

Development & Validation of a Questionnaire to Determine Injury Prevalence, Frequency & Severity in Recreational Marathon Runners

^[1] Falak Kanabar, ^[2] Dr. Anil Kumar Mishra

^[1] Assistant Professor and Ph.D. Scholar, Shrimad Rajchandra College of Physiotherapy, Uka Tarsadia University - Deemed to be University, Bardoli, Gujarat, India

^[2] Guide & Principal, Shrimad Rajchandra College of Physiotherapy,

Uka Tarsadia University - Deemed to be University, Bardoli, Gujarat, India

Corresponding Author Email: ^[1] falakkanabar@gmail.com, ^[2] anil.mishra@utu.ac.in

Abstract— While numerous questionnaires have been developed to investigate injuries in athletes across various sports, a significant void exists in the literature regarding a questionnaire that specifically assesses injury prevalence, frequency, and severity in recreational marathon runners, highlighting the need for a targeted and validated tool. Therefore, this comprehensive study was envisaged to develop and validate a questionnaire which can be used in any long distance runner. Questionnaire was constructed in two phases: 1. questionnaire development and 2. validity assessment & pilot testing. Questionnaire was developed after thorough critical review of relevant articles. Once the questionnaire was developed primary content validation was done by 2 experts of the field. Based on the suggestions of the experts revision was done in the questionnaire. This was followed by face validation from 2 runners of target population. After receiving the responses from runners Delphi blinded validation was done to get reviews from external blinded reviewers. After Delphi validation pilot fill-up was done from 2 participants of target population and at last item level content validity index (I-CVI) and scale-level content validity index (S-CVI/Ave) values were calculated to get quantitative detail of the questionnaire validity. The calculated score CVI value was 0.9629 which suggested excellent content validity. Delphi facilitator had also received positive reviews from the reviewers. In conclusion the questionnaire was found to be a valid measure for determining injury prevalence, frequency & severity in recreational marathon runners.

Keywords: Injury questionnaire, Recreational marathon runners and injuries, Running injuries, Validation of a questionnaire.

I. INTRODUCTION

Marathon running is a recreation activity which has experienced an exceptional development over the last decade, as an increasing number of individuals consider it an appropriate alternative for recreation based physical activity [1]. Long-distance running is a popular activity with runners ranging from recreational through to elite, differing in speed and abilities. Faster and better performing runners generally have a more efficient running movement and better running economy [2].

However, running may also cause injuries, especially to the lower extremities. Various studies have reported on the prevalence and incidence of running injuries occurring in long distance runners during training or races. [3], [4], [5] With the boost in the number of runners, there has been an increase in the prevalence of running-related musculoskeletal injuries, where the incidence may vary from 19.4% to 92.4%, depending on the characteristics of the runner studied and the methodology used to assess the occurrence of injury [6], [7], [8].

Despite the benefits of running, the number of running injuries reported in the literature is worrisome [9]. Further investigation is necessary, because the incidence of running injuries in long distance runners is not clear and knowledge

of the specific determinants of these injuries is still unsatisfactory. Future studies should clearly define the type of runners included (sprinters, middle distance, or long distance runners) and also specifically report information about training characteristics and race participation, so that the results can be applied on the correct group of runners. Also investigators should try to use a universal definition of running injury, so that results can easily be compared. Likewise the length of observation period needs to be equal in different studies and the incidence numbers need to be expressed in comparable units. Finally, to obtain information on the clinical consequences of running injuries, details on the duration and severity of these injuries, as well as information on the use of professional medical advice and the chosen treatment, is required [6].

It is assumed that training overload can accentuate the symptoms of an overuse injury, causing the runner to change his usual running pattern, overloading integral structures, causing a new injury [10].

Along with above mentioned findings, author also noted after thorough literature review that there is a lack of validated questionnaire specifically designed for recreational marathon runners which include above mentioned assessment parameters. The development of a valid questionnaire would enable researchers and sports

physiotherapists to accurately assess injury patterns in this population, identify high-risk groups, and develop targeted interventions to reduce the burden of injuries.

This investigation aimed to design, develop, and validate a specialized questionnaire for assessing injury prevalence, frequency, and severity in recreational marathon runners, thereby providing a standardized instrument for research, clinical, and sports applications, and addressing a significant gap in the current literature.

II. MATERIAL & METHODS

The present instrument development study was conducted at *Shrimad Rajchandra College of Physiotherapy, Uka Tarsadia University*, from February to August 2023, after approval from the Institutional Human Ethical Committee.

Due to the dearth of a validated questionnaire in the domain of injury documentation of recreational distance runners, a questionnaire tool was prepared *de novo* to address the gap.

Sections of the questionnaire: The questionnaire was constructed with 4 different sections. Section A was for demographic details of the participant, section B was designed to understand training characteristics of the participant, section C was design to understand the pain and injury characteristics and section D was included to document location of pain and injury. At the end of the questionnaire a remark section was also given to write any additional comments.

Phases of the questionnaire development process: The questionnaire was constructed in the following two phases, phase 1: questionnaire development; phase 2: assessing the validity of the questionnaire by primary content validation, face validation from participants, Delphi blinded validation, followed by pilot fill-up and at last item level content validity index (I-CVI) & scale-level content validity index (S-CVI/Ave) average value calculation.

Phase 1: Questionnaire development:

Phase 1a: Establishment of a conceptual framework and identification of Categories: A conceptual framework ensures identification of all the relevant categories of the underpinning research objective and their coverage in the study questionnaire. Therefore, for all four sections, phase 1a involved an intensive literature review in multiple databases using the following search criteria: 'injury in runners', 'recreational marathon runners & injury', 'long distance running and injury', 'injury in marathon runners', 'running injuries'. The process also included identification of categories – to which the components subsequently developed were mapped.

Phase 1b: Generation of questions: Relevant components for all four section/categories were generated through critical review of multiples articles. Along with that literature review was also done to understand phrasing of questions in such a way that it can be understood very easily.

Phase 2: Assessing the validity of the questionnaire:

Validity is defined as whether the tool measures what it is intended to [11],[12].

After development of the questionnaire primary content validation was done by two experts in the field of sports physiotherapy. Suggestions were taken from those experts and based on those suggestions some revisions were done in the questionnaire. Following the revision face validation was done from target population. After face validation from the participants

Delphi blinded validation was initiated with the help of a facilitator and expert of the field. The facilitator sent the questionnaire to multiple blinded expert reviewers of the field and responses were received from the blinded reviewers. Following the Delphi blinded validation pilot fill-up was done from participants of the target population to understand their response for the questionnaire.

At last for quantification of content validity, two experts were asked to fill a content validation form, these are the experts who had given reviews during primary content validation. The experts had given rating to each and every question of the survey questionnaire for its relevance and clarity towards the research objective.

Based on the ratings from those two experts I-CVI & S-CVI average values were calculated.

As described by Denise F. Polit [13] I-CVI values were calculated by total number of experts in agreement divided by total experts for each item of the questionnaire. While, S-CVI Average is the arithmetic mean of I-CVI. S-CVI Average, having values ≥ 0.9 are considered as having excellent content validity [14]

III. RESULTS

Phase 1: Questionnaire development:

Phase 1a: Establishment of a conceptual framework and Identification of Categories: Establishment of the framework and identification of categories were done by quite thorough literature review. A conceptual framework for the questionnaire was established through a comprehensive process of collecting and organizing all relevant questions. To maintain simplicity and clarity, a basic structural framework was designed, commencing with a demographics section that solicits essential personal information from participants. This is followed by a training characteristics section, which gathers detailed information regarding the participant's running training regimen. The third section focuses on pain and injury characteristics, inquiring about past and current experiences of pain or diagnosed injuries, as well as the participant's current injury status. The final section aims to pinpoint the location and severity of any existing injuries. This structured framework ensures a logical and systematic approach to data collection

Phase 1b: Generation of questions: Using literature search, expert consultation and qualitative data, a total of 27

items were finally generated and mapped under three different injury specific sections. So in total the questionnaire has four sections out of which 1st section is for demographic details and the remaining three are injury and training specific sections. As mentioned previously in the first section questions were kept to gather basic information of the participants. In section two 'Training characteristics' details of the running experience, type of shoe used, number of marathons completed, warm up, cool down strategies etc. were gathered. Majority of the questions in section two were close ended with opportunity to write description in certain questions as per the need of the interviewer. In section three 'Pain and injury characteristics' participants are asked whether they are having any pain or not, whether they had any injury previously or not, whether they had to take rest days or easy training days because of any injury etc. In fourth section 'Location of pain and injury' information of current injury is gathered including location of pain, occurrence of trauma or not, what is the intensity of the injury and specific location of pain and injury. With this section information of specific location of pain and injury is supposed to be gathered to understand the impairment of the athlete better. In the last section all the body regions are listed and athlete describes the exact region of pain and injury along with the injury intensity.

A first version of the questionnaire was developed containing 4 sections and 27 injury specific questions which was subject to primary content validation for experts of the field and revision.

Phase 2: Assessing the validity of the questionnaire:

Phase 2a: Primary content validation - After development of the questionnaire primary content validation was done by two experts in the field of sports physiotherapy. These experts are sports physiotherapy practitioner and researchers. Their suggestions were taken regarding the framework of the questionnaire and also regarding the type & formatting of the questions, based on those suggestions some revisions were done in the questionnaire. The suggestions by the experts were towards the grammatical formatting of questions, addition of some missing body region in section four, changing of a word from 'off day' to 'rest days' and also a suggestion was received to document the history of participant regarding the physiotherapy treatment taken in past. Many more suggestions were given by experts in primary content validation based on which revision in the questionnaire was made.

Phase 2b: Face validation - Following the revision face validation was done from target population. Two participants from the target population provided their views on the questionnaire with face validation form. For relevance, readability, clarity and understandability of the questionnaire the participants described the questionnaire as 'outstanding' and 'good' in face validation forms.

Phase 2c: Delphi blinded validation - After face validation from the participants delphi blinded validation was initiated with the help of a facilitator and expert of the sports physiotherapy field. The facilitator sent the questionnaire to multiple blinded expert reviewers of the field and responses were received from the blinded reviewers. Responses from all the blinded expert reviewers were 100% positive and they mentioned the questionnaire as 'good to go' for surveys. Hence 2nd round of the Delphi validation process was omitted.

Phase 2d: Pilot fill-up - As in the delphi blinded validation process, the questionnaire received unanimous approval and endorsement from all expert reviewers, with a 100% consensus indicating excellence and readiness for application in survey research, an interview based pilot fill-up was conducted from 2(two) participants of target population to understand their response for the questionnaire and to understand their responses to each section and each question. The objective with the pilot fill-up was to understand whether the participants are able to interpret and answer all questions or not and also to understand what amount time does it take to fill up the questionnaire.

Following the pilot fill up it was interpreted that the participants are able to interpret all the questions and they are able to answer all the questions. The time taken to fill up the questionnaire for one participant was 15 minutes when it is being filled for the first time and 10 to 11 minutes when filled on follow up.

Phase 2E: Calculation of I-CVI and S-CVI Average values - towards the end of validation process content validation form was filled by those two experts who had given reviews during primary content validation. The experts had given rating to each and every question of the questionnaire for its relevance and clarity towards the research objective.

Based on the ratings from those two experts I-CVI & S-CVI average values were calculated.

As described by Denise F. Polit [13] I-CVI values were calculated by total number of experts in agreement divided by total experts for each item of the questionnaire. While, S-CVI Average is the arithmetic mean of I-CVI. S-CVI Average, having values ≥ 0.9 are considered as having excellent content validity. [14]

The calculated I-CVI value was 1 in total 25 questions out of total 27 questions. The remaining 2 questions had received 0.5 I-CVI score. Hence the calculated S-CVI Average value was 0.9626 which suggests excellent content validity.

IV. DISCUSSION

This study describes the development process of the questionnaire meant for measuring injury prevalence, frequency and severity in recreational marathon runners. Study also reports the outcomes of the validity assessment. The development of the questionnaire was done after

reviewing multiple articles on injury rates in marathon runners as well as articles were referred to understand formulation of a questionnaire. It takes 15 minutes to fill the questionnaire for the first time and 10 to 11 minutes in follow up assessments.

Study underwent development of questionnaire followed by primary content validation and face validation. In addition blinded delphi validation process was included to get reviews from blinded external reviewers. An interview based pilot fill up was also conducted from participants of the target population which helped to refine the interviewing technique and also gave an insight on the responses of the participants.

The questionnaire demonstrated satisfactory validity, as evidenced by its clear and relevant content, which aligns with the intended measurement objectives, and its appearance, which appropriately reflects the underlying construct being assessed. Various validity statistics that included item level content validity index (I-CVI), scale level content validity index (S-CVI/Ave) proved the adequacy, relevance and clarity of the questionnaire.

The questionnaire underwent significant revisions throughout its development, involving the addition and removal of items, as well as modifications to existing questions, resulting in a refined and improved final version.

The study's culmination is a comprehensive questionnaire that aligns with the primary aim and objectives of the study. This innovative tool is capable of capturing diverse patterns in injury prevalence, frequency and severity in recreational marathon runners. With minor adaptations to account for context and applicability, this tool can also be effectively applied to professional marathon runners, making it a valuable resource for research in sports physiotherapy specifically on marathon runners.

While the questionnaire demonstrated excellent validity, a notable limitation was the perceived lengthiness of the instrument, which may potentially lead to respondent fatigue. However, expert reviewers unanimously agreed that the included items were essential and crucial for capturing the complexity of injury experiences, outweighing concerns about the questionnaire's length. Additionally during the pilot test, it was notable that respondents remained engaged throughout the survey, suggesting that the questionnaire's length did not lead to fatigue or disinterest. Another limitation to consider was reliability testing was not conducted.

V. CONCLUSION

In conclusion, the meticulous development process yielded a comprehensive and rigorously validated questionnaire, encompassing four sections and 27 questions specific to pain, injury, and training. This tool is specifically designed to assess injury prevalence, frequency, and severity among recreational marathon runners, providing a robust instrument for research and analysis.

Future studies can cover the reliability testing of the questionnaire and can also use the questionnaire on large sample size with follow up assessments to understand usability of the questionnaire.

Financial Support & Sponsorship: None.

Conflicts of Interest: None.

REFERENCES

- [1] Koronios, Konstantinos & Psiloutsikou, Marina & Kriemadis, Athanasios & Zervoulakos, Pavlos & Leivaditi, Eleni. "Factors Influencing Future Marathon Running Participation.", *EASM-2015-97/R1* - (607), October 2015.
- [2] Winter, Sara & Gordon, Susan & Brice, Sara & Lindsay, Daniel & Barrs, Sue "Overuse injuries in runners of different abilities—a one-year prospective study." *Research in Sports Medicine An International Journal*. 29. 10.1080/15438627.2019.1616548, May 2019.
- [3] Estok PJ, Rudy EB. "Marathon running: comparison of physical and psychosocial risks for men and women.", *Res Nurs Health*;10:79–85, 1987.
- [4] Koplán JP, Rothenberg RB, Jones EL. "The natural history of exercise: a 10-yr follow-up of a cohort of runners." *Med Sci Sports Exerc*;27:1180–4, N 1995.
- [5] Johnston CA, Taunton JE, Lloyd-Smith DR, D.C. McKenzie. "Preventing running injuries. Practical approach for family doctors." *Can Fam Physician*;49:1101–9, September 2003.
- [6] van Gent RN, Siem D, van Middelkoop M, van Os AG, Bierma-Zeinstra SM, Koes BW. "Incidence and determinants of lower extremity running injuries in long distance runners: a systematic review." *Br J Sport Med*;41(8):469-80. May 2007
- [7] Buist I, Bredeweg SW, Lemmink KA, van Mechelen W, Diercks RL. "Predictors of running-related injuries in novice runners enrolled in a systematic training program: a prospective cohort study." *Am J Sports Med*;38:273-280. February 2010
- [8] Buist I, Bredeweg SW, Bessem B, van Mechelen W, Lemmink KA, Diercks RL. "Incidence and risk factors of running-related injuries during preparation for a 4-mile recreational running event." *Br J Sports Med*. ;44(8):598-604. June 2008
- [9] Saragiotto, Bruno & Yamato, Tiê & Lopes, Alexandre. "What Do Recreational Runners Think About Risk Factors for Running Injuries? A Descriptive Study Of Their Beliefs And Opinions.", *The Journal of orthopaedic and sports physical therapy*. 44. 1-18. 10.2519/jospt.2014.5710, August 2014
- [10] Saragiotto BT, Yamato TP, Hespanhol Junior LC, Rainbow MJ, Davis IS, Lopes AD. "What are the main risk factors for running-related injuries?", *Sport Med*;44(8):1153-63, May 2014.
- [11] Kaitelidou D, Economou C, Galanis P, Konstantakopoulou O, Siskou O, Domente S, et al. "Development and validation of measurement tools for user experience evaluation surveys in the public primary healthcare facilities in Greece: A mixed methods study." *BMC Fam Pract*; 20 : 49, April 2019.
- [12] Pati S, Hussain MA, Swain S, Salisbury C, Metsemakers JF, Knottnerus JA, et al. "Development and validation of a questionnaire to assess multimorbidity in primary care: An Indian experience." *Biomed Res Int* 2016;: 6582487, January

- 2016.
- [13] Polit, Denise & Beck, Cheryl. "The Content Validity Index: Are you sure you know what's being reported? Critique and recommendations." *Research in nursing & health*. 29. 489-97. 10.1002/nur.20147, May 2006.
- [14] Rodrigues IB, Adachi JD, Beattie KA, MacDermid JC. "Development and validation of a new tool to measure the facilitators, barriers and preferences to exercise in people with osteoporosis." *BMC Musculoskelet Disord*; 18 : 540, December 2017.
- [15] Ghosal J, Dutta A, Kshatri J, Das A, Kanungo S, Singh A, "Development, validation & pilot testing of a questionnaire to assess healthcare seeking behaviour, healthcare service utilization & out-of-pocket expenditure of Particularly Vulnerable Tribal Groups of Odisha, India." *The Indian Journal of Medical Research*. 157. 412-420, May 2023.
- [16] Aithal P, Architha & Aithal, Sreeramana. "Development and Validation of Survey Questionnaire & Experimental Data -A Systematical Review-based Statistical Approach." 5. 233-251. 10.5281/zenodo.4179499. November 2020
- [17] Ayre, Colin & Scally, Andrew., "Critical Values for Lawshe's Content Validity Ratio." *Measurement and Evaluation in Counseling and Development*. 47. 79-86. 10.1177/0748175613513808, December 2013.
- [18] Lawshe, C.H.. "A Quantitative Approach to Content Validity." *Personnel Psychology*. 28. 563 - 575. 10.1111/j.1744-6570.1975.tb01393.x, December 2006.
- [19] Daoud, Adam & Geissler, Gary & Wang, Frank & Saretsky, Jason & Daoud, Yahya & Lieberman, Daniel. "Foot Strike and Injury Rates in Endurance Runners: A Retrospective Study." *Medicine and science in sports and exercise*. 44. 1325-34. 10.1249/MSS.0b013e3182465115, January 2012
- [20] Rhim, HC, Kim, SJ, Jeon J, Nam HW , Jang KM. "Prevalence and risk factors of running-related injuries in Korean non-elite runners: a cross-sectional survey study." *The Journal of sports medicine and physical fitness*. 61. 10.23736/S0022-4707.20.11223-4, July 2020.
- [21] Andreyo, Evan & Unverzagt, Casey & Schoenfeld, Brad. "Influence of Minimalist Footwear on Running Performance and Injury." *Strength & Conditioning Journal*. Publish Ahead of Print. 10.1519/SSC.0000000000000661. July 2021
- [22] Salzler, Matthew & Bluman, Eric & Noonan, Samantha & Chiodo, Christopher & de Asla, Richard. "Injuries Observed in Minimalist Runners." *Foot & ankle international*; 33. 262-6. 10.3113/FAI.2012.0262, April 2012.