 (0.0)	16	0.78	3.25	3.00	(3-4)	Retained

Table IIIB: Round Two Consensus Ratings for Delphi Questionnaire Items on Educational Programme Content (n = 18)

Domain	Item	SA n (%)	A n (%)	D n (%)	SD n (%)	SA+A (n)	CVR	Mean	Median	IQR	Decision
Safe Patient Handling and Transfer Techniques	Manual Handling Devices and Protocols Training	13 (72.2)	5 (27.8)	0 (0.0)	0 (0.0)	18	1	3.72	4.00	(3-4)	Retained
	Assistive devices	10 (55.6)	8 (44.4)	0 (0.0)	0 (0.0)	18	1	3.56	4.00	(3-4)	Retained
	Transfer and Lifting Procedures and Techniques	13 (72.2)	5 (27.8)	0 (0.0)	0 (0.0)	18	1	3.72	4.00	(3-4)	Retained
Workplace policies and support systems	Occupational Health and Safety Regulations	15 (83.3)	3 (16.7)	0 (0.0)	0 (0.0)	18	1	3.83	4.00	(4-4)	Retained
	Reporting and monitoring systems	10 (55.6)	8 (44.4)	0 (0.0)	0 (0.0)	18	1	3.56	4.00	(3-4)	Retained
	Job control	9 (50.0)	8 (44.4)	1 (5.6)	0 (0.0)	17	0.89	3.53	4.00	(3-4)	Retained
	Communication with upline and downline	10 (55.6)	8 (44.4)	0 (0.0)	0 (0.0)	18	1	3.56	4.00	(3-4)	Retained
	Departmental/organizational structure and workload allocation	11 (61.1)	7 (38.9)	0 (0.0)	0 (0.0)	18	1	3.61	4.00	(3-4)	Retained
	Workplace Risk Assessment	15 (83.3)	3 (16.7)	0 (0.0)	0 (0.0)	18	1	3.83	4.00	(4-4)	Retained
Psycho-social Factors and Stress Management	Stress and WRMSDs	13 (72.2)	5 (27.8)	0 (0.0)	0 (0.0)	18	1	3.72	4.00	(3-4)	Retained
	Building Resilience	11 (61.1)	5 (27.8)	2 (11.2)	0 (0.0)	16	0.78	3.56	4.00	(3-4)	Retained
	Job satisfaction	12 (66.7)	6 (33.3)	0 (0.0)	0 (0.0)	18	1	3.67	4.00	(3-4)	Retained
	Importance of Psychosocial Support	12 (66.7)	6 (33.3)	0 (0.0)	0 (0.0)	18	1	3.67	4.00	(3-4)	Retained
Case Studies and Practical Simulations	Hands on simulations	9 (50.0)	9 (50.0)	0 (0.0)	0 (0.0)	18	1	3.50	3.50	(3-4)	Retained
	Problem-Solving in Patient Handling	13 (72.2)	4 (22.2)	1 (5.6)	0 (0.0)	17	0.89	3.65	4.00	(3-4)	Retained
	Case Scenario to Demonstrate Ergonomic Compliance at Work	14 (77.8)	4 (22.2)	0 (0.0)	0 (0.0)	18	1	3.78	4.00	(4-4)	Retained
Assessment and feedback	Self-assessment tools	14 (77.8)	4 (22.2)	0 (0.0)	0 (0.0)	18	1	3.78	4.00	(4-4)	Retained
	Feedback and Peer Support	12 (66.6)	6 (33.3)	0 (0.0)	0 (0.0)	18	1	3.67	4.00	(3-4)	Retained

Footnotes:
SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree;
Agreement (SA+A): Sum of experts who rated the item as "Strongly Agree" or "Agree"
CVR (Content Validity Ratio): Calculated using Lawshe's formula: $\frac{ne-N/2}{N/2}$, CVR where
ne is the number of experts agreeing on an item, and N = total panel size. Minimum acceptable CVR for N=20 is 0.42.
Decision: Item retained if CVR ≥ 0.42 and SA+A ≥ 75%

Taken together, these findings make a compelling case for treating organizational reform not as a background consideration but as a central pillar of any serious effort to reduce WRMSDs in clinical settings.

The panel also gave meaningful attention to physical conditioning and self-care as protective strategies. Experts highlighted the value of strengthening and flexibility exercises, scheduled micro-breaks during

clinical sessions, joint protection techniques, aerobic physical activity, health literacy, and nutritional awareness. Agreement percentages for some of these items were somewhat lower than for other domains, yet the CVR values remained consistently strong, indicating that the panel regarded these elements as genuinely important rather than supplementary. This is hardly a surprising finding. Physiotherapists who take their own physical health seriously and build consistent self-care routines into their lives are simply better prepared for the realities of clinical work and are far less likely to find themselves sidelined by injuries that accumulate quietly over years of practice. The research bears this out. Workplace exercise programs that combine resistance training with regular stretching have proven effective in reducing musculoskeletal pain and restoring function in areas like the neck and back, which bear much of the burden in this profession. [23] There is also evidence that when physiotherapists engage in both strengthening and flexibility training together, the physical strain of patient handling tasks becomes considerably more manageable. [24]

Psychosocial factors are recognised contributors to WRMSDs. [21,26] Aforementioned factors such as high patient volumes, staffing shortages, and resource limitations in Nigerian practice settings may exacerbate stress and reduce job satisfaction. The Delphi results demonstrated expert endorsement of stress management, resilience building, job satisfaction, and psychosocial support. This aligns with research indicating that psychosocial interventions, clear communication structures, and supportive workplace environments can reduce WRMSDs incidence and improve adherence to preventive behaviours. [25, 26] Collectively, these findings support a multidimensional prevention model integrating physical, organisational, and psychosocial components.

Experiential learning strategies, including case studies and hands-on simulations, were also strongly supported. Agreement was also strong for simulation-based activities and case-based ergonomic scenarios, with high CVR values. These findings suggest recognition that experiential learning enhances knowledge translation and reinforces safe handling behaviours more effectively than theorectical instruction alone. Problem-solving and simulation-based training enable exercises allow physiotherapists to apply knowledge in realistic clinical settings, enhancing critical thinking and decision-making. under physical and cognitive demands. [27] Evidence shows that these experiential approaches improve posture awareness, promote safe handling practices, and help reduce musculoskeletal injury risk. [28] In the Nigerian context, where clinical workloads are high and supervision may be limited, incorporating case-based simulations learning may strengthen physiotherapists' practical competence in WRMSDs prevention.

The novelty of this study lies in the systematic development and validation of a structured, context-specific educational programme for WRMSDs prevention among

physiotherapists in Southwest Nigeria. High expert consensus and strong content validity indices indicate methodological robustness. Comparable multidimensional educational programmes addressing physical conditioning, ergonomics, safe patient handling, organisational strategies, and psychosocial support have been shown to reduce musculoskeletal injury among healthcare workers. [29-31]

The pilot feasibility phase demonstrated high usability and acceptability. Participants reporting positive experiences and engagement, and high USE scores indicate that the programme was accessible, well-structured, and relevant to physiotherapy practice realities. These findings are consistent with studies showing that user-centred educational interventions enhance knowledge retention, adoption, and implementation of safe workplace behaviours. [32-34] In settings where formal training on WRMSDs prevention is limited, such a programme appears particularly feasible and valuable, providing structured guidance that aligns with participants' workflow and resource constraints.

This study had some limitations. The Pilot phase was conducted exclusively in tertiary health facilities, which may limit the generalisability of the findings to primary care and private practice settings. In addition, cultural and resource variations across different Nigerian clinical settings were not fully captured, which may affect the applicability of the programme beyond the study sites.

Implications for practice and education: Implementation of this programme has the potential to enhance physiotherapists' knowledge, skills, and adherence to safe work practices, including ergonomic compliance, effective patient handling, and stress management. Incorporating this curriculum into pre-service and in-service training could address gaps in current Nigerian physiotherapy education, fostering safer clinical environments and potentially reducing the incidence of WRMSDs.

Conclusion and Recommendation

The Delphi study successfully developed and validated a structured educational programme for preventing WRMSDs among physiotherapists in Southwest Nigeria. High expert endorsement across content domains and positive pilot feasibility findings indicate that the programme is relevant, acceptable, and implementable in clinical practice. The results highlight the importance of integrating physical, organisational, and psychosocial strategies into physiotherapy education and continuous professional development to reduce occupational risk. Multi-centre studies incorporating longer-term follow-up and objective measures of behaviour change are required to further evaluate the programme's implementation potential and scalability across diverse Nigerian clinical settings.

Ethical Considerations: The researchers obtained ethical approval from the Humanities and Social Sciences Research Ethics Committee, HSSREC, of the University of KwaZulu-Natal ethical committee (ethical approval number: HSSREC/00007376/2024) and Health Research Ethics Committee of the Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria (HREC) approval number:

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