DEVELOPMENT AND PRELIMINARY VALIDATION OF “THE FALLS PREVENTION QUESTIONNAIRE - RWANDA”

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ABSTRACT

**Background:** Physiotherapists’ knowledge, attitude and practice patterns in falls prevention are studied mainly in middle- and high-income countries. This study aims to develop and validate a questionnaire for studying the attitude, self-reported knowledge and clinical practice of Rwandan physiotherapists in falls prevention of older adults.

**Method:** In a cross-sectional design the content, face and cross-cultural validity was tested on four Swedish experts and four Rwandan physiotherapists. Test-retest was performed with 20 Rwandan physiotherapists and descriptive data was summarized for these physiotherapists. Content validity index (CVI) was calculated per item and scale, and face validity index with face validity index (FVI) per item and scale. Interviews complemented the face validity scorings for cross-cultural validation. Test-retest was analysed with intraclass correlation coefficient (ICC). Results were categorized into individual, behavioural and environmental factors, in line with the Social Cognitive Theory.

**Results:** The questionnaire attained a satisfactory degree of content validity with content validity index per item (I-CVI) and scale-level content validity index based on the average method (S-CVI/Ave) of 0.96. Questionnaire had satisfactory face validity with a face validity index per item (I-FVI) and scale-level face validity index based on the average method (S-FVI/Ave) of 0.89. The questionnaire was shown to be pertinent to Rwandan physiotherapists’ context. The test-retest stability of the questionnaire was non-significant. Most physiotherapists emphasized individual rather than environmental or behavioral risk factors for falls and in falls prevention treatment.

**Conclusion:** The content and face validity as well as cross-culture validity of preliminary questionnaire of falls prevention were acceptable. Further research in this area is essential to complete validation and to improve the reliability of the questionnaire. The study highlights the importance of application of social cognitive theory in studying how physiotherapists consider the complexity of factors contributing to falls.

**Keywords:** fall prevention, older adults, physiotherapists’ knowledge, attitude, clinical practice.
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1 BACKGROUND

1.1 Falls, consequences and prevalence of falls

A fall has been defined as a loss of equilibrium or balance that leads to a fall if you are unable to steady yourself while losing balance (Zecevic et al., 2006). In a study by Zecevic et al. (2006) older adults and health care providers were asked how they defined falls and potential reasons for falls. The elderly described falls as an unintentional, involuntary shift of bodily weight to the ground at a lower level than before. The World Health Organization (WHO, 2021) describes falls as an occurrence that causes a person to fall to the ground, floor, or other lower level by accident.

According to global estimates of the burden of falls; (James et al., 2020; Ye et al., 2021) falls are listed as the 18th largest cause of age-standardized rates of disability-adjusted life years in the Global Burden of Diseases, Injuries and Risk Factors for people aged from 65 years and above. It was concluded that in 2017, the age-standardized incidence of falls in the world ranged from 1990 to 2532 falls per 100 000 persons and the age-adjusted prevalence of falls was from 4622 to 5849 falls per 100 000 persons. In addition, the mortality rate was estimated and the age-standardized mortality rate of falls related issues was 9.2 (8.5-9.8) per 100 000 persons, resulting in 695 771 deaths (644 927-741 720) globally in 2017 (James et al., 2020).

As the world’s older population expands, so does the rate of death and illness, especially in low- and middle-income countries due to consequences of falls, leading to limitations in seniors’ opportunities in their lifespan, especially in activities in daily living (ADL) and overall health. In a systematic review from 2011 (Worum et al., 2011) it was concluded that studies on the risk and prevalence of falls in developing countries are scarce and predominantly based on retrospective data from hospitals. Thus, the incidence of falls in African countries is largely unknown. Some information can however be found in James et al., (2020) where African countries are demonstrated to have a relatively low incidence of falls. In a study from Nigeria, Bekibele & Gureje (2010) found that falls affected 23% of the elderly population in Nigeria aged 65 and over, with females reporting falls at a higher proportion (24.0%) than males (17.9 %). In a Master’s thesis (Ntagungira, 2005) the incidence of recurrent falls was reported to be 23.3% for a selected sample of participants over 60 years of age in the province of Umutara, Rwanda.
The National Institute of Statistics in Rwanda estimated the Rwandan population to be around 13.4 million, with only 7% over the age of 60 years in 2022 (Fifth National Institute of Statistics Rwanda, 2022). Rwandans are predominantly rural residents. Demographic factors could probably affect the incidence of falls in Rwanda.

Falls can result in a range of outcomes, from small to severe; they can be divided into two categories: bodily consequences and psychological effects. These consequences include fractures (especially hip fractures due to osteoporosis presented in the older population), discomfort, incapacity to be independent, repeated falls, a long stay in the hospital, and a loss of self-efficacy for various activities; depression and increased morbidity (Terroso et al., 2010). In addition, Montero et al., (2022) found that falls and fall related injuries are an extremely serious healthcare issue since it is closely linked to individual distress, disability, morbidity, hospitalization, and mortality.

1.2 Physiotherapy in Rwanda

In many countries physiotherapists have the possibility to work with falls prevention in both the clinic and in home health services.

The health care services in Rwanda are delivered through public health services, government assisted health facilities, private health facilities (WHO, & Alliance for Health Policy and Systems Research 2017). Physiotherapists (PTs) are employed in the public health care sector, government assisted health facilities and private health facilities. The Department of physiotherapy started in 1996 at former Kigali Health Institute (KHI) Rwanda. The KHI was moved to the College of Medicine and Health Sciences in 2013 (College of Medicine and Health Sciences, CMHS). In estimation 400 PTs have graduated from 1996 to 2021. About 90% of them are currently practicing as PT in Rwanda in both the public and private sector, and most in the city of Kigali. In relation to the current Rwandan population the density of 0.33 PTs serves a population of 10,000 (World Physiotherapy, 2021). Patients may get a referral from medical doctor and seek physiotherapy services if need be, or patients may self-refer to PTs without a referral from other health care professional (World Physiotherapy, 2021). Due to Rwanda’s style of living, elderly people in Rwanda tend to remain and stay in their own homes. When a physiotherapy intervention, such as falls prevention is required, physiotherapists do home visits, or the patient seek physiotherapy at a health care setting. Generally, there is limited information on how PTs work in Rwanda.
1.3 Biopsychosocial factors of importance for falls

Multiple and diverse risk factors interact to cause falls. Age, disease, and the environment all affect this connection (Pasquetti et al., 2014). The most frequently mentioned reason for falls is "accidental" or "environmental," which accounts for 30–50 percent; however, accidents are caused by a combination of observable environmental dangers and increased human vulnerability to hazards because of age and sickness (Rubenstein, 2006). Indoor environmental risks were found to be more likely to influence the likelihood of falls among older women, whilst outdoor environmental hazards were found to be more essential factors influencing falls among older men (Lee, 2021). The indoor or outdoor environment in which older individuals reside and perform their daily activities is connected to falls in this population. A combination of poor physical activity and sedentary behaviour has been found to be associated with falls in older adult (Arkkukangas, 2020).

The WHO (2008) reports different fall-related factors such as behavioural, psychological, social, biological, economical, and environmental that all work together to cause falls. Chronic pain in particular is a strong predictor for falls in community-dwelling old adults (Stubbs, 2014). Multiple chronic illnesses, functional disability and urine incontinence are linked to multiple fall-related injuries in the Indonesian community-dwelling older males and females (Pengpid & Peltzer, 2018). In the same study sleep interruption, prior cigarette usage and vision problems were also identified to be risk factors in men. Moreover, a lower socioeconomic status, poor cognitive functioning, poor nutrition and depression symptoms were associated with fall related injury in women (Pengpid, &Peltzer, 2018). The psychosocial factors linked to falls in older adults include decreases in social activities and fear of falling. Older persons who live alone are twice as likely to have multiple falls (Leung et al., 2010).

Different independent risk factors are associated with falls and include alcohol consumption, obesity), below general health status and other health problem like a history of stroke or vision impairment (Grundstrom et al., 2012). Loss of strength and balance, as well as functional performance, are associated with falls, according to Arkkukangas et al., (2020), adding to the current recognized fall risk factors. Older women are more vulnerable to falls when they are engaged in regular physical activity which are beyond their capabilities; on the other hand, physical exercise (at least 150 minutes per week) do not appear to be associated with fall-related injuries (Arkkukangas et al., 2020). In a Chinese study, it was demonstrated that most of the risk factors for falls have similar impacts on older people living in rural and urban areas (Zhang et al., 2019).
To conclude, the risk factors for falls in older individuals are numerous and should be looked at from an individual, environmental and behavioural perspective (Sherrington, & Tiedemann, 2015).

1.4 Falls prevention

Falls prevention is defined by the WHO (2008) as behavioural and environmental modifications that are associated with protective factors for falls in older individuals. For reducing fall risks and fall related factors, clinical practice guidelines should be applied in falls prevention. The guidelines include multi-factorial interventions, fall risk factors identification, assessment technique, fractures or osteoporosis treatments, medication management, promoting exercises, physiotherapy referral, environmental modifications, and vision, footwear, and cardiovascular interventions (Montero et al., 2021).

A combination of exercises and various interventions including environmental modification, multi factorial interventions, assessment procedure, vision treatment and vitamin D are associated with prevention and reduction of falls (Lee & Yu, 2020). Further, patient-level and clinic-level quality improvement strategies are suggested to be focused on in interventions (Tricco et al., 2017). Environmental modifications and careful home assessment are one of the strategies that can minimize fall risks and fall-related factors which can help the elderly population to stay in their homes longer (Pynoos et al., 2010). In the study by Rao (2005), multi-factorial interventions targeting identified risk factors, muscular strengthening exercises combined with balance training, and withdrawal of psychiatric medication were concluded to be the most effective fall prevention strategies in an older population.

Three pillars were used by WHO (2008) to summarize fall prevention strategies: 1. raising awareness of the importance of falls prevention and treatment; 2. enhancing the assessment of individual, environmental, and socio-cultural factors that increase the likelihood of falls; and 3. promoting the design and implementation of contextually sensitive, evidence-based intervention strategies that will dramatically reduce the number of elderly people who fall. A global initiative has lately led to global guidelines for the management and prevention of falls in older people (Montero et al., 2022). International experts discussed existing fall prevention guidelines, and several weaknesses were discovered. Therefore, new guidelines and recommendations were developed by reflecting new evidence and clinical service challenges as well, to promote the health and well-being of older individuals globally as it is the primary goal of the United Nations Decade of Healthy Ageing (2021-2030). These can be used in various clinical settings in collaboration with older persons who have had fall
experiences (Montero et al., 2022). However, Campani et al., (2021) stated that fall prevention strategies in older adults should be individualized but also focused on the influence of the environment and socio-culture context.

Ganz & Latham, (2020) revealed that community-based rehabilitation and home-based exercise programs focusing on coordination and strengthening exercises are beneficial in lowering the risk of falls in older adults who are at moderate or high risk for falls. Morris et al., (2022) investigated the effectiveness of different interventions to increase awareness in both staffs and patients, assistive devices, procedures and standards, rehabilitation efforts, drug oversight, and cognitive impairment management. They found that education was the most effective technique for lowering the rate and risk of falls in hospital settings. In addition, Montero et al., (2022) stated that fall prevention should be addressed in low-middle-income countries' policies using culturally considerate techniques that are adapted to the level of local resource availability and knowledge.

1.5 Falls prevention in physiotherapy from a behavioural medicine perspective

Physiotherapists play a significant role to prevent as well as reduce falls in older adults (Martin et al., 2013). The behavioural medicine approach in physiotherapy is becoming more widespread and known (Sandborgh et al., 2020). Behavioural medicine is an interdisciplinary field that combines elements of integration with behavioral and biomedical knowledge which is relevant to health and disease. It refers to psychology, biology, and medicine to understand and improve the relationship between behaviour and health used in diagnosis, treatment, rehabilitation, and care as well as in prevention and health promotion (Dekker et al., 2017).

The behavioural medicine perspective on falls prevention implies that biopsychosocial factors of importance for falls are systematically assessed and targeted in treatment (Arkkukangas et al., 2021). Individual, environmental, and behavioural components interact with one another, as proposed in Social Cognitive Theory (SCT). SCT is characterized by a strong focus on social impact and external and internal social reinforcement. To provide more comprehensive patient care insights, the use of SCT supports behavioural research and practical applications from a number of domains, including psychology, sociology, and rehabilitation (Cameron et al., 2018). The use of SCT as a framework for fall preventions implies that personal, behavioural and environmental risk factors for falls are considered in physiotherapy, as recommended by Arkkukangas et al., (2020).
Self-efficacy, the individual’s belief in his/her ability to perform a specific behaviour, is a cognitive mechanism that interacts between thoughts/emotions and behaviours which is made by efficacy expectation and outcome expectation (Bandura, 1986). Falls efficacy refers to a person’s perception of their own ability to carry out the appropriate activities in a variety of situations, such as those that occur before, during, or after a fall (Soh et al., 2021; Tinetti & Powell, 1993). Falls efficacy is negatively associated with falls in older community-living people; therefore, the lower the falls efficacy, the higher the probability of falling. Li et al., (2002) stated that falls efficacy plays an intermediary role in the link between fear of falling and functional ability; therefore, enhancing falls efficacy should be emphasised during interventions to lower falls and fall-related fear.

In the study by Hellström et al., (2013) it was concluded that to identify community living older people at a risk of falling the assessment of falls efficacy in instrumental activities of daily living (IADL) should be included. In addition, fear of falling and depression are strong predictors of falls efficacy as it leads to decreased physical activity and thus to a decrease in physical function (Scheffer, et al., 2008; Hughes et al., 2015). Therefore, falls prevention in physiotherapy management should consider individual (physical and psychological), environmental and behavioural factors when addressing fall risk in older adults.

1.6 Physiotherapists’ attitudes, knowledge and clinical practice in falls prevention

Physiotherapists possess the necessary competence in falls prevention through their assessment, treatment planning, exercise prescription, gait and balance training, environmental modifications, education and advice, and their ability to work collaboratively within a multidisciplinary team (Shubert, 2011). By addressing the specific needs and impairments of individuals, physiotherapists play a key role in reducing the risk of falls and promoting overall safety and well-being especially in older adults (Levinger & Hill, 2021).

Physiotherapists’ knowledge and clinical practice patterns in falls prevention have been studied mainly in middle and high-income countries, but in African countries there is limited information about physiotherapist’s knowledge, attitudes and practice patterns for falls prevention in older individuals. It has been reported that physiotherapists have positive attitudes towards falls prevention and acknowledge the importance of implementing fall prevention strategies in their clinical practice. Physiotherapists have been found to have good knowledge of evidence-based falls prevention strategies and are able to identify individual fall risk factors (Stroud, 2014). In a study from USA, it was concluded that physiotherapists in
home health care were well-versed in fall risk assessment and intervention procedures (Peel et al., 2008).

In the study by Kalu et al. (2019) it was concluded that the participating Nigerian physiotherapists had a good level of knowledge and practice regarding fall prevention for older individuals, although there was still space for development in terms of standardized and multidisciplinary approaches to fall prevention. Physical factors were the main emphasis of Peel et al., (2008) and Kalu et al., (2019).

However, studies have also shown that there may be a gap between knowledge and clinical practice as some physiotherapists may not consistently implement fall prevention strategies in their practice (Worum et al., 2019), especially in African countries. Further research is needed to explore the reasons for this gap and to develop effective implementation strategies.

1.7 Questionnaires for measuring knowledge of falls prevention and self-reported practice

Peel et al. (2008) developed and tested a questionnaire which was aiming to determine the (1) knowledge of fall risk factors and interventions, and (2) practice patterns with relation to fall risk assessment, among home health physical therapists in Alabama, USA. The questionnaire covered only individual physical risk factors. The reliability for the questionnaire was considered good with Cohen’s weight kappas of 0.65 and 0.64 for inter-rater and test-retest reliability respectively. However, the face and construct validity of the questionnaire was not tested. Another questionnaire (Conde et al., 2022) aimed to evaluate the knowledge, practices, and self-reported levels of foot-specific fall risk and exercise for fall prevention among physiotherapists working in Portugal and the UK. Face and cross culture validity as well as reliability was tested on physiotherapists in the United Kingdom and Portugal. Consequently, technical terms were added to improve reliability, one question was added in response to physiotherapists’ feedback and minor phrasing modifications were made. The questionnaire focused mostly on personal physical risk factors (Conde et al., 2022).

The psychometric testing of the questionnaire used by Kalu et al. (2019) to measure Nigerian physiotherapists’ knowledge of risk factors and practice in fall prevention of older adults resulted in that some of questions were added, other questions were modified and wording revised. The intra-class correlation in test-retest was 0.94. Another questionnaire based on a model from the Connecticut Collaboration for Fall Prevention (CCFP) was used by Brown et al., (2005) to measure physiotherapists’ attitudes, knowledge and self-reported practice.
behaviours regarding fall risk assessment and management. The face and content validity of the questionnaire was satisfactory. However, the psychometric properties of the questionnaire were not further tested.

Asiri et al., (2018) used a modified vision survey to test knowledge of home healthcare professionals regarding fall related issues and prevention strategies, and concluded that a majority of home health care practitioners addressed fall risks factors, used fall prevention strategies in their plan of treatment and recognized the significance of falls. However, the results’ generalizability is impacted negatively by the small sample size and low response rate. Davenport et al., (2020) undertook an anonymous survey of emergency providers to assess their knowledge, attitudes, and behaviours in fall prevention in older adults and concluded that the emergency providers recognize the necessity of fall prevention but lack expertise about patients screening strategies and the time to do it. In summary, the identified questionnaires above mostly focused on physical and environmental factors and lacked a psychosocial and behavioural perspective on falls prevention.

No questionnaire for assessing physiotherapists’ attitudes, knowledge and clinical practice in fall prevention in older adults has been identified as being utilized in Rwanda.

1.8 Problem formulation

Falls are common among the older population worldwide. There are multiple risk factors for falls in the elderly population; and often an interaction of several risk factors can cause a fall in this population.

Physiotherapists’ knowledge and practice patterns in falls prevention is studied mainly in middle- and high-income countries and have mainly concerned physical risk factors. There is limited information about physiotherapists’ attitudes, knowledge and clinical practice in falls prevention for older individuals, particularly in African countries such as Rwanda.

Falls prevention in physiotherapy should take into consideration the multitude and the interaction of risk factors for falls. The interaction of personal, environmental, and behavioural aspects should be considered in physiotherapy clinical practice to prevent falls. Therefore, physiotherapists’ attitudes, knowledge and clinical practice patterns in falls prevention could be studied from a SCT perspective. In addition, the attitudes, knowledge, and self-reported clinical practice of Rwandan physiotherapists in falls prevention is unknown and should be studied. To study this, a reliable and valid questionnaire should be developed which means that the answers from Rwandan physiotherapists on this
questionnaire should capture behavioural, personal physical, psychological and environmental aspects on fall prevention.

2 AIM

To develop and validate a questionnaire for studying the attitude, knowledge and self-reported clinical practice of Rwandan physiotherapists in falls prevention. Further, the aim is to study the attitudes, knowledge and self-reported clinical practice for falls prevention in a sample of Rwandan physiotherapists.

2.1 Study questions

1. What is the content, face and cross-cultural validity of the questionnaire?
2. What is the test-retest reliability of the questionnaire?
3. What is the attitude, knowledge and self-reported clinical practice of the included physiotherapists in Rwanda?

3 METHODS

3.1 Research design

A cross-sectional design was used for validity testing of the questionnaire and descriptive data, and a longitudinal design was used for a test-retest.
3.2 Development of the questionnaire and procedure

3.2.1 Selection of appropriate questionnaire

Items in the questionnaire were based on the questionnaire by Peel et al. (2008) and discussions with a Swedish expert in falls prevention in physiotherapy. Although Peel et al. (2008) served as the basis for developing the appropriate questionnaire, some items were added, and some were omitted to make the questionnaire more relevant to the aim and research questions. Items should make it possible to capture physiotherapists’ knowledge of social cognitive factors: individual, behavioural and environmental risk factors for falls.

3.2.2 Content validity

Content validity was tested to evaluate the degree to which each item was representative of a construct’s conceptual definition (Yusoff, 2019; Allen et al., 2023). The content validity was tested with ratings and comments in English by four Swedish researchers in physiotherapy whose expertise are in falls prevention. These experts were identified through contacts at the division of physiotherapy at Mälardalen University and represented two Swedish universities and two regional research centres.

3.2.3 Face and cross-culture validity

After testing the content validity, the face- and cross-cultural validity were tested. The Rwandan physiotherapists were identified and contacted through the College of Medicine and Health Sciences (CMHS) in Rwanda. The head of the physiotherapy department in CMHS was contacted and informed about the study and requested to provide four people with expertise in the field. Face validity was tested on four physiotherapists in Rwanda who do home health care who rated how understandable the questions were and how easy it was to answer. The participants sent back their responses(ratings). Thereafter, face and cross-cultural validity was tested in an interview of the same four physiotherapists that answered the face validity ratings. The semi-structured interviews focused on face and cross-culture validity for the concerned items. Cross-cultural validation aimed to confirm or disconfirm the equivalence of the items (Caron, 1999) in a Rwandan context but did not involve translation in Kinyarwanda.

The physiotherapists were asked to complete the 13-items questionnaire and rate the degree to which items were understandable and how easy to answer on a 3-graded rating scale (see Appendix C)
In the semi-structured interviews, the participants were asked to provide their opinions regarding their ratings and agreement on items in the questionnaire. Participants were asked if they found questions unclear, if they had any suggestions for how to make it more understandable and if there were problems in how to answer. Thematic analysis was then used to determine the reason why participants found items in questionnaire to be unclear and liking or disliking specific items (Connell et al., 2018). To accomplish this, patterns in the provided answers were identified, and interpreted to explore both explicit and implicit meanings within the data.

3.2.4 Test-retest reliability

The final version was sent as an online questionnaire in Survey&Report (see appendix E) to the participating Rwandan physiotherapists twice with a two-week interval and answered confidentially. The time interval for answering the questionnaire first and second time was between 19 and 45 days, hence exceeding the expected 14 days interval.

A formal request was sent to the heads of the selected clinics and hospitals in Rwanda. Participants who matched the inclusion criteria received a link to the questionnaire via email. After permission, the information and questionnaire was sent to potential participants via contact persons at each clinic or hospital. Informed consent was obtained through the first question in the survey where the respondents could agree or decline participation in the study as explained in the information letter (see appendix E).

3.3 Sample

For content validity four PTs and experts in falls prevention were included. The experts identified were PhD holders active in research on falls preventions in older adults. These physiotherapists represented two universities and two clinical research centres in Sweden.

For face and cross-cultural validity four Rwandan physiotherapists with experience of falls prevention were included. The PTs included were master’s degree holders and had clinical experience in falls prevention for older adults. Two physiotherapists represented a university, one a private clinic and one a governmental hospital in Rwanda.

For measuring attitude, knowledge and self-reported clinical practice, 27 physiotherapists were asked to participate. The physiotherapists from Rwanda work with old people in home visits and/or at clinics in Kigali city, where most PTs in Rwanda are working. The sample was
deemed appropriate to be representative of Rwandan physiotherapists working in the private and public healthcare sectors. Participants who did not meet with old people in their clinical practice were excluded from the study. A convenience sampling method was used. The convenience sampling method is a non-probability sampling technique in which participants are selected based on their availability and ease of access (Stratton, 2021). The participants were from private clinics and public hospitals; then simple random sampling was used to choose which private clinics or hospitals that would be included. Thereafter, all physiotherapists from the chosen private clinics and hospitals were asked to participate. A sample of 27 responders was expected.

### 3.4 Data collection

For content validity the experts rated for the first version of the questionnaire, the suitability of items in relation to measuring knowledge and self-reported practice for falls prevention in physiotherapy (see appendix B). This was done to ensure that the tool had enough items and adequately covered the individual (physical and psychological), environmental and behavioural factors when addressing fall prevention in older adults (Streiner, & Norman, 2008). In the first version of the questionnaire there were 2 domains with 7 items. The domains concern “Self-reported practice” and “Knowledge in falls prevention”. The experts were asked to provide their expert judgement on the degree of relevance of each item to the measured domains. Each item could be rated from 1 = the item is not relevant to the measured domain to 4 = the item is highly relevant to the measured domain. In addition, experts were asked to make comments relating to the items and to make suggestions for additional questions.

For face validity, the responders were asked to fill in the second version of the questionnaire and thereafter to rate how clear they found the questions and how easy it was to answer or difficult on a 3-point rating scale (see appendix C) as a starting point for the following interviews. For cross-cultural validity, the same responders were also interviewed concerning the applicability of the items in a Rwandan context. The semi-structured interviews on face and cross-culture validity concerned items that the responders found difficult to understand and/or to answer (see appendix D), and data were recorded audibly.

The final version of the questionnaire was sent to physiotherapists in Rwanda through a contact person at each clinic or hospital as an online survey in Survey&Report. For those physiotherapists who responded the questionnaire was repeatedly sent within a two-week interval. Background questions in the questionnaire concerned the participants’ degree level, work place, number of years as practicing physiotherapist, number of older adults met per
month. The remaining questions were both closed and open and concerned attitudes, self-reported clinical practice and knowledge in falls prevention (See appendix E).

3.5 Data management and analyses

For content validity of the questionnaire the ratio of agreement between the experts’ ratings, and the content validity ratio for each item in the questionnaire was calculated.

To analyse the content validity of the questionnaire measuring attitudes, knowledge and self-reported clinical practice of fall prevention in Rwandan physiotherapists, the content validity index (CVI) was used. Prior to calculating the CVI per item (I-CVI) ratings 1 and 2 were recoded as 0 and ratings 3 and 4 as 1. The content validity index per item was then calculated by summing up the ratings per item and dividing the sum of ratings by the number of experts. The scale-level content validity index based on the average method (S-CVI/Ave) was calculated as the average of I-CVI scores across all items (Yusoff, 2019).

For face validity on each item of the questionnaire the ratio of agreement between the responders’ ratings, and the face validity ratio were determined. To evaluate face validity of the questionnaire and quantifying the scores from the raters, the face validity index (FVI) was used. Prior to calculating the face validity index (FVI), the relevance ratings were recoded as 1 (for ratings 2 or 3) or 0 (for rating 1). The face validity index per item (I-FVI) was calculated by summing up all ratings in agreement per item and then dividing by the number of raters. S-FVI/Ave (scale-level face validity index based on the average method) is defined as the average of the I-FVI ratings for each item on the scale (Yusoff, 2019). Moreover, the S-FVI/Ave was calculated by summing up the I-FVI scores for each item on the scale and then divided by the number of item.

Interview data on face and cross-culture validity were summarized for each item that was deemed difficult to understand or answer and concerning the relevance for a Rwandan context. Based on research done by (Andersson et all., 2015; Thomas & Harden, 2008), the audio recordings from interview data were verbatim transcribed, reviewing the content of the text, making some preliminary notes and familillize with the data, coding, the creation of descriptive themes, and the develop analytical themes. Additionally, the themes generated interpretations, constructs, and explanations.

Test-retest reliability for item 1 to 5 as nominal data in the questionnaire was calculated with Intra-class correlation coefficient (ICC) with analysis of variance(ANOVA) as described by Harvey (2021), 95% confidence interval between the two sets of responses for each subscale on the questionnaire (Koo & Li, 2016). Items 6, 7, 10, 11, 12 an absolute-agreement, two-way mixed-effects model were used in calculating the ICC. For the test-retest of reported risk...
factors and activities or treatments (item 8 and 9) only the number of factors and activities were used. In addition, for item 8 to 9 the answers were categorized into the categories individual, environmental physical and behavioural factors. The correlation between the total number of risk factors at measurement one and two were calculated with Spearman’s rho. For the list of risk factors and activities/treatments, the chi2 analysis was not feasible. The proportion (percentage) of individual, environmental and behavioural risk factors at both measurement points are reported descriptively. The proportion (percentage) of treatments or activities regarding individual, environmental and behavioural at both measurement points are reported descriptively. Using different methods of statistical analysis for different items was based on several considerations to ensures accurate and meaningful interpretation of the data. Those considerations were including the level of measurement, distribution of data, research objectives, and specific characteristics of the rating score.

Descriptive data is reported in medians, range and quartile deviations. Non-parametric tests were used as data did not meet assumptions for parametric tests, i.e. normal distribution, data level and sample size. Exploratory factor analysis were used for test-retest reliability.

### 3.6 Ethical considerations

Ethical permission from Hospitals and clinics in Rwanda was requested before data collection began. The study was performed according to the Helsinki Declaration (General Assembly of the World Medical Association, 2014). An information letter explaining the purpose of the study was sent to the participants and participation in the study was voluntary. In the survey the consent questions concerned having received and read the information about the study and consenting to that the information provided was stored according to the general data protection regulation (GDPR). If the physiotherapist did not consent to participate in the study, after having received the information, then the PT did not send in the answer to the questionnaire. In addition, participants were informed that they could resign from the study at any moment. The participants’ responses were confidential, identification information provided was coded and privacy was respected during data collection, data analysis as well as in reporting data (Rohan et al., 2015). The data was safely maintained and protected against unauthorized disclosure or loss. Data was stored on the authors’ laptop, which is protected by a password and the laptop was kept in a locked room.
4 RESULTS

4.1 Content validity

A 100% return rate was achieved. The I-CVI was between 0.75 and 1 per item. See table 1.

<table>
<thead>
<tr>
<th>Item</th>
<th>I-CVI</th>
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<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0.75</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

The S-CVI/Ave was 0.96. Therefore, the I-CVI and the S-CVI/Ave met sufficient requirements, and the questionnaire attained a satisfactory degrees of content validity. In addition, based on comments by the experts one domain concerning attitude with two questions were added, and one question concerning the ranking of importance for falls-related factors was changed so that the responders did not have to rank the importance of risk factors. See appendix E.

4.2 Face and Cross-cultural validity

The return rate was 100% with 4 face validity ratings out of the 4. The face validity index for each of the 13 items (including the background questions) resulted in a score of 1 for all items. The S-FVI/Ave was 0.89. Therefore, the questionnaire had satisfactory face validity.

Based on the interview questions (see appendix D), one item from questionnaire was removed that addressed how long PTs had been providing home healthcare. This was because the respondents stated that not all PTs are providing home healthcare. One item from questionnaire was changed since the question was asking about how many older persons the PT met per month at home visits. The interviewees stated that PTs could also meet older adults at hospital or clinic visits, so ‘home visits’ was erased from the item. Two other items from questionnaire were reworded to make these easier to answer. These items requested the
respondents to list the importance of risk factors or treatment or activities in falls prevention. So the items were reworded by asking participants to list as many as they could remember of risk factors or treatments/activities in fall prevention. Overall, the findings showed that the questionnaire is pertinent to the Rwandan physiotherapists’ context.

### 4.3 Test-retest reliability

Twenty participants responded to the first and second measurement. For items 1 to 5, the intraclass correlation coefficient (ICC) was 0.625 (0.096, 0.849), \( p = 0.016 \). For self-reported knowledge, as measured in two items (item number 10 and 11), the ICC was 0.477 (-0.168, 0.783), \( p = 0.028 \). For self-reported practice, measured in 3 items (item 7, 8 and 9), the ICC was -0.227 (-0.930, 0.369) with a non-significant p-value. For attitude, measured in two items (item number 6 and 12), the ICC was 0.321 (-0.279, 0.690) with non-significant p-value. The number of risk factors reported at measurement one was 128 and at measurement 2 was 145. The number of treatment/activities in falls prevention was 117 at measurement one and 121 at measurement 2. The proportion of individual risk variables was 81% in both measurements (first and second). The proportion of environmental risk factors was 14% in the first measurement and 12% in the second. In the first measurement, behavioral risk factors made up 5% of the total, while in the second measurement, they made up 7%. The overall proportion of individual for the treatments or activities was 86.3% in the first measurement and 85.9% in the second. In the first measurement, the percentage of the treatments or activities that were environmental was 11.9%, and in the second, it was 12.3%. The proportion of behavioral treatment/activities was 1.6% in the first measurement and 1.7% in the second. See table 2.

*Table 2: Proportion of individual, environmental and behavioural risk factors and treatments/activities at the first and second measurement.*

<table>
<thead>
<tr>
<th></th>
<th>Measurement 1 N (%)</th>
<th>Measurement 2 N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total number of risk factors</strong></td>
<td><strong>128 (100%)</strong></td>
<td><strong>145 (100%)</strong></td>
</tr>
<tr>
<td>Individual</td>
<td>104 (81%)</td>
<td>118 (81%)</td>
</tr>
<tr>
<td>Environmental</td>
<td>18 (14%)</td>
<td>18 (12%)</td>
</tr>
<tr>
<td>Behavioural</td>
<td>6 (5%)</td>
<td>9 (7%)</td>
</tr>
<tr>
<td><strong>Total number of treatment or activities</strong></td>
<td><strong>117 (100%)</strong></td>
<td><strong>121 (100%)</strong></td>
</tr>
<tr>
<td>Individual</td>
<td>101 (86.3%)</td>
<td>104 (85.9%)</td>
</tr>
<tr>
<td>Environmental</td>
<td>14 (11.9%)</td>
<td>15 (12.3%)</td>
</tr>
<tr>
<td>Behavioural</td>
<td>2 (1.7%)</td>
<td>2 (1.6%)</td>
</tr>
</tbody>
</table>
4.4 Attitude, self-reported practice and knowledge of the sample

A 74% return rate was achieved for the 20 out of 27 participants that had agreed to answer the questionnaire in Survey&Report. Background questions were covered in measurement 1. Fifty percent of physiotherapists were employed by private clinics and while other 50% were employed by hospitals, non-governmental organisation and independent practitioner. The majority (65%) of participants had five to ten years of work experience. A greater number of the participants 90% had a bachelor's degree. The highest number of older persons repeatedly encountered per month was 10, which was answered by 20 % of the participants. Table 3 shows a description of the sample.

Table 3. Background data for the sample, n=20.

<table>
<thead>
<tr>
<th>Description</th>
<th>Number of therapists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Degree level</strong></td>
<td></td>
</tr>
<tr>
<td>Bachelor in PT</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>Master in PT</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Master in other Subject</td>
<td>1 (5%)</td>
</tr>
<tr>
<td><strong>Work place</strong></td>
<td></td>
</tr>
<tr>
<td>Private clinic</td>
<td>10 (50%)</td>
</tr>
<tr>
<td>Hospital</td>
<td>8 (40%)</td>
</tr>
<tr>
<td>Non-governmental organisation</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Independent Private practitioner</td>
<td>1 (5%)</td>
</tr>
<tr>
<td><strong>Work time</strong></td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>5 (25%)</td>
</tr>
<tr>
<td>5-10 years</td>
<td>13 (65%)</td>
</tr>
<tr>
<td>15 years of above</td>
<td>2 (10%)</td>
</tr>
<tr>
<td><strong>Older people met per month</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>4</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>5</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>6</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>7</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>8</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>10</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>12</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>20</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>30</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>50</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>60</td>
<td>1 (5%)</td>
</tr>
</tbody>
</table>
Self-reported knowledge

Questions 10 and 11 addressed level of the knowledge of risk factors and effective activities/treatments in physiotherapy for falls prevention. Table 3 show the frequencies of responses self-reported level of knowledge of risk factors and activities/treatments.

Table 4. Self-reported knowledge level of risk factors and PT activities/treatment for falls prevention.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Number(percentage%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate your level of knowledge about important risk factors for falls in older adults?</td>
<td></td>
</tr>
<tr>
<td>No knowledge</td>
<td>7 (35%)</td>
</tr>
<tr>
<td>Little knowledge</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Some knowledge</td>
<td>13(65%)</td>
</tr>
<tr>
<td>High knowledge</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Level knowledge about effective activities and treatments in Physiotherapy for falls prevention?</td>
<td></td>
</tr>
<tr>
<td>No knowledge</td>
<td>5(25%)</td>
</tr>
<tr>
<td>Little knowledge</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Some knowledge</td>
<td>15(75%)</td>
</tr>
<tr>
<td>High knowledge</td>
<td>0(0%)</td>
</tr>
</tbody>
</table>

Self-reported practice

Question 7 (a,b,c) addressed the participants’ self-reported practice. The majority of physiotherapists reported that they “sometimes” asked about history of falls and identified risk factors for falls. However, 70% reported that they “often” provide interventions that address risk factors for falls. See Table 5.

Table 5. Self-reported practice in falls prevention.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Almost Never or never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost always or always</th>
</tr>
</thead>
<tbody>
<tr>
<td>7a In your initial assessment of patients, how often do you ask older adults if they have a history of falls?</td>
<td>0(0%)</td>
<td>18(90%)</td>
<td>2(10%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>7b In your assessment of patients, how often do you identify risk factors for falling?</td>
<td>0(0%)</td>
<td>17(85%)</td>
<td>3(15%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>7c In your treatment planning how often do you provide interventions to address fall risk factors?</td>
<td>0(0%)</td>
<td>6(30%)</td>
<td>14(70%)</td>
<td>0(0%)</td>
</tr>
</tbody>
</table>
**Attitude**

When asked about their attitude about the importance of falls prevention, 60% of the sample replied “Quite important” and all physiotherapists (100%) replied that they need more knowledge regarding fall risk assessment and falls prevention. (Shown in table 6).

*Table 6. Physiotherapists’ attitude to importance and need of more knowledge of falls prevention.*

<table>
<thead>
<tr>
<th>Questions</th>
<th>Number (percentage%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In your opinion, how important is falls prevention in older adults in</strong></td>
<td></td>
</tr>
<tr>
<td>Rwanda**</td>
<td></td>
</tr>
<tr>
<td>Not important at all</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>7 (35%)</td>
</tr>
<tr>
<td>Quite important</td>
<td>12 (60%)</td>
</tr>
<tr>
<td>Very important</td>
<td>1 (5%)</td>
</tr>
<tr>
<td><strong>How would you rate your need of more knowledge in fall risk assessment</strong></td>
<td></td>
</tr>
<tr>
<td>and falls prevention?</td>
<td></td>
</tr>
<tr>
<td>No need at all for more knowledge</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Some need for more knowledge</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>High need for more knowledge</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Very high need for more knowledge</td>
<td>20 (100%)</td>
</tr>
</tbody>
</table>

*Table 7. Individual, environmental and behavioural risk factors for falls, as stated by the physiotherapists at measurement 1*

<table>
<thead>
<tr>
<th>Individual risk factors</th>
<th>Number of PTs who reported a risk factor</th>
<th>Percentages (%) of PTs who reported a risk factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor balance and coordination</td>
<td>18</td>
<td>90%</td>
</tr>
<tr>
<td>Muscle weakness</td>
<td>19</td>
<td>95%</td>
</tr>
<tr>
<td>Vision and hearing impairment</td>
<td>12</td>
<td>60%</td>
</tr>
<tr>
<td>Foot pain</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Poor reaction time</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Mental health (depression, stress)</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>Sleep disorders</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Fear of falling</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Agitation or anger</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Alcoholism</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>Musculoskeletal or neurological conditions</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td>Disabilities</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Ageing</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Dizziness</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Obesity</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Environmental risk factors</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Slippery surface | 14 | 70%
Uneven surface | 17 | 85%
Inappropriate environment (eg. weather condition) | 5 | 25%
Infrastructure (stairs) | 2 | 10%
Social isolation | 1 | 5%
Living alone | 1 | 5%

**Behavioural risk factors**
Sedentary lifestyle | 8 | 40%
Physical inactivity | 7 | 35%

The percentage of physiotherapists who identified each risk factor is shown in Table 7. The majority of the therapists above 85% named muscle weakness, poor balance and coordination as well as environmental dangers (uneven surface) as causes of falling (physical and environmental factors). Other risk factors were listed into social, behavioural, psychological and condition factors. The risk factors that did not obviously fit into one of the a priori categories were categorized as "other".

*Table 8.* Individual, environmental and behavioural of treatment/activities for falls prevention at measurement one.

<table>
<thead>
<tr>
<th>Individual activities/treatment for falls prevention</th>
<th>Number of PTs who reported and activity/treatment</th>
<th>Percentages(%) of PTs who reported an activity/treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthening exercises</td>
<td>19</td>
<td>95%</td>
</tr>
<tr>
<td>Balance and coordination training</td>
<td>18</td>
<td>90%</td>
</tr>
<tr>
<td>Ergonomics adaptation</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>PNF techniques</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Resistance training exercises</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Functional ability training</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Gait training(walking exercises)</td>
<td>13</td>
<td>65%</td>
</tr>
<tr>
<td>Get up and go exercises</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Activities like stair climbing</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Pain management</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Physical activity to reduce weight</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Avoid alcohol</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Participating in self-care activities</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Raising older people's self-confidence</td>
<td>1</td>
<td>5%</td>
</tr>
</tbody>
</table>
The percentage of therapists who identified each treatment/activity is shown in Table 8. Above 90% of therapists identified exercises for strengthening and balance as treatments for falls prevention and 65% of respondents listed “gait training”.

## 5 DISCUSSION

### 5.1 Summary of results

The aim of this study was to develop and validate a questionnaire for studying the attitude, knowledge, and self-reported clinical practice of Rwandan physiotherapists in falls prevention. Further, the aim was to study the attitudes, knowledge, and self-reported clinical practice for falls prevention in a sample of Rwandan physiotherapists.

The questionnaire attained a satisfactory degrees of content validity as measured with the I-CVI and the S-CVI/Ave. Following the experts’ judgment of the content validation of the questionnaire, seven items remained relevant for measuring the domains self-reported knowledge and clinical practice. Following the experts’ advice two more items were added for an additional domain, attitude to falls prevention. The face validity was satisfactory with a score of 1 for all items in FVI, resulting in a S-FVI/Ave of 0.89. For cross-cultural validity, based on the interviews, one item was eliminated, one item modified, and two were reworded to make the questionnaire relevant to the Rwandan physiotherapists' context.

For the test-retest, twenty participants provided feedback on the first and second measurement. The intra-class correlation coefficient (ICC) from item 1 to item 5
demonstrated significant results with $P=0.016$. The ICC for self-reported knowledge, as measured by two items was significant with $p = 0.028$; however, the three items measuring self-reported practice had an ICC with a non-significant p-value. The ICC for the attitude component, evaluated with two items, also had a non-significant p-value. The time interval for responding to the questionnaire varied greatly between responders. The responders listed in total 128 risk factors for falls at measurement one and 145 at measurement two. At both the first and second measurement, the proportion of behavioral, environmental, and individual risk factors were almost the same. There was in total 117 treatments/activities for preventing falls reported at measurement 1, and 121 at measurement 2. The proportion of individual, environmental, and behavioral treatments/activities for falls prevention was nearly the same in the first and second measurement. Despite the test-retest reliability, the questionnaire was intended to identify baseline knowledge, self-reported and attitude of Rwandan physiotherapists about fall prevention. Andrade et al., (2020) stated that the primary goal of conducting knowledge, attitude and practice surveys is to determine the baseline knowledge, myths, misconceptions, attitudes, beliefs, and behaviors regarding a certain health-related topic.

5.2 Results discussion

The results of this study showed satisfactory of content, face, and cross-culture validity. To test the validity of a questionnaire means to test if the questionnaire measures what it is intended to measure (Tsang et al., 2017). However, validity can be investigated from different angles and in the current study only preliminary validation was performed. Therefore, further studies are needed to test the construct, concurrent, and predictive validity.

For test-retest, only backgroung questions and self-reported knowledge was significantly correlated between measurement one and two, while self-reported practice and attitudes to falls prevention were not. Most of the participating physiotherapists were focusing on individual risk factors for falls rather than environmental or behavioural factors. As advised by Arkkukangas et al. (2020), the application of SCT as a framework for fall prevention in physiotherapy should take into account environmental, behavioural, and individual physical risk factors for falls. Regarding individual physical risk factors Bergland et al. (2003) and Gantz et al. (2020) stated that walking impairment and poor balance are considered to be strong predictors of falls in the elderly. However, the most common risk factors for falls listed by the participants in the current study were muscle weakness, poor balance, and coordination impairment. Falls can be induced by inactivity owing to a lack of lower limb strength and might be caused by a fear of falling (Brouwer et al., 2004). Other individual and physical and psychological risk factors listed in the current study were musculoskeletal and neurological conditions, ageing, diabetes and disability as well as depression and fear of
In the current study, 85% of the physiotherapists identified individual physical risk factors as the major cause of falls.

The most common environmental factors for falls listed by the participants were uneven and slippery surfaces. There was a slightly higher proportion of environmental factors at measurement one. In total 14% (first measurement) to 12% (second measurement) of the total risk factors listed were environmental risk factors. According to Pynoos et al. (2010) most falls, 55%, in older adults occur within the home, including falls on stairs and 23% occur outside of home. These falls outside the home may be caused by a lack of assistive devices, a slippery environment, or uneven ground. Other environmental risk factors listed by some participants were social isolation and living alone. Leung et al. (2010) stated that living alone was the only psychosocial factor significantly associated with falls.

Boelens et al. (2013) divided behavioural risk factors for falls into activities and behaviors; physical inactivity, avoiding behaviour, and risk-taking behavior. In the current study, the most common behavioural risk factors listed were physical inactivity and a sedentary lifestyle. The proportion of behavioural risk factors were however at a lower level of 5% to 7% in the first and second measurement in comparison to other risk factors listed. Fall-related injuries have been shown to correlate with sedentary behavior and inactivity (Helgadottir et al., 2015). According to the WHO (2008), several fall-related factors such as behavioural, the physical and social environment, individual physical and psychological factors, and economical factors all interact together to cause falls. According to the SCT; individual, environmental and behavioural factors interact in reciprocal determinism in the so called dynamic triad (Bandura, A. 1978; Arkkukangas et al., 2020). Falls can occur as a result of the gap between a person’s physiological and psychological function, their environment, and the person’s behaviour. To summarize, the risk factors for falls in older people are numerous and should be examined from an individual, environmental, and behavioral standpoint (Sherrington & Tiedemann, 2015).

The most common treatments/activities for falls prevention listed by the physiotherapists was strengthening exercises, balance and gait training. However, these are physical-related interventions for falls prevention. Environmental and behavioural interventions were rarely mentioned. Sherrington et al., (2017) stated that the most effective interventions for preventing falls include strengthening exercises for the legs and balance training with gradually more vigorous activities. Several studies conclude that fall prevention interventions should address numerous risk factors at the same time and involve the expertise of multiple professionals (Montero et al., 2021; Rao, 2005; Wallace, 2001). In addition, Arkkukangas et al., (2020) stated that falls prevention in older adults should be based on SCT as an approach that can target personal, behavioral, and environmental risk factors for falls.
According to the findings, 65% of physiotherapists reported that they had some knowledge about risk factors and 75% that they had some knowledge about effective treatments/activities for falls prevention. The perception of physiotherapists about their knowledge of falls prevention was generally positive; however, because of the small sample size, this cannot be generalized to all physiotherapists in Rwanda. Most physiotherapists in their self-reported practice stated that they "sometimes" inquired about a patient’s history of falls and determined fall risk factors. Seventy percent of the physiotherapists reported that they often provide interventions that address risk factors for falls. Moreover, it is evident from the results that 60% of physiotherapists’ attitude toward the importance of falls prevention in Rwanda was that falls prevention was not very important as they stated “quite important”. This could relate to the small number of older persons, and the majority of young adults in the Rwandan population. In 2022, only 7% of older adults were aged over 60, as estimated by Rwanda’s National Institute of Statistics (Fifth National Institute of Statistics Rwanda, 2022). In addition, all participants in the current study, stated that they need more knowledge of falls prevention. The study also underscores the importance of developing multifaceted interventions (treatments or activities) that focus on the individual, environmental and behavioral factors in fall prevention.

5.3 Methods discussion

The study’s strength was its 100% response rate. For those who answered the first time, 100% also answered the second time, which enhanced the credibility of the information. Despite the strength of response rate, there were some methodological issues. Items in the questionnaire were based on the questionnaire by Peel et al. (2008) but to make it relevant to the aim and research questions, there were some items added and some were excluded. Content validity was done only by Swedish experts since there were no Rwandans with expertise in fall prevention were found. Rwandan experts could have contributed with important input if they could have been included in the content validation. It has been discussed which amount of proportion that is adequate to indicate a greater degree of content validity index using the average method. The conclusion is that the scale-level content validity index based on the average method (S-CVI/Ave) above 0.70 should be considered as good indicator of content validity of an instrument (Almohanna et al 2022; Wynd et al., 2003; Shi et al., 2012). According to Yusoff (2019), a cut-off score of 0.70 for face validity is considered sufficient. Therefore, the scores of content and face validity of this questionnaire met the criteria for satisfactory validity. For cross-cultural validity, the sum of scores from participants’ responses was calculated for each item. However, to make items easy and understandable in a Rwandan context, some items were removed, and others changed and
rewarded. As English is not the primary language in Rwanda it could have influenced how the participants understood and answered the items in the questionnaire.

There were some difficulties in analysing the test-retest reliability for questions 8 and 9 as neither ICC or Chi² calculations were appropriate. There could have been a participant who reported 8 risk factors and 5 treatments during the first measurement and then have reported 4 risk factors and 3 treatments at the second measurement. This means that there is discrepancy in ratings between the two measurements that were not captured and may have influenced the reliability (Aldridge et al., 2017). In addition, the current study showed lower ICC values for physiotherapists’ self-reported knowledge with the ICC value of 0.477, attitude with the ICC value of 0.321, while the self-reported practice ICC value was negative with -0.227. The negative ICC value revealed bad or unfortunate estimation (Liljequist et al., 2019). Koo & Li (2016) stated that ICC determines the degree of agreement and correlation between measurements and if ICC values are less than 0.5 that indicates poor reliability of the questionnaire. Therefore, ICC values of this questionnaire did not meet the assumptions of good reliability. Another factor that could have affected the reliability of the questionnaire was the participants’ delay in responding to the second measurement. It is possible that the varying time interval between responses to measurement one and two could have influenced the correlation between the two measurements. Long time interval may affect results in a variety of ways, including respondents may forget their initial responses (recall bias), they may interpret questions differently, and exposure to outside influences like media or events which can make responses less consistent upon retesting (Krosnick & Presser 2009; Moreno et al., 2022). In contrast, a longer time interval between measurements allows for a greater range of values to be observed, increasing the scale’s sensitivity to changes and fluctuations in the quantity being measured. Although, sensitivity for change is essential, but not of interest as no intervention has been performed in current study. Furthermore, the small sample size of this study may limit the generalisability of the findings. In addition, the study could not clearly demonstrate the level of knowledge, attitude, and self-reported competency that Rwandan physiotherapists possessed. This could be due to different reasons such as different level of education, working experience, work place (rural or urban). Further research is required to consider the selection of items, the creation of answer possibilities, the scoring of the instrument, and validation. According to Streiner et al., (2015), the instrument used on a certain population group with different education levels, or different circumstances, could constitute a threat to the generalizability of the findings.

5.4 Ethical discussion

When designing a questionnaire, it is important to consider the ethical implications involved. This study complied with ethical guidelines (General Assembly of the World Medical
Association, 2014), and no ethical issues appeared as participants' privacy and integrity were maintained. Voluntary participation and the right to withdraw from the study were ensured. Participants responses were strongly protected throughout the study and the participants' email addresses were kept confidential so that they could not be identified (Rohan et al., 2015).

5.5 Clinical implications and future research

The results imply that there is a need to improve physiotherapists’ knowledge about falls prevention and how this is implemented in a Rwandan clinical practice, as the population is gradually getting older. Future research in falls prevention should focus on improving accuracy, individualizing interventions, providing long-term monitoring, validating in diverse populations, and assessing the impact on quality of life, and comparing results with SCT. These areas of research have the potential to enhance the clinical utility and effectiveness of fall prevention strategies. Future research should focus on construct validity of the questionnaire, tested with confirmatory factor analysis (Yuwanich et al., 2018) and concurrent validity as well as predictive validity which can be measured by correlation coefficients analysis. The questionnaire could be used as an outcome measure in an implementation intervention study where knowledge, attitude and clinical practice is targeted in the intervention. In addition, future research in falls prevention questionnaires should be linked with SCT constructs to assess individual, behavioural and environmental risk factors for falls.

6 CONCLUSION

In conclusion, this study aimed at developing and validating a questionnaire assessing Rwandan physiotherapist perspectives on fall prevention with focus on attitude, knowledge, and self-reported practice. The validation process demonstrated satisfactory content and face as well as cross-cultural validity. However, the stability of the questionnaire, as studied in the test re-test reliability analysis, indicated non-significance. The findings highlighted that most physiotherapists emphasize individual rather than environmental or behavioral risk factors for falls and in falls prevention. Further research in this area is essential to complete validation and to improve the reliability of the questionnaire. The study also highlights the importance of application of social cognitive theory in studying how physiotherapists consider the complexity of factors contributing to falls. The study may serve as an incentive
for understanding Rwandan physiotherapist perspectives and may lay a foundation for better and targeted interventions in falls prevention within physiotherapy. Overall, the study's findings were unable to adequately demonstrate the level of knowledge, attitude, or self-reported competences Rwandan physiotherapists possess.
REFERENCE LIST


Suzuki, M., Kurata, S., Yamamoto, E., Makino, K., & Kanamori, M. (2012). Impact of fall-related behaviors as risk factors for falls among the elderly patients with dementia in a


https://doi.org/10.1093/acprof:oso/9780199231881.001.0001


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APPENDICES

APPENDIX A: REQUEST FOR PERMISSION

Mälardalen University,
School of Health, Care and Social Welfare
Division of Physiotherapy
Box 883, 721 23 Västerås
Sweden
Tfn: +46 2110 13 00
E-mail: info@mdu.se Web: www.mdu.se

March 27, 2023

Dear Sir/Madam,

Re: Permission to send a questionnaire on falls prevention to physiotherapists at (clinic/hospital name).

Background and aim
Falls are globally a common cause of injury and disability in older adults. The incidence of falls in Rwanda is unknown, but data from other African countries imply that this could be a growing problem also in Rwanda.
In a Master’s degree project the aim is to develop a valid and reliable questionnaire and study the self-reported knowledge and clinical practice of Rwandan physiotherapists in falls prevention for older persons living at home.

Procedure, participants, and confidentiality
Physiotherapists who are doing home visits in their regular practice will be requested to participate. If they agree to participate, they will be asked to answer a web questionnaire. It will take around 15 minutes to answer the questionnaire. The same questionnaire will be answered twice with a two week interval for a test-retest trial.
Participants answers and the results will be treated confidentially, so that no unauthorized person will have access to the data. Individual privacy will be maintained in all published and written data resulting from the study. The name of the hospital or clinic will be confidential. The participants will not be advantaged or disadvantaged in any way by participating. They will be reassured that they can withdraw their participation at any time during this study without any penalty. There are no expected risks in participating in this study. The participants will not be paid for participating in the study.

**Presentation of the study results**
The results will be reported in a Master’s thesis, and published in a data base for universities in Sweden, DiVA.

**Permission**
We are now seeking permission to send out a web questionnaire to physiotherapists at your (clinic/hospital). If you agree to give permission for the study, we kindly request that you:

- Send your permission by e-mail to the master’s student mma21006@student.mdh.se and the supervisor maria.sandborgh@mdu.se
- Send, in the same e-mail, the e-mail to the head of the physiotherapy department at your clinic/hospital so that we may contact him or her.

Please let us know if you require any further information. We look forward to your response as soon as is convenient.

Yours sincerely,

Master’s student Physiotherapy
Maurice Mwenedata, RPT, BSc
Tel: +46728467052
E-mail: mma21006@student.mdh.se

Thesis supervisor
Maria Sandborgh, RPT, PhD, ass prof
School of Health, Care and Social Welfare
Division of Physiotherapy
Mälardalen University
tel: +46 21101395
E-mail: maria.sandborgh@mdu.se
Dear experts,

This questionnaire contains 2 domains and 7 items. The domains concern “Self-reported practice” and “Knowledge in falls prevention”. We need your expert judgement on the degree of relevance of each item to the measured domains. Please use the following rating scale

Degree of relevance:
1 = the item is not relevant to the measured domain
2 = the item is somewhat relevant to the measured domain
3 = the item is quite relevant to the measured domain
4 = the item is highly relevant to the measured domain

The full questionnaire in a test version can be found here (see page 2): https://sunet.artologik.net/mdu/Survey/15555

Please send back the document with your ratings by e-mail to both the master student and the supervisor in an attachment. E-mail addresses below.

If you have questions, please contact us:

Masterstudent: Maurice Mwenedata, RPT, BSc
mma21006@student.mdu.se

Supervisor: Maria Sandborgh, RPT, PhD
Maria.sandborgh@mdu.se
### Domain 1: Physiotherapists self-reported practice

<table>
<thead>
<tr>
<th>Tested items</th>
<th>Degree of relevance. Mark with an X in the box for the grading you chose for each item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. the item is not relevant to the measured domain</td>
</tr>
<tr>
<td>6A.</td>
<td>In your initial assessment of patients, how often do you ask older adults if they have a history of falls?</td>
</tr>
<tr>
<td>6B.</td>
<td>In your assessment of patients, how often do you identify risk factors for falling?</td>
</tr>
<tr>
<td>6C.</td>
<td>In your treatment planning, how often do you provide interventions to address fall risk factors?</td>
</tr>
<tr>
<td>6D.</td>
<td>In your treatment planning, how often do you recommend patients to consult other health care professionals to address fall risk factors (for example: Medical doctor, Occupational therapist, Optometrist, Pharmacist, Podiatrist, Nutritionist, Other)?</td>
</tr>
</tbody>
</table>
### Domain 2: Physiotherapists self-reported knowledge

<table>
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<tr>
<th>Tested items</th>
<th>Degree of relevance. Mark with an X in the box you chose for each item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 the item is not relevant to the measured domain</td>
</tr>
</tbody>
</table>

7. Risk factors for falls:
List risk factors for falls in boxes on line A1 and A2.
In the boxes on line B1 and B2, please use the following to assign a level of importance to each risk factor listed above:

1 *Very important*
2 *Moderately important*
3 *Somewhat important*
4 *Not very important*

You can assign the same level of importance to several risk factors.

8. List as many activities and treatments in Physiotherapy as you can, that might help prevent falls in your older patients.

9. How would you rate your level of knowledge about specific risk factors for falls in older adults?

**Comments (state for which item/-s):**
APPENDIX C: FACE VALIDITY RATING FORM OF THE FALLS PREVENTION QUESTIONNAIRE-RWANDA

Dear Physiotherapist,

This questionnaire contains 13 questions. The questionnaire concern “Attitudes to falls prevention”, “Self-reported practice” and “Knowledge in falls prevention”. We need your opinion on how clear each question is, and how easy it is to answer each question.

How understandable the question is:
1 = the question is not at all understandable
2 = the question is somewhat understandable
3 = the question is understandable

How easy it is to answer the question:
1 = the question is impossible to answer
2 = the question is difficult to answer
3 = the question is easy to answer

If you have questions, please contact us: Masterstudent: Maurice Mwenedata, RPT, BSc mma21006@student.mdu.se
Supervisor: Maria Sandborgh, RPT, PhD maria.sandborgh@mdu.se

Questions:

1. **Please provide your e-mail address.** The questionnaire will be sent out twice in order to test the reliability of the questionnaire. Because we want to pair your answers on the first and second measurement you need to give us your e-mail address, so we will know how the same individual answered the first and second time. Your e-mail address will be confidential and only available to the researchers, Maurice Mwenedata and Maria Sandborgh.

(email address) .............................................................................................................

2. **Degree level: What type of degree do you hold?**

(Answer options):
Diploma in Physiotherapy
Bachelor of Physiotherapy
Master of Physiotherapy
Master in other subject

3. **Where do you work?**

(Answer options):
Private clinic
Hospital
Non-government organization

4. **For how long have you worked as a Physiotherapist?**

(Answer options):
0 – 1 year
1 – 5 years
10 – 15 years
15 years or above

5. **How long have you been providing home healthcare?**

0 – 1 year
1 – 5 years
10 – 15 years
15 years or above

6. **Approximately how many older persons do you meet per month.**

(Answer options): open question

7. **In your opinion, how important is falls prevention in older adults in Rwanda?**

(Answer options):
Not important at all
Somewhat important
Quite important
Very important

8. **Fall risk factors, assessment, and treatment.**

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<thead>
<tr>
<th></th>
<th>Almost Never or never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost always or always</th>
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<tr>
<td>8A</td>
<td>In your initial assessment of patients, how often do you ask older adults if they have a history of falls?</td>
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<tr>
<td>8B</td>
<td>In your assessment of patients, how often do you identify risk factors for falling?</td>
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<tr>
<td>8C</td>
<td>In your treatment planning how often do you provide interventions to address fall risk factors?</td>
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<tr>
<td>8D</td>
<td>In your treatment planning how often do you refer patients to other health care professionals to address fall risk factors (i.e. MD, OT, Optometrist, Pharmacist, P&amp;O, other)?</td>
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</table>

9. **List important risk factors for falls on line A1 and A2. One risk factor per box.**

A1. List risk factors:
A2. Continued list risk factors (if needed)

10. **List as many activities and treatments in Physiotherapy you can, that you consider are effective to prevent falls in your older patients. One activity or treatment per box.**

List of activities and treatments
Continued list of activities and treatments
Continued list of activities and treatments
Continued list of activities and treatments

11. **How would you rate your level of knowledge about important risk factors for falls in older adults?**

(Answer options):
No knowledge
Little knowledge
Some knowledge
High knowledge

12. **How would you rate your knowledge about effective activities and treatments in Physiotherapy for falls prevention?**

(Answer options):
No knowledge
Little knowledge
Some knowledge
High knowledge
13. How would you rate your need of more knowledge in fall risk assessment and falls prevention?
(Answer options):
No need at all for more knowledge
Some need for more knowledge
High need for more knowledge
Very high need for more knowledge

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<tr>
<th>Question #</th>
<th>1A</th>
<th>2A</th>
<th>3A</th>
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</table>
Comment (state for which question or questions):

APPENDIX D: FACE AND CROSS-CULTURAL INTERVIEW QUESTIONS

1. Why did you find this question unclear?
2. Do you have a suggestion for how to make it more understandable?
3. Why were there problems filling in your answer for this question?

1. Is there any question that you find a bit strange in a Rwandan physiotherapy context? In what way?
2. Overall, do you think the questions concern issues that are relevant for a Rwandan physiotherapy context?
APPENDIX E: FINAL VERSION OF QUESTIONNAIRE

PHYSIOTHERAPY ATTITUDE, KNOWLEDGE AND SELF-REPORTED CLINICAL PRACTICE IN ELDERLY FALLS PREVENTION QUESTIONNAIRE

Code number:

1. Please provide your e-mail address. The questionnaire will be sent out twice in order to test the reliability of the questionnaire. Because we want to pair your answers on the first and second measurement you need to give us your e-mail address, so we will know how the same individual answered the first and second time. Your e-mail address will be confidential and only available to the researchers, Maurice Mwenedata and Maria Sandborgh.

(email address) ........................................................................................................

2. Degree level: What type of degree do you hold?

(Answer options):
Diploma in Physiotherapy
Bachelor of Physiotherapy
Master of Physiotherapy
Master in other subject

3. Where do you work?

(Answer options):
Private clinic
Hospital
Non-government organization

4. For how long have you worked as a Physiotherapist?

(Answer options):
0 – 1 year
1 – 5 years
5. Approximately how many older persons do you meet per month.

(Answer options): open question

6. In your opinion, how important is falls prevention in older adults in Rwanda?

(Answer options):
Not important at all
Somewhat important
Quite important
Very important


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<th>Almost always or always</th>
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<tbody>
<tr>
<td>7A</td>
<td>In your initial assessment of patients, how often do you ask older adults if they have a history of falls?</td>
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<tr>
<td>7B</td>
<td>In your assessment of patients, how often do you identify risk factors for falling?</td>
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<tr>
<td>7C</td>
<td>In your treatment planning how often do you provide interventions to address fall risk factors?</td>
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<tr>
<td>7D</td>
<td>In your treatment planning how often do you refer patients to other health care professionals to address fall risk factors (i.e. MD, OT, Optometrist, Pharmacist, P&amp;O, other)?</td>
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</tbody>
</table>

8. List important risk factors for falls on line A1 and A2. One risk factor per box.

A1. List risk factors:
A2. Continued list risk factors
(if needed)
9. List as many activities and treatments in Physiotherapy you can, that you consider are effective to prevent falls in your older patients. One activity or treatment per box.

List of activities and treatments
Continued list of activities and treatments
Continued list of activities and treatments
Continued list of activities and treatments

10. How would you rate your level of knowledge about important risk factors for falls in older adults?

(Answer options):
No knowledge
Little knowledge
Some knowledge
High knowledge

11. How would you rate your knowledge about effective activities and treatments in Physiotherapy for falls prevention?

(Answer options):
No knowledge
Little knowledge
Some knowledge
High knowledge

12. How would you rate your need of more knowledge in fall risk assessment and falls prevention?

(Answer options):
No need at all for more knowledge
Some need for more knowledge
High need for more knowledge
Very high need for more knowledge