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South African Audiologists' Perceived Knowledge, Views and Reported Practice in the Realm of Fall Risk Screening with Older Adults

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Masters in Audiology by Dissertation

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June 2023

University of the Witwatersrand, Johannesburg

School of Human and Community Development

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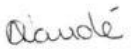
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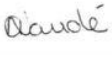


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Article title: "***Professional guidelines and reported practice of audiologists performing fall risk assessment with older adults: a systematic review".***

Journal name, year, volume and page numbers: American Journal of Audiology, 2022, 31(1), 243-260

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AKNOWLEDGEMENTS

This would not have been possible without my support team.

To my supervisors, Prof. Amisha Kanji and Dr Alida Naudé, thank you for your invaluable guidance. Thank you for pushing me beyond my comfort zone and cultivating my growth and thinking as a researcher throughout this process. You always saw my capabilities before I did, and for that I am truly grateful.

To my Fiancé, Jared, thank you for your endless patience, sacrifice and support over the past three years. Thank you for helping me balance my academic and professional responsibilities with life, love and fun- I adore you.

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DEFINITION OF TERMS

The terms frequently used within this research study are listed and defined below:

1.2.1 Falls

For the purposes of this study, the World Health Organisation's (WHO) definition of a fall was used : "an event whereby an individual unexpectedly comes to rest on the ground or another lower level" (p. 3), "which is not the result of a major intrinsic event or external hazard (e.g. myocardial infarction, stroke, seizure or an overwhelming external hazard, such as being hit by a vehicle)" (Kiely et al., 2015, p. 3).

1.2.2 Fall risk and fall risk factors

A person is said to have a fall risk when one or multiple fall risk factors are evident (Cuevas-Trisan, 2019). Fall risk factors are referred to as intrinsic (referring to a person's health and biological status) or extrinsic (referring to behavioural, environmental and social factors (de Clercq, 2021). For the purposes of this study, these fall risk factors are understood in line with the International Classification of Functioning, Disability and Health (ICF) code set as defined by de Clercq (2020), which directs health care professionals (HCPs) to recognise of fall risk factors as the initial step towards the assessment and management of patients with fall risk.

1.2.3 Fall risk screening(FRS)/ fall risk identification

The objective of the FRS is to identify a person's fall risk factors and their subsequent risk of falling (Johnston et al., 2019). For this reason, 'Identification of fall risk' and 'FRS' are used interchangeably within this study, with both referring to the process used to establish an older adult's fall risk factors.

1.2.4 Older adults

In the literature the older population is generically classified in terms of the youngest-old (65-74), middle-old (75-84), and oldest-old population (> 85)(Lally & Valentine-French, 2019). For the purposes of this study, however, older adults included all adults over the age of 65 years. This is in line with the American Geriatrics Society (AGS) & British Geriatrics Society guideline (BGS) which recommends annual FRS for all adults aged 65 years and older (American Geriatrics Society (AGS) & British Geriatrics Society (BGS), 2011).

1.2.5 Perceived knowledge

The lens through which individuals view their reality is perception. Self-assessment or the feeling of knowing certain information is how it is defined, and thus it may not always reflect tested knowledge (Mcdonald, 2012). Perception is a subjective measure of an individual's opinions, judgements, understanding and thoughts based on personal experiences and interpretation thereof (Mcdonald, 2012).

1.2.6 Presbyastasis:

Presbyastasis refers to the natural age-related decline in the body's ability to maintain balance, leading to reduced postural stability and an increased risk of falls in older adults. These changes can be caused by degenerative changes in the vestibular system, as well as age-related alterations in vision, muscle strength, and cognitive function. Symptoms may include dizziness, unsteadiness, and difficulty with balance and walking, especially in situations that require intricate movements or challenging environments (Rizzo et al., 2019).

1.2.7 Presbyvestibulopathy:

Presbyvestibulopathy refers to the natural degenerative changes that occur in the vestibular system, responsible for maintaining balance and spatial perception, as people age. The vestibular system includes the inner ear, which contains sensory cells that react to movements and changes in head position, and neural pathways that connect the inner ear to the brainstem and other parts of the brain (Müller et al., 2022).

1.2.8 Views

The views in this research describe audiologist's personal attitudes, beliefs, opinions and preferences in relation to FRS (Patterson & Honaker, 2014). Views are believed to strongly influence a person's behaviour (the behaviour in this study would be conducting FRSs) (Mcdonald, 2012).

1.2.9 Reported practice

The reported practice findings in this research will detail descriptions provided by audiologists on the procedures they follow and the methods/ tools they would use to conduct FRS. These descriptions are self-reported and not verified nor confirmed through observations of actual practice in the clinical environment (Burch et al., 2018).

1.2.10 The International Classification of Functioning, Disability and Health (ICF) Framework

The ICF framework is a classification system for the description of a person's overall health at three levels. These levels include impairment (body structures and function), activity limitation and participation restriction. Furthermore, it also takes into consideration the environmental and personal factors influencing an individual's health (Leonardi et al., 2022).

ABBREVIATIONS

AAA: American Academy of Audiology

ABC Scale: Activities Specific Balance Confidence Scale

ADLs: Activities of Daily Living.

AGS: American Geriatrics Society

AOTA: American Occupational Therapy Association

APTA: American Physical Therapy Association

ASHA: American Speech-Language-Hearing Association

AU: Registered profession with the HPCSA: Audiologist

Au.D : Doctorate of Audiology

BBS: Berg Balance Scale

BGS: British Geriatrics Society

BPPV: Benign Paroxysmal Positional Vertigo

BSA: British Society of Audiology

CAA: Canadian Academy of Audiology

CDC: Centres for Disease Control and Prevention

CES-D : Centre for Epidemiologic Studies Depression Scale

COVID-19: Coronavirus Disease of 2019

CDP: Computerised Dynamic Posturography

CPD: Continuing Professional Development

DGI: Dynamic Gait Index

DHI: Dizziness Handicap Inventory

DVA: Dynamic Visual Acuity

ENT: Ear, Nose and Throat specialist

FES: Falls Efficacy Scale

FES-I: Falls Efficacy Scale-International

FGA: Functional Gait Assessment

FRAT: Fall Risk Assessment Tool

FRT: Functional Reach Test

GANS SOP: Gans Sensory Organisation Performance Task

GDS: Geriatric Depression Scale

GP: General Practitioner

GST: Gaze Stabilization Test

HADS: Hospital Anxiety and Depression Scale

HCP: Healthcare Professional

HHIE: Hearing Handicap Inventory for the Elderly

HPCSA: Health Professions Council of South Africa

IADL: Instrumental Activities of Daily Living

ICF: International Classification of Functioning, Disability and Health

JHFRAT: The Johns Hopkins Fall Risk Assessment Tool

KAB Framework: Knowledge, Attitudes and Behaviour Framework

LAMI: Low and Middle Income

MCT: Motor Control Test

mCTSIB: Modified Clinical Test of Sensory Integration in Balance

MDT: Multidisciplinary Team

MMSE: Mini-Mental State Examination

MOCA: Montreal Cognitive Assessment

NCOA: National Council on Aging

NHI: National Health Insurance

NIDCD: National Institute on Deafness and Other Communication Disorders

NIH: National Institutes of Health

PQRS: Physician Quality Reporting System

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

QoL: Quality of Life

SA: South Africa

SAAA: South African Association of Audiologists

SASLHA: South African Speech-Language-Hearing Association

SMU: Sefako Makgatho Health Sciences University

SOP: Sensory Organisation Performance

STA: Registered profession with the HPCSA: Speech Therapist and Audiologist

STEADI: Stopping Elderly Accidents, Deaths & Injuries

STRATIFY: St. Thomas Risk Assessment Tool in Falling Elderly Inpatients

TBAT: Tinnetti Balance Assessment Tool

TUG: Timed Up and Go

UCLA: University of California Los Angeles

UCT: University of Cape Town

UK: United Kingdom

UKZN: University of KwaZulu-Natal

UP: University of Pretoria

URL: Uniform Resource Locator

USA: United States of America

VADL: The Vestibular Disorders Activity of Daily Living Scale

VEMP: Vestibular Evoked Myogenic Potential

vHIT: Video Head Impulse Test

VHQ: Vertigo Handicap Questionnaire

VNG/ENG: Videonystagmography/Electronystagmography

VOR: Vestibular Ocular Reflex

VSS-sf: Vertigo Symptom Scale-short form

WHO: World Health Organization

WITS: University of the Witwatersrand

ABSTRACT

Background: Falling in older adults has contributed significantly to injury and loss of life worldwide, thus, warranting the development of fall screening and prevention measures. Audiologists routinely evaluate older adults and are also key role players in balance disorders. The effectiveness of FRS and prevention is believed to depend on the healthcare professional's level of knowledge and practice in fall prevention. Little is however known about South African (SA) audiologists' views, perceived knowledge, and practice in the realm of fall risk with older adults.

Objective: The objective of this study was to determine the perceived knowledge, views and reported practices of SA audiologists in the realm of FRS with older adults.

Method: A mixed methods approach with a sequential triangulation design was utilised. The participants recruited for this study were SA audiologists who were registered with the Health Professions Council of SA (HPCSA) and had experience with older adults. The systematic review was used to inform the data collection tools. The data was then collected via online surveys and online interviews. Purposive sampling was used as the survey Uniform Resource Locator (URL) link and interview invitations were distributed via email to the SA Association of Audiologists (SAAA) and, the National Speech Therapy and Audiology databases and was also distributed via audiology-specific social media platforms. One hundred and six (n=106) participants completed the online survey and eighteen (n=18) participated in the online interviews. Data from the survey was analysed using descriptive and correlation statistics, and a deductive thematic analysis was used for interview data.

Results: The research study findings indicated a strong motivation among audiologists to learn more about supporting older adults at risk of falling, as almost 100% (n=102) expressed a desire for further training. Notably, the results showed that 83% (n=88) of participants

believed that audiologists lacked sufficient training in FRS during their undergraduate curriculum, aligning with their perception of limited knowledge in conducting FRSs. In light of these results, it is, however, encouraging that 68% (n=73) of participants believed that audiologists had an important role to play in FRS and 58% (n=62) believed that it should be within the audiologist's scope of practice. Ninety percent (n=95) of participants believed that incorporating FRS would change clinical practice and may provide the profession with an opportunity for expansion. Several challenges which could influence the perceived feasibility of the implementation of FRS clinically were reported, including the need for additional training (80%; n=85), lack of time (48%; n=51), difficulty collaborating with multidisciplinary team (MDT) members (38%; n=40) and discomfort with the vestibular portion of their scope of practice (38%; n=40). Currently, it appears that very few audiologists are conducting FRSs with older adults. The results clearly suggests an opportunity for audiologists to expand their current perceived scope of practice, enhancing their role in preventative audiology.

Conclusion: Overall, this study found that SA audiologists viewed embracing the implementation of FRS positively. A lack of perceived knowledge and anticipated challenges were reported to limit the implementation of FRS clinically.

Key words: audiology, fall risk, falls, screening, prevention, older adults, perceived knowledge, views, reported practice.

CHAPTER 1: BACKGROUND, ORIENTATION AND PROBLEM STATEMENT

'Science is not meant to cure us of mystery, but to reinvent and reinvigorate it'
- Robert Sapolsky

1.1 Introduction and outline

This chapter provides an orientation to the background and problem statement addressed in the dissertation and highlights the contribution of the study to the literature. The chapter then proceeds to define the most important terms and provides a list of abbreviations used in this study. Lastly, an outline of the six chapters within this dissertation is described.

1.2 Problem statement and background

Research suggests that "in the next 15 seconds, an older adult will be treated in an emergency department for a fall-related injury and in the next 29 minutes, an older adult will die from injuries sustained from a fall" (CDC, 2012). As a result, medical facilities are burdened with coping with the repercussions of falls. Furthermore, due to poor prevention of falls, many older adults are suffering the significant medical, physical, psychological, social, and financial consequences of falls (assuming the fall was not fatal), suggesting the need for more prevention strategies.

With the anticipated quadrupling of SA's elderly population over the next four decades (Department of Health, 2000), fall-related research and the development of sensitive and specific FRS protocols is fundamental to preventing future falls and reducing the burden of falls in SA. Audiologists are in a strategic position to screen patients and identify those at risk of falling. This is because firstly audiologists are specialists in balance deficits and prevention hereof and secondly because the population at risk of falling (older adults) are regularly consulting with audiologists. The portion of the older adult population who are said to consult with audiologists, are even more at risk of falling than the general population of older adults

(Criter & Honaker, 2016). This is due to their susceptibility to multifactorial fall risk factors, one of them being age related deterioration of inner ear sensory functions, affecting both balance and hearing abilities in older adults (Iwasaki & Yamasoba, 2015, Zalewski, 2015). Audiologists are in the ideal position to improve global identification of elderly individuals at-risk (Criter & Honaker, 2016).

Although the key role of audiologists in the prevention of falls has been highlighted in literature, international research suggests that very few audiologists are screening older adults for fall risk (Baxter et al., 2017). In America, a study revealed that although audiologists believed it was within their scope of practice, less than 17% of audiologists felt they had adequate knowledge and training on how to prevent falling in the elderly (Patterson & Honaker, 2014). If fall risk identification and prevention is within the audiologist's scope of practice and is not being conducted, principles of beneficence and non-maleficence can be argued, especially considering that FRS does not require extensive training and can be performed in as little as 10-15 minutes (Tinetti et al., 1986). Unfortunately, there is a dearth of information in the area of FRS related to sub-Saharan African countries (Kalula et al., 2016). Information regarding SA audiologists' views related to scope of practice, perceived knowledge and implementation of FRS has not yet been published.

With literature suggesting that the success of fall prevention relies on the level of the clinician's knowledge of fall risk (Kalu et al., 2018; Lee et al., 2018; Honaker, 2021), the question remains: what is the perceived knowledge of SA audiologists in the area of fall risk identification and prevention? Additionally, what are their views towards FRS being conducted by audiologists? Lastly, what is currently being done by audiologists to screen for fall risk in older adults? This study's objectives focused on obtaining answers to these questions to

provide profession specific information that could assist in informing the development of guidelines and best practices for audiologists in SA.

In light of the facts provided, falls in the elderly population are a public health crisis (Baxter et al., 2017). Further research which establishes what the current status of audiologists' perceived knowledge, views and current practice in the realm of FRS of older adults is critical. Future research should prioritize the building upon of existing knowledge to develop, document, and incorporate best practice evidence-based fall risk screening (FRS) recommendations into undergraduate and continuous professional development (CPD) training programs (Honaker et al., 2013a).

1.3 Chapter outlines

The dissertation consists of six chapters. **Chapter 1** comprises the problem statement and an orientation to the rationale and motivation for the study, it concludes with an outline of the subsequent chapters in this research.

The conceptual framework for the study is provided in **Chapter 2**, which begins with a discussion related to the prevalence and impact of falls in the older adult population. This is followed by a discussion of fall risk factors. The fall risk factors that specifically contribute to audiology patients being at risk if falling are highlighted. Hereafter the importance of primary prevention of falls and the reduction of fall risk is highlighted. This chapter then proceeds to review what the audiologists' role in FRS and prevention is, further detailing reports of audiologists' current knowledge, views and practice is in FRS.

The methodology adopted during the research study is described in **Chapter 3**. The discussion starts with a presentation of the aims, objectives, research design and ethical considerations for this study. The chapter then proceeds to document the two stages of this

study, namely: Stage 1- the research tool adaptation and Stage 2: The main study. Stage 1 documents the process and results of the systematic review, survey adaptation and pilot study- which was conducted to strengthen the reliability and validity of the main study. Stage 2 documented the research considerations and processes used to obtain data regarding SA audiologists' perceived knowledge, views and reported practice in the realm of FRS with older adults, using online surveys and interviews.

Chapter 4 presents the results obtained from the online surveys and virtual interviews. The results of the online survey and virtual interviews are presented against the background of the objectives and in line with the Knowledge, Attitudes and Behaviour (KAB) Framework adapted for this study. The demographics of the participants is first described, followed by results pertaining to audiologists' perceived knowledge on FRS; then audiologists' views on FRS; followed by audiologists' reported practice on FRS.

The data presented in Chapter 4 is interpreted and discussed in **Chapter 5**. The results of the study are integrated to answer the research question: "What is the perceived knowledge, views and reported practice of audiologists in terms of FRS with older adults, specifically in the SA context?". The results are discussed in relation to the relevant literature, in accordance with objective C-E of this study.

In Chapter 6, a comprehensive summary of the findings is presented, emphasizing their implications. The research study is critically evaluated, showcasing its strengths and limitations. Subsequently, the clinical implications are discussed, followed by recommendations for future research.

The appendices contain details regarding the procedures of data collection and analysis, crucial for comprehending and replicating the study.

1.4 Summary

This introductory chapter provided the rationale for the current research by summarising the background literature that informed the need for this research, further emphasising the relevance and urgency of this research. The chapter concluded with an outline of the six chapters in this dissertation.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction and outline

This chapter starts by providing the reader with a global and national overview of the incidence and impact of falls in older adults. This is followed by a discussion of the factors considered to increase older adults' risk of falling. The chapter continues to express the importance of primary prevention of falls. Hereafter, this chapter explores the reason older adults forming part of the audiologists' case load appear to present with a higher fall risk than the general older adult population. The audiologist's role in screening for fall risk is explored, followed by the current practice, knowledge and views of audiologists in the realm of FRS, as specified in literature. The chapter concludes with a summary of key concepts related to the study, including a clear rationale for the objectives of this study.

2.2 Aging and falls: Global and National Incidence

Globally, the aging population is increasing. There were 703 million persons older than 65 years in the world in 2019. The number of older persons is projected to double in number to 1.5 billion in 2050 (United Nations, 2019). Population aging is, however, occurring nearly three times faster in Low and Middle Income (LAMI) Countries compared to high income countries (Chatterji et al., 2015). SA's older adult population is projected more than double from 4.2 million people to 10.1 million people by 2050 (WHO, 2015).

With the expected escalation of older adults, the healthcare sector may experience an influx of increased medical needs associated with aging. One such consideration is increased fall risk in older adults. Falls, defined as unexpected, uncontrolled, accidental, downward movements of the body to the ground (LeCuyer et al., 2017), have reached epidemic proportions in the population of older adults (Vaishya & Vaish, 2020). After motor vehicle accidents, falls are the second leading cause of accidental or unintentional fatalities worldwide

(WHO, 2018b). Approximately 30% of older adults are falling each year, resulting in 646 000 fatalities worldwide, with over 80% of these fatalities occurring in LAMI countries (Baydan et al., 2019; WHO, 2018b, 2021). Very little is known about the incidence of falls in older adults in SA, however, it has been reported that falls appear to be the most common injury (recorded over a six-year period) requiring medical intervention in SAs older adults (da Costa et al., 2020). Reports suggest that Sub-Saharan Africa experiences the most rapid growth of the older population compared to any other region globally (Aboderin & and Beard, 2015). Consequently, fall fatalities and injuries among South Africa's older adult population has emerged as a critical health concern (Department of Health, 2000).

Incidence of falls may vary depending on an individual's age group, gender, race and socio-economic status. Talbot et al. (2005) included 1497 young, middle aged and elderly individuals identified an increased incidence of falls reported with increased age. Findings revealed that 35% of older adults reported a history of recent falls, whereas only 21% of middle-aged participants and 18% of younger participants reported a recent history of falls (Talbot et al., 2005). Furthermore (although not statistically significant), a study by Gale et al. (2016) found that women appear to be more susceptible to falling than men, with a 29.1% prevalence in women and a 23.5% prevalence in men. Johansson et al. (2016) suggested that woman may be slightly more at risk of falling than men due to increased variation in gait pattern during dual-task activities. Research has however argued that possible increased prevalence in elderly woman may only be due to woman being more likely to report a fall (Cuevas-Trisan, 2019). Race also appears to play a role in an individual's fall risk. A study conducted in the USA identified that African American people appeared to have a 30-40% decreased chance of falling compared to Caucasian people. The reason for this remains unexplained (Sun et al., 2016). Lastly, fall risk susceptibility appears to increase for older adults with poor economic

status, because with low-income, low education, poor living situations and restricted access to services, they are more predisposed to acquiring (and not managing) several fall risk factors (fall risk factors will be described in **Section 2.3**) (Siqueira et al., 2011). This highlighted the importance of screening older adults in a LAMI country such as SA.

2.3 Impact of falls in older adults

The devastating consequences of falls on older adults themselves is far-reaching, so much so that, falls are recognized as part of the quintet referred to as the 'geriatric giants.' The geriatric giants include falls, dementia, poor mobility, incontinence, and polypharmacy and have been observed to result in the greatest impairment within the population of older adults (Bartoszek et al., 2019). The World Health Organisation (WHO) developed the International Classification of Functioning, Disability and Health (ICF), a framework utilized to evaluate an individual's impairment due to health conditions. The ICF helps HCPs to gauge how fall consequences may affect one's functionality levels and ability to participate in activities of daily living (ADL)(Leonardi et al., 2022).

The consequences of non-fatal falls on older adults' ADL and participation may be largely influenced by the devastating threats that falls pose to older adults' health, independence, psychological well-being, and financial security (Vaishya & Vaish, 2020). Approximately one third of seniors hospitalized for non-fatal falls are predicted to sustain injury severe enough to limit their independence and necessitate placement in a long-term care facility (WHO, 2018b). Loss of independence due to falls, has also been reported to contribute to or worsen conditions such as depression, confusion, and other mental health issues. As a result, the quality of life (QoL) for older adults is negatively affected. (Bjerk et al., 2020; Public Health Agency of Canada, 2014).

The burden that falls, and its related injuries and consequences, have placed on older adults and the healthcare systems is unprecedented. The United States of America (USA) reported an estimate expenditure of $754 million, related to fatal falls (Florence et al., 2018). The highest disbursement however is related to non-fatal falls, with the United Kingdom (UK) and the USA spending £2.3 billion (NICE, 2013) and $50 billion (Florence et al., 2018), respectively, although more updated statistics were not identified, the point remains that falls have results in significant health expenditure worldwide. Limited information is available on SA's health expenditure due to falls. Given the personal, social, and economic devastation caused by falls, is important for HCPs to confirm fall risk factors in an older adult, in order to actively participate in the reduction of falls.

2.4 Fall risk and related risk factors in older adults

Risk factors are conditions that increase the risk of developing a condition, such as a fall (Lukaszyk et al., 2016). Conventionally, fall risk factors have been characterised in terms of intrinsic and extrinsic factors. In literature, the biological factors of age, gender and race alongside an individual's health status refers to a person's 'intrinsic' fall risk factors. These factors are intrinsic to each individual and can be classified as either modifiable (able to be altered through measures such as chronic medication) or non-modifiable (inherent factors that cannot be changed, such as age). Extrinsic fall risk factors refer to environmental factors which may increase an individual's likelihood of falling (e.g., tripping hazards). Once intrinsic fall risk factors are present, older adults are also more likely to stumble without regaining their balance when they are exposed to extrinsic fall risk factors (Gazibara et al., 2017).

Overall, older adults are more susceptible to acquiring several health problems, each of which may have a correlation with an increased risk of falling (Gazibara et al., 2017; Kalu et al., 2018). For this reason, the AGS and BGS guidelines recommend that all adults aged 65

years and older should be screened for the presence of fall risk factors annually (AGS & BGS, 2011). Examples of fall risk factors can be viewed in **Table 2.1.**

Table 2.1

Summary of Intrinsic and Extrinsic Fall Risk Factors, Categorized within their Respective ICF Dimensions

INTRINSIC FACTORS	
Personal factors	Body function and structure

- Age
- Race
- Gender
- Dizziness/vertigo
- Chronic conditions:
  ▪ Diabetes
  ▪ Cardiac conditions
  ▪ Orthostatic hypotension
  ▪ Arthritis
  ▪ Osteoporosis
  ▪ Lung disease
  ▪ Renal disease
- Number of falls (history of falls)
- Epilepsy
- Stroke/ head injury
- Alcohol/drug intake
- Fear of falling
- Nutritional and vitamin D deficiency
- Depression, anxiety
	- Deterioration of senses:
	  ▪ Poor hearing
	  ▪ Poor vision
	  ▪ Poor proprioception
	- Lower extremity weakness
	- Balance/gait abnormalities
	- Impaired mobility
	- Frailty
	- Cognitive deterioration
	- Incontinence
	- Foot pain
	
	Environmental factors
	- Medications (polypharmacy)

EXTRINSIC FACTORS	
Environmental factors	Personal factors
- Unstable/uneven surfaces - Tripping hazards - Lighting - Living alone	- Poor footwear - Use of assistive devices Activities and participation - Sedentary and behavior- lack of exercise and social isolation - Situational avoidance and social isolation - Difficulty completing ADL
(Crow et al., 2018; French et al., 2016; Heitz et al., 2019; Lukaszyk et al., 2016; Patterson & Honaker, 2014; Rios et al., 2019)	

When considering older adults' fall risk factors, it is important to consider these factors within the multi-dimensional concepts of the ICF framework. The ICF aids in guiding HCPs to identify, describe and organise an individual's unique fall risk by categorising factors into body function, body structures, activities and participation, environmental factors and personal factors (**Table 2.1**). This facilitates conceptualisation of an older adult's holistic fall risk

picture, so that an effective referral and management plan can be devised (de Clercq, 2021; WHO, 2013).

As can be viewed in **Table 2.1** several chronic health conditions may contribute to a person's fall risk. Around 85% of older adults experience the presence of at least one chronic health condition, with 60% having a minimum of two chronic conditions (NIH, 2017). According to the National Council on Aging (NCOA) Centre for Healthy Aging Falls' Database, more than 67% of participants enrolled in falls prevention programs reported having multiple chronic conditions, with the top three self-reported conditions were arthritis (66%), cardiac conditions (27%), and diabetes (24%) (NCOA, 2021).

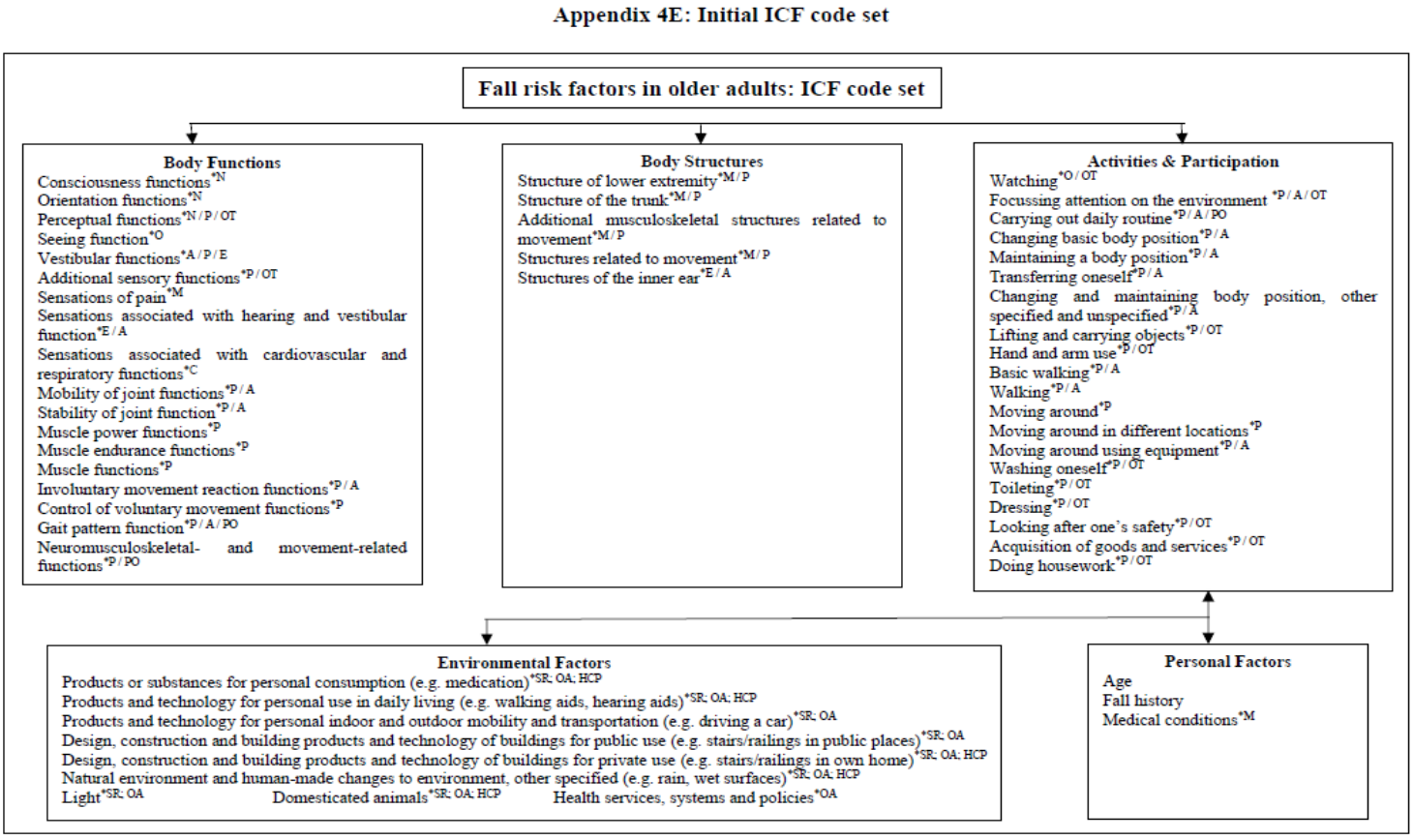
Chronic health conditions, aging and the accompanying need for several medications, contributes to the deterioration of an individual's physical, physiological and psychological well-being (Ferreira et al., 2014). The resultant cumulative fall risk factors significantly increase fall susceptibility (Gazibara et al., 2017). Co-occuring risk factors cause multifactorial dizziness in 20-40% of older adults, often making it challenging to attribute the dizziness to a single cause and effectively treat (Ciorba et al., 2017). Onset of *dizziness, imbalance* and *fear of falling* may also spur on several additional risk factors which affect an individuals activities and participation. For example, individuals may begin restricting their activity. *Inactivity* can result in the development of *fragility* (Ferreira et al., 2014). Resultantly, older adults may also begin to *isolate* themselves from social activities. Concequences hereof could be the development of *depression* and accelerated *cognitive decline* (Sartor-Glittenberg et al., 2018). All of these italicized factors are considered to be fall risk factors in literature and points out that it is very rarely the case that only one fall risk factor is present and that often dynamic interactions of fall risk factors exist (Hopewell et al., 2020). The multifactoral, occasionally accumulative nature of fall risk factors futher highlights the nessesity of utilising the

biopsychosocial ICF framework to best identify and comprehend a patient's fall risk profile (Hopewell et al., 2020; Hulla et al., 2016).

Recently, dDe Clercq (2020), explored intrinsic and extrinsic fall risk factors for older adults and developed an ICF code set (**see Figure 2.1).**

Figure 2.1

De Clercq (2020)'s ICF Code Set for Fall Risk Factors in Older Adults



Note: Image from *Developing an ICF Code Set for Health Care Practitioners to Identify Fall Risk Factors in Older Adults* by Hendrika de Clercq (2020), Page A-129.

The ICF code set (**Figure 2.1)** can act as a FRS tool as well as a guideline to inform a holistic, biopsychosocial FRS protocol to identify all factors contributing to an older adult's individual's fall risk (de Clercq, 2021).

2.5 Factors contributing to fall risk in audiology patients

Older adults may find themselves consulting with an audiologist due to symptoms which are evident because of deterioration of the auditory and/or vestibular system with age. Just as the auditory system deteriorates with age, requiring annual monitoring and intervention, so the vestibular system requires similar consideration (Shapiro, 2019). Both presbycusis and presbyvestibulopathy increases an older adult's chances of falling. Deterioration of both the sensory organs (hearing and balance) is considered to be one of the most common factors increasing fall risk in the older adults (Iwasaki & Yamasoba, 2015).

Hence, it has been found that audiology patients are more at risk of falling than those who do not consult with audiologists (Criter & Honaker, 2016a). Pivotal findings from research at John Hopkins University in 2012 indicated that the population of older adults with unaddressed mild hearing loss exhibited an almost threefold increase in the likelihood of having a history of falls. Furthermore, for every ten decibels that a patient's hearing deteriorated, their chances of falling increased by 1.4 times (Lin & Ferrucci, 2012). Several studies have shown that older adults with hearing loss exhibited increased instability in postural balance (de Almeida Ciquinato et al., 2020; Thomas et al., 2018). Criter and Honaker (2013) found that 50% of older adults seen in an audiology hearing clinic reported at least one fall within the last year. The prevelance of dizziness in older adults is 74% with the most common type of dizziness reported being vertigo and imbalance (Ferreira et al., 2014). Vertigo specifically is strongly associated with inner ear (vestibular) dysfunction. Jacobson et al. (2008)'s study also identified that vertigo was highly prevalent in older adults: among the older adults referred for a fall risk assessment, quantitative evidence of peripheral or central vestibular system impairment was found in 73% (n=185) of cases. These studies suggested that dizziness, vertigo and imbalance are highly prevalent amongst older adults within the audiologists' case load.

Literature describes several possible reasons why hearing loss may increase a patient's risk of falling. Microvascular changes which occur because of the physiological aging process and common chronic disorders (e.g., hypertension and diabetes), has been known to cause damage to sensory cells (Agrawal et al., 2019). Balance relies on incessant afferent inputs from sensory cells of multisensory modalities (visual, somatosensory, vestibular and auditory). The diminution of these modalities is known as presbyastasis. Presbyastasis leads to a feedback reduction to the central control centres which controls balance (Agrawal, van de Berg, et al., 2019; Thomas et al., 2018). Although audiologists predominantly focus on the function of the auditory and vestibular system, it is important to consider that presbyastasis is a complicated condition involving several interconnected systems rather than dysfunction within the vestibular/auditory system in isolation (Rogers, 2010). In addition to presbyastasis in older adults, researchers have also speculated that fewer cognitive resources are dispensed to the balance system when patients need additional cognitive skills to compensate for hearing loss, resulting in imbalance (Lin & Albert, 2014). Finally, individuals with hearing loss also experience decreased environmental and spatial awareness due to decreased hearing sensitivity and localisation abilities, making them more prone to falling (Honaker, 2021).

In addition to presenting with presbycusis and presbyvestibulopathy, research has shown that individuals with hearing loss are also more likely to present with chronic conditions, visual impairment, cognitive impairment and psychosocial health issues (all of which are also fall risk factors) than those without hearing loss. An older adult audiology patient's susceptibility to presenting with a complicated, multifactorial fall risk profile on the ICF code set (**Figure 2.1**) is high (Besser et al., 2018; Shukla et al., 2020), again highlighting the importance of a holistic approach.

The aforementioned findings are concerning, as the WHO predicts that approximately one in every three adults over the age of 65 present with a disabling hearing loss (Frost et al., 2015; WHO, 2018a). By 2025, there will be 1.2 billion people over 60 years of age worldwide, with more than 500 million individuals who will suffer significant hearing impairment from presbycusis (WHO, 2018a), and consequently present with a higher risk of falling. This implies a future rise in the number of older adults (and at-risk) potentially seeking audiological services, highlighting the importance of the role of the audiologist in the identification of fall risk in this population.

2.6 Primary prevention of falls

Understanding just how 'at-risk' and vulnerable older adults are at falling and how devastating the consequences of falls are, the importance of primary prevention of falls cannot be understated (Rogers, 2021). Many of the fall risk factors discussed above are modifiable and easy to identify (Cheng et al., 2018). Early detection and preventive intervention are realistic goals that could save lives (Cheng et al., 2018). HCPs should be the trusted source to initiate FRS with older adults (Shubert et al., 2013). Ideally, all patients over the age of 65 should consult with a geriatrician for a fall risk assessment and prevention program (Ungar et al., 2013). The challenge, however, is that although most major public and private hospitals in SA have a specialist geriatrician, in Sub-Saharan Africa, there is only one geriatrician per 275,000 older persons (Cassim, 2017). As a result, due to accessibility, older adult patients are more likely to consult with a general practitioner (GP). Concern has however been expressed regarding the lack of training GPs receive in geriatric medicine (Frost et al., 2015). Due to this reported lack of training and the complexity of comorbid age-related conditions and their interactions, health concerns of older adults, such as falls, can often be overlooked (Cigolle et

al., 2007; Grue et al., 2009). With the prevalence of older adults at risk of falling being so high however, a multidisciplinary approach is imperative (Honaker et al., 2013).

Literature makes mention of the following MDT members within fall risk prevention, assessment and management teams: GP, physiotherapist, occupational therapist, nurse, audiologist, pharmacist, podiatrist, optometrist, ophthalmologist, dietitian, nutritionist, social worker, otolaryngologist and a specialist physician (Alvord et al., 2008; AOTA & APTA, 2017; Cohen et al., 1992; Falls SA, 2016; R. Gans & Rutherford, 2020; Government of Western Australia Department of Health, 2020; Vassallo et al., 2009). Shubert et al. (2013) stated that the therapeutic science HCPs (nurses, audiologists, physiotherapist and occupational therapists) particularly play an equal, if not greater role in the success of FRS and intervention to GPs.

2.7 Reducing fall risk

Large strides to reduce fall risk and falls in older adults is particularly evident within nursing and physiotherapy literature. Nursing literature has shown particular focus on fall prevention within acute care and long-term care facilities (Fisher, 2019; Zhao et al., 2019). Research has suggested that successful fall-prevention depends on nursing leaders having knowledge of fall risk factors and prevention strategies (Zhao et al., 2019). Physiotherapists also play a crucial role in both acute and long-term care settings. Considering that fall risk is a significant concern for all adults aged 65 and above, efforts made by physiotherapists to reach community-dwelling older adults are also documented in the literature (Hughes et al., 2019; Muir et al., 2008; Sherrington & Tiedemann, 2015).

Reaching community-dwelling individuals is challenging, particularly because older adults may not be aware of the severity of their risk of falling, and thus do not seek specific medical advice from HCPs for fall risk (Ong et al., 2021; Ott, 2018). Internationally, targeted

community-dwelling outreach programs to screen, educate and prevent falls have been initiated to make older adults more aware of their potential fall risk (Renfro & Fehrer, 2011; Vincenzo et al., 2021). Similar programs however do not yet appear to have been successfully developed and implemented in Sub-Saharan Africa (Charumbira et al., 2021). Considering the current patient to- physiotherapist ratio internationally and in sub-Saharan Africa, physiotherapists are often dealing with the devastating consequences of falls as their capacity to actively prevent falls is limited (Charumbira et al., 2021; Shubert et al., 2013).

With prevalence of falls being so high, the mammoth task of preventing falls has been realized by researchers and HCPs. As a result, internationally, fall risk prevention programs have been created whereby all HCPs working with older adults are encouraged to contribute to the prevention of falls. An example of such programs includes the Stopping Elderly Accidents, Deaths & Injuries (STEADI) program developed by the Centres for Disease Control and Prevention (CDC, 2019a) and the Johns Hopkins Fall Risk Assessment Tool (JHFRAT)(Institute for Johns Hopkins Nursing, 2007). Collaboration between MDT team members to identify how they can contribute to fall prevention has never been more important.

For the purposes of this research, the role of the audiologist in contributing to primary prevention of falls is of interest. The subsequent sections will focus on describing the audiologist's important role in screening their patients for fall risk.

2.8 Fall risk within the realm of audiology

2.8.1 The audiologists' role in FRS and prevention

As previously mentioned, audiology patients are more at risk of falling than non-audiology patients (Criter & Honaker, 2016). Audiologists are, therefore, considered to be part frontline professionals, responsible for protecting this vulnerable population (Heather, 2015). Not only are audiologists ideally positioned for screening and referring patients who are at risk

of falling, they should also be qualified to conduct many of the simple, quick and low-cost FRS assessments (Bassett et al., 2018) (although little is known about what fall risk training tools are being taught to undergraduates in SA). Audiologists cannot assume that their patients' fall risk is being managed by the GP because only 20% of audiology patients in the USA reported discussing falls with an HCP (Criter & Honaker, 2016a). The initiation of discussion and education on fall risk factors may be the first step necessary to empower older adults in the audiology clinic to make lifestyle changes or to seek additional assistance to manage their fall risk factors (Honaker et al., 2013b).

After consulting the literature, it is still unclear whether audiologists are aware of the important role they play in the prevention and reduction of falls. According to the HPCSA, the audiologists' scope of practice in balance services include: Prevention, identification or screening, assessment or evaluation, consultation, diagnosis, management, counselling, collaboration, record keeping and report writing, and lastly, appropriate referrals (Department of Health South Africa, 2011). In reference to scope of practice and the relationship between inadequate balance function and fall risk, audiologists have a duty to identify fall risk and refer older adults for appropriate management of their risk factors(ASHA, 2015; Baxter et al., 2017). There is however a possibility that the reference to 'balance' is too broad and needs to be further specified because there appears to be uncertainty for some audiologists as to whether FRS specifically is within the audiologists' scope of practice (Patterson & Honaker, 2014). Several authors have stated that FRS is within the scope of the audiologist and that the audiologist's contribution within the MDT is fundamental (Bassett, 2018; Bassett & Honaker, 2016; Baxter et al., 2017; Criter & Honaker, 2017; Jedlicka, 2020; Lindsey, 2015; McCaslin, 2013; Smith & Porter, 2013). Audiology scope of practice guidelines from leading Audiology Professional Bodies in the UK and USA however, make minimal mention of FRS specifically (AAA, 2004;

ASHA, 2018; BSA, 2019). Without clear guiding documentation and policies driven by strong research, audiologists may be unsure regarding their specific role in FRS practice.

Although the audiologist's role and practice in FRS does not appear to be clearly detailed in audiology guidelines, vestibular assessment was mandated within SA Audiology Degree programs since 2011 (HPCSA, 2018). The inclusion of vestibular practice was justifiable because of the vestibular system being part of the inner ear, sharing much of the cochlea's physiology (Bassett & Honaker, 2016). To effectively assess the vestibular system, the audiologist needs an in-depth knowledge base on the interworking of the full balance system (vestibular-proprioceptive-visual system input and the subsequent motor output) and how it can affect balance (Donovan & McCaslin, 2021). Historically however, it appears that audiologists have primarily been focussed on identifying the presence or absence of physiological abnormalities of the vestibular system (Callahan et al., 2013a; McCaslin, 2013). Resultantly, several factors, beyond the vestibular system, contributing to the imbalance may be missed (McCaslin, 2013). The complexity of the balance system's physiology requires audiologists working in this field to be able to integrate this understanding with assessment results, including the patient's extrinsic and intrinsic risk factors, in order to fine comb where the break down in balance may be occurring (Criter et al., 2013). Disregard for viewing the patient holistically may result in a missed opportunity to effectively identify, council and manage a patient's fall risk (Jacobson, 2001; Lindsey, 2015).

2.8.2 Audiologists' practice in FRS

Although the need for audiologists to screen for fall risk has been recommended (Criter et al., 2013; Criter & Gustavson, 2020; Criter & Honaker, 2016a; Jacobson et al., 2008), literature revealed that FRS within the realm of audiology does not yet appear to be seen as 'standard practice'. In the USA, only 14% (N=238) of audiologists conduct FRS with their

patients (Patterson & Honaker, 2014). Similarly, in Canada, only 11.2% (N=53) of audiologists attempt screening patients for fall risk (Baxter et al., 2017). In SA, 59.4% of audiologists reported that they are not confident in performing vestibular assessments and are for the most part only assessing auditory function (Khoza-Shangase et al., 2020). There is however no literature discussing SA audiologist's practice in FRS. Rogers et al. (2020) conducted a study to investigate fall risk intervention within the realm of audiology in SA, wherein it was stated that "Significant progress is required before fall prevention become part of audiology practice in SA" (p16).

In the USA, FRS practices of the few audiologists conducting fall risk assessments were researched by Patterson and Honaker (2014) as well as Bassett (2018). Considering that only vestibular audiologists in Patterson and Honaker (2014)'s study were conducting FRS, it was understandable that the most reported fall risk assessment tools used by these audiologists were tests which were also included in the diagnostic vestibular test battery. Very few screened for other fall risk factors listed in the ICF code set (De Clercq, 2021). The consequences of viewing a patient's fall risk using a vestibular assessment test battery is firstly, that many fall risk factors may not be identified (especially if the case history is focused on purely establishing if there is a peripheral/central vestibular pathology); secondly, vestibular assessments are often not sensitive enough to identify age- related deterioration of the vestibular function (Zalewski, 2015). This may result in the patient leaving the consultation with no answers or a way forward in reducing their fall risk.

Based on the current state of knowledge, it is uncertain as to what tools should be included in FRS protocols for older adults in the audiology clinic. Only two studies have looked at the feasibility and sensitivity and specificity of FRS protocols within the audiology context. Criter and Honaker (2017)'s used the Hearing Handicap Inventory for the Elderly (HHIE), the

Dizziness Handicap Inventory (DHI), number of medications, and the Timed Up and Go (TUG) test which revealed a 92.0% sensitivity and 100% specificity. Further research may however be needed to confirm this finding as a small sample size was used. Moreover, Bassett (2018)'s PhD study concluded that case history questions (≥4 prescription medications, fear of falling, and use of ambulation device), DHI, and the Modified Clinical Test of Sensory Integration in Balance(mCTSIB) was able to accurately detect 100% (high sensitivity) of the previous fall cases, however, the specificity was low (18%).

In general, FRS tools can be placed into the following categories: fall risk-factor measures, performance-based screening tools, self-reported measures, vestibular functioning and 'other' measures (Bassett, 2018). The selection of which tools to use for a FRS protocol can be steered by a biopsychosocial approach, whereby the using ICF code set can provide significant guidance (de Clercq, 2021; Mehraban et al., 2013). Additionally, protocol selection will depend on what is feasible for each clinic's context and which combination of tools provides that highest sensitivity and specificity (Criter & Honaker, 2017). According to the current scientific understanding, many FRS protocols have been designed and used, but there is not enough research yet to define a FRS protocol which can effectively be used within the audiology context which is both sensitive and specific to fall risk (Bassett, 2018; Criter & Honaker, 2017). Thus, there is a stated need within the audiology context for the identification of a low-cost, time-efficient, and effective FRS protocol. (Bassett & Honaker, 2016, p.12).

2.8.3 Audiologists perceived knowledge, views and practice in FRS

Practice of FRS is highly dependent on audiologists' knowledge and views in the realm of FRS of older adults. Honaker (2021, P1) stated: *"Many falls are preventable, but prevention is dependent upon our understanding of the factors placing an individual at risk of falling"* (Honaker, 2015, P 1). A framework which supports this reasoning is the knowledge, attitudes

and behaviour (KAB) framework, developed by Woolf (1993) and subsequently modified by Roelens et al. (2006) (**See Figure 2.2**).

Figure 2.2:

Conceptual Framework for this Study (based on the Knowledge Attitudes and Behaviors



This framework theorises that behaviour (FRS practice) will be influenced by audiologists' views/attitudes (views on FRS) and their views/attitudes will be influenced by their knowledge (perceived knowledge). For the purposes of this study, knowledge was changed to perceived knowledge because knowledge is an objective measure of what a person knows, while perceived knowledge is a subjective measure of how much a person believes they know. Investigating a person's perceived knowledge over their academic knowledge can provide insights into their self-perception and confidence and help identify gaps in their understanding that need to be addressed (Serafin et al., 2022). In line with the Knowledge Attitudes and Behaviours framework, it was identified that perceived knowledge and views of audiologists needs to be investigated and elaborated on before researchers can truly understand why FRS is or is not being conducted by audiologists in SA.

In the USA, Patterson and Honaker (2014) identified that poor perceived knowledge in the area of FRS contributed to why audiologists were not conducting fall risk assessments with their patients. Only 38.2% (n=275) of audiologists reported receiving formal training in fall risk. Furthermore, only 16.3% believed audiologists were knowledgeable in fall risk and only 11.8% believed that they had been provided with sufficient training to conduct fall risk

assessments (Patterson & Honaker, 2014). It appears that this may be due to most student training programs in the USA primarily focusing on the standard diagnostic vestibular test battery, with little focus given to functional balance and fall risk (Baxter et al., 2017; Callahan et al., 2013; Jedlicka, 2020; McCaslin, 2013). These findings highlight the need for increased knowledge and training within the audiology profession, particularly as both Kalu, Vlachantoni and Norman (2018) as well as Lee et al. (2018) attributed the success of fall-prevention to the levels of knowledge among HCPs.

Knowledge levels also influence views on a topic (Roelens et al., 2006). Audiologists have viewed that conducting FRS may be difficult because of a lack of resources, time and reimbursement (Patterson & and Honaker, 2014), however, authors have argued that this may be due to lack of knowledge on FRS, because FRS can be done quickly with little to no resources and can be designed to fit unique clinical contexts. FRS programs can be presented in various formats, including a checklist completed before or during the appointment (Baxter et al., 2017), 10-minute screening protocols (Criter & Honaker, 2016c) to a multifactorial extensive fall risk assessments which includes vestibular diagnostics and screening for fall risk factors (Jacobson, 2009; Lindsey, 2015). Poor knowledge of what FRS is, is perhaps also why 79% of audiologists believed that FRS and prevention should be under the responsibility of audiologists practicing in vestibular clinics and not for audiologists dispensing hearing aids (Patterson & Honaker, 2014). This finding is concerning, because as previously mentioned, patients presenting with a hearing loss are also more at risk of falling. Therefore, all audiologists working with older adults who are hard-of hearing should be conducting FRS on these patients, not just those who practice in vestibular audiology (Baxter et al., 2017).

Ultimately audiologists would need sufficient knowledge in fall risk factors, as well as practical experience in conducting and interpreting findings from FRSs, to provide informed

guidance, referrals, and counselling to older adults on fall risk reduction. Literature has discussed that awareness of fall risk factors and being equipped with the information on how to manage these risks is important in reducing falls (Honaker, 2021).

2.9 Summary and rationale

Falls in the population of older adults are a public health crisis (Baxter et al., 2017). Research suggests that "in the next 15 seconds, an older adult will be treated in an emergency department for a fall-related injury and in the next 29 minutes, an older adult will die from injuries sustained from a fall" (CDC, 2012, p.1). Given the high prevalence and devastating impact of falls, particularly in LAMI countries like SA, research must prioritize strategies to promote healthier and prolonged independence among older adults by reducing fall occurrence and mitigating the burden of fall consequences.

Screening older adults for fall risk is one of the first steps that can be taken by audiologists to contribute to the reduction of fall risk and subsequent falls. Audiologists are ideal professionals to contribute to fall prevention because they are trained to understand the balance system and many older adults require continual assessment and management of hearing and balance concerns from audiologists (Honaker, 2021). Undoubtedly, it is evident that audiologists may play a strategic and key role in contributing to fall reduction through early FRS.

Older adult audiology patients appear to be more at-risk of falling due to presbycusis, presbyvestibulopathy and increased probability of acquiring several additional intrinsic risk-factors (Criter & Honaker, 2016b; Iwasaki & Yamasoba, 2015; Zalewski, 2015). The impact of preventing a fall of an older adults has significant implications for an enhanced QoL in their later years (Ciorba, 2015). Under audiologists' oath of beneficence, it may be argued that failing to assess for fall risk to screen for the need for further assessments, referrals and

prevention strategies, is a far-reaching omission in the duty of care to audiology patients (Rogers, 2020).

"Omission of duty' however would imply that audiologists are aware that they have a responsibility towards reducing falls in older adults. Although literature has repeatedly discussed the audiologist's vital role in fall prevention (Bassett, 2018; Bassett & Honaker, 2016; Jedlicka, 2020), studies have revealed that some audiologists did not believe that FRS was within their scope of practice, and no updated research has confirmed otherwise (Baxter et al., 2017; Patterson & Honaker, 2014). The juxtaposition between what researchers are stating as the audiologist's responsibility and what audiologists are taking responsibility for, could perhaps be explained by the lack of guidance on fall risk within scope of practice documents. Specific mention of FRS was not evident in scope of practice documents from international leading audiology professional bodies or local bodies in SA (AAA, 2004; ASHA, 2018; BSA, 2012; CAA, 2002; HPCSA, 2011). Furthermore, guidelines for FRS of older adults in the audiology setting appear scant internationally and non-existent (or undiscoverable) nationally.

Evidently, poor adoption of FRS practice within international audiology clinics has been reported. Only three studies explored audiologist's practice in FRS (two in the USA and one in Canada). In both the USA and Canada, less than 15% of audiologists were conducting fall risk assessments with their patients (Baxter et al., 2017; Patterson & Honaker, 2014). Even when FRS became compulsory for audiologists working with Medicare patients in the USA (as stipulated by the Physician's Quality Reporting System (PQRS) in 2015, 45.4% of audiologists were still not screening older adults for fall risk (Bassett, 2018). No research exists quantitatively exploring and focusing on SA audiologists' practice in fall prevention of their older adult patients.

HCPs need to start embracing their role and responsibility to safeguard older adults from falls. Audiologists are well positioned to screen for fall risk, making it fitting for them to take on this role. Embracing audiologists' role in FRS is integral to successful primary prevention of falls. Considering the impending roll out of the National Health Insurance (NHI) in SA, a shift is expected away from the diagnosis-driven 'normative' observed within student training and clinical practice (South Africa Department of Health, 2017). Audiologist's will be obliged to shift to a more biopsychosocial, person-centred, preventative and holistic health management approach, which is in line with the ICF approach to fall risk practice (Honaker, 2015a). The question that remains, is whether the healthcare community is prepared to handle this looming challenge (Zalewski, 2015). The time has come for audiologists to engage in discussions about falls (Honaker, 2021).

In talking about falls, we may be able to gauge audiologists' perceived knowledge and views in the realm of FRS of the older adults. According to the KAB framework however, audiologist's willingness to take action may hinge on their perceived knowledge in the area of FRS and how this affects their views regarding their role, abilities, motivation and outcome expectancies of FRS (Roelens et al., 2006). Considering that literature also suggests that the success of fall prevention relies on the level of the clinician's knowledge of fall risk (Kalu et al., 2018; Lee et al., 2018), the question remains: What are SA audiologists' perceived knowledge and views on fall risk identification and prevention? Additionally, what are their current practices in the realm of FRS, and can it be linked to their perceived knowledge?

Further action on the part of audiologists may be necessary to improve global identification of older adults at-risk of falling (Criter & Honaker, 2016). It is crucial for the audiology profession to actively pursue a deeper understanding of falling risk factors and

undertake research endeavours aimed at enhancing fall prevention across all audiology practices (Honaker et al., 2013b).

2.10 Conclusion

Chapter two of this research paper sheds light on the detrimental repercussions of falls, particularly among individuals aged 65 years and above. Older adults who consult with audiologists are more at risk of falling than those who do not seek out audiological services, this is believed to be the case because they have increased susceptibility to several fall risk factors (over and above presbycusis and presbyvestibulopathy). The ICF may aid in guiding audiologists to identify, describe and organise an individual's unique fall risk profile by categorising factors into body function, body structures, activities and participation, environmental factors and personal factors. Given the frequent interaction of audiologists with older adults and their specialized knowledge in vestibular-related matters, it is evident that they are exceptionally suited to assume the responsibility of screening for fall risk and actively participating in primary fall prevention efforts. Little is however known about SA audiologists' perceived knowledge, views and reported practice in FRS nationally.

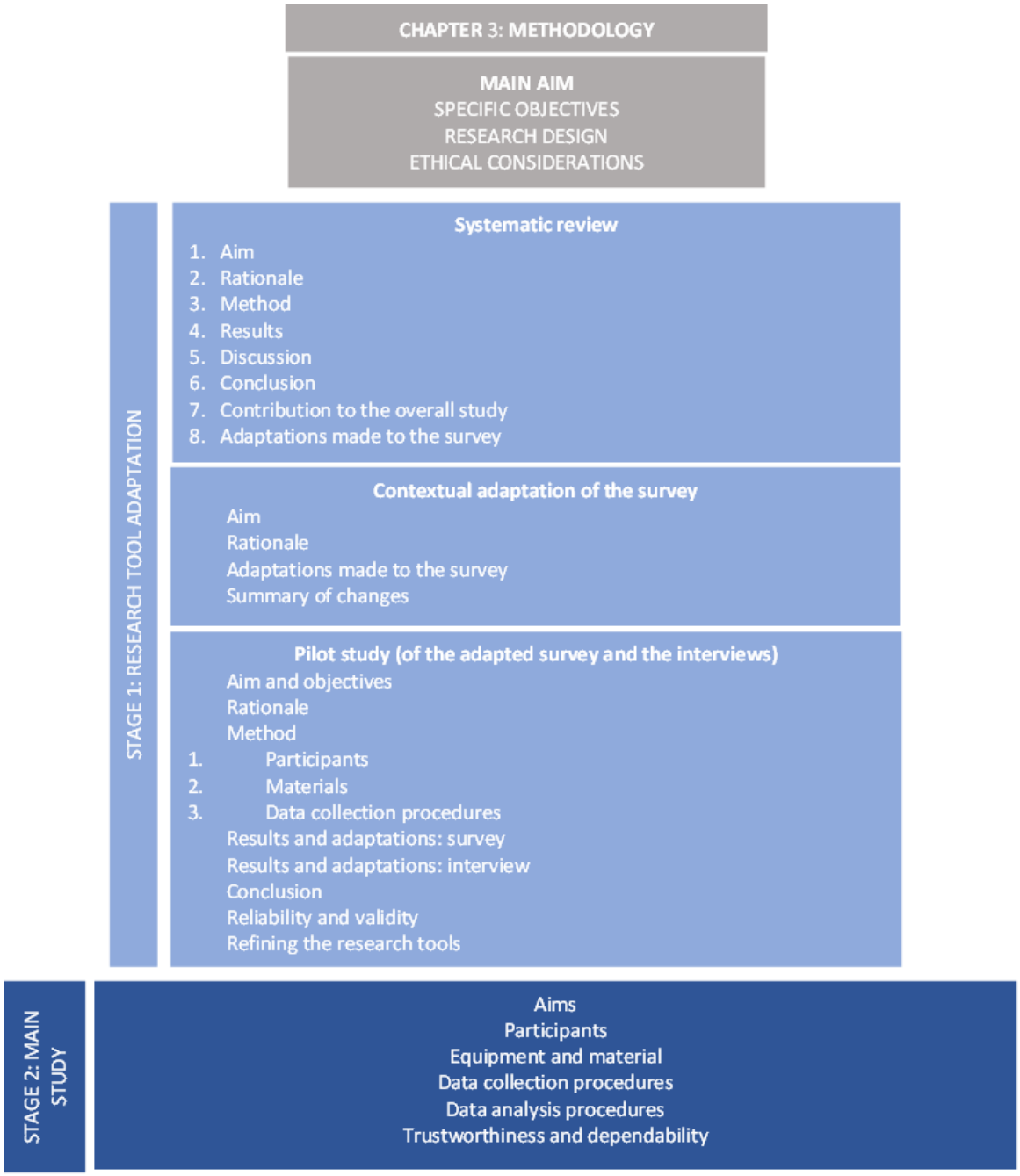
CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction and Outline

This chapter initially explains the methodology applied for the research study. Thereafter the first stage of the methods is discussed, namely the adaptation of the research tool (survey) following a systematic review, contextual adaptations and the pilot study. The methodology for the main study is then presented. The outline of Chapter 3 is summarized as follows in **Figure 3.1**.

Figure 3.1:

Outline of Chapter 3: Methodology



3.2 Main aim

The main aim of this research study was to explore the perceived knowledge, views and reported practice of SA audiologists in the realm of FRS with older adults (>65 years).

3.3 Specific Objectives

In order to realise the main aim of this research study, the specific objectives were:

A. To perform a systematic review to:
   - Explore the recommended fall risk assessment practices in audiology, identify audiologists' reported practices in fall risk assessment, and recognize the documented barriers and facilitators affecting fall risk assessment in clinical practice.
   - Establish the most recent audiology guidelines and research discussing FRS, to determine key information needed for the systematic adaptation of Patterson and Honaker (2014)'s survey (**Appendix 1**).

B. To adapt Patterson and Honaker (2014)'s survey (**Appendix 1**) to ensure that all questions
   - Were reflective of the content identified through the systematic review;
   - Were contextually relevant to the SA audiology context;
   - Provided information on audiologists', perceived knowledge, views and reported practice on FRS, hereby strengthening the content and construct validity of the survey.

C. To determine SA audiologists' perceived knowledge of FRS of older adults. This objective assisted the researcher in identifying the current status of FRS knowledge and training/education (received or through self-study) amongst SA audiologists.

D. To describe SA audiologists' reported views on FRS of the older adult population within the realm of audiology and to explore their views in relation to FRS practice.

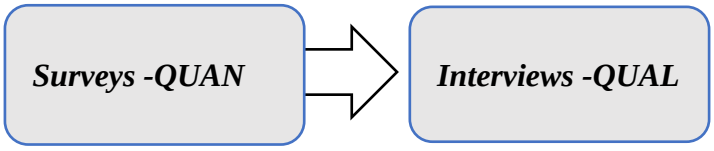
E. To describe SA audiologist's reported practice in FRS of the older adult population in SA.

3.4 Research Design

This study followed a sequential, partially mixed methods explanatory design, which is further detailed in **Figure 3.2.**

Figure 3.2:

Implementation Stage: Research Design of the Main Study



Time dimension: Sequential
Dependance: Dependent
Emphasis dimension: Quantitative dominant
Mixing dimension: Partially mixed methods-explanatory design
Theoretical drive: Deductive

The survey (QUAN) was conducted before the interviews (QUAL) with each participant. The interview data (QUAL) were used to establish a possible explanation for the survey data obtained (QUAN) (Schoonenboom & Johnson, 2017). The interpretation of the data by the Knowledge, attitudes, and practice framework (Roelens et al., 2006) and thus a deductive approach was used for data analysis of the interviews. The study design was a partially mixed methods explanatory design during which the survey (QUAN) and interview

(QUAL) data were individually conducted and analysed with mixing of the results only occurring at the interpretation stage (Guetterman & Fetters, 2018).

With a mixed methods approach, supporting explanations for the quantitative responses recorded in the surveys were obtained. The research was consequently more likely to reflect the participants' views and relied less on the researcher's interpretation, subsequently minimising bias. Results would therefore more likely be a more credible and generalisable representation of audiologists' views, perceived knowledge and reported practice.

With the rich and comprehensive data collected, the disadvantages of this sequential, mixed methods design was that it was more time-consuming (Creswell & Plano Clark, 2016). When contemplating the ultimate outcome, mixed methods designs, despite their increased complexity, are generally considered to be superior to utilizing a single method (Creswell & Plano Clark, 2016).

3.5 Ethical Considerations

Adherence to the following ethical considerations described in **Table 3.1** ensured that stringent ethics principles were upheld.

Table 3.1

Ethical Considerations for this Study

Ethics principle	How this principle was adhered to in this study
The principle of *voluntary participation.* **The principle of voluntary participation necessitates that individuals are not pressured into partaking in research activities** (Amer, 2019)**.**	• Participants were under no obligation to participate in the survey or interviews.
The principle of *objectivity and professional integrity.* **Researchers should maintain objectivity in their study to prevent distortion of findings resulting from the influence of their personality, beliefs, and values** (Amer, 2019)**.**	• The researcher did not indicate personal biases and opinions regarding FRS when asking questions. • The research was conducted in a proficient manner, as an objective and scientifically rigorous project, devoid of bias. It employed a valid research design that incorporated pertinent theory, methods, and prior findings.
The principle of *informed consent.* **Participants should be able to voluntarily participate after they have been provided with detailed information about what it means for them to take part, and that they give informed consent before they enter the research** (Resnik, 2018)**.**	• Participants were provided with comprehensive information regarding the overall nature of the study, as well as any potential risks associated with their involvement. • Participants were duly informed about the anticipated procedures and their expected role as participants in the study. • Participants were obligated to provide informed consent for their participation in the study and for the video recording of Zoom interviews.
The principle of *veracity:* **Veracity necessitates that the researcher adheres to truthfulness and communicates information in a comprehensive and impartial manner** (Amer, 2019)**.**	• This research study was meticulously designed and executed to minimize the potential for misleading outcomes. • Verbatim transcriptions of Zoom interviews were conducted to ensure precise reanalysis. • An interview template script was adhered to, and no leading remarks or predetermined questions were provided. • The data presented in this study were authentic and free from fabrication or falsification. • Sufficient information was shared with colleagues to enable them to evaluate the methods and findings of this study, while also highlighting the limitations of the data's reliability and applicability. • The results were accurately reported within the relevant context, ensuring accuracy.
The principle of *confidentiality* **Confidentiality pertains to a situation where the researcher possesses knowledge of a**	• All data were saved in a code-protected folder and were coded to protect the participants' identity.

Table 3.1

Ethical Considerations for this Study

Ethics principle	How this principle was adhered to in this study
research subject's identity but implements measures to safeguard that identity from being revealed to others (Misra & Tyagi, 2019).	
The principle of *opt-out consent* **Participants had the option of withdrawing from the study at any point** (Resnik, 2018)**.**	• Participants' autonomy was upheld throughout the study, allowing them the freedom to withdraw from participation at any stage without incurring any adverse consequences.
The principle of *anonymity* **Anonymity is a display of confidentiality that involves safeguarding the identities of participants, ensuring their privacy** (Resnik, 2018)	• This principle applied specifically to the audiologists who agreed to participate solely in the survey component of the study. • The researcher was unaware of the identities of the audiologists who completed only the surveys. In the surveys, gender information was not requested due to the scarcity of male audiologists in SA, as noted by (Pillay et al., 2020) • As for the interviews, the researcher was familiar with the interviewees; however, their anonymity was upheld in the research write-up. No personally identifiable information about the participants was disclosed to individuals not directly involved in the study. Participant numbers were used to refer to the participants throughout the study.
The principle of *researcher bias* **Researcher bias refers to any inclination or deviation from factual accuracy during data collection, analysis, interpretation, or publication, which may lead to erroneous conclusions** (Resnik, 2018)**.**	• The researcher did not guide or manipulate any participants during the process or in their responses to reach predetermined conclusions.

3.6 Stage One: Research Tool Adaptation

The Research Tool Adaptation stage comprised three steps, namely the systematic review, the contextual adaptation of the survey, and the pilot study. The data collection of all three stages were qualitative in nature and guided the adaptation of the survey questions to be in line with the specific objectives of the study. The pilot study further guided the adaptation

of the post-survey interview questions and procedure, ensuring that the interview questions were structured to allow participants to elaborate on their answers provided in the survey.

3.6.1 Systematic review

The systematic review conducted as part of this dissertation was published: "Professional Guidelines and Reported Practice of Audiologists Performing Fall Risk Assessment with the Elderly: A Systematic Review", van Rie, Kanji and Naudé (2022) in the American Journal of Audiology. To view the systematic review, please see **Appendix 2** for a copy of the published article.

3.6.1.1 Aim. The aim of this systematic review was to identify the recommended and reported practice of audiologists performing fall risk assessments with their older adult patients.

The following three objectives were defined:

1. To establish what the recommended practice for audiologists is in the realm of fall risk assessment according to professional scope of practice and guideline documents.

2. To identify current fall risk assessment practices of audiologists as mentioned in literature.

3. Lastly, this review aimed to distinguish what factors encouraged or prevented audiologists from conducting fall risk assessments, to aid in understanding the barriers and facilitators affecting fall risk assessment in audiology.

3.6.1.2 Systematic Review contribution to the overall study: The importance of conducting a systematic review was two-fold. Firstly, it guided the researcher in making appropriate adaptations and additions to the survey to ensure that the questions and question

answer-options incorporated the perceived knowledge, views and reported practice currently implied in present literature. Secondly, to the researcher's knowledge, no prior systematic review had been conducted to establish the status of FRS within the realm of audiology. This was important information to systematically summarise, to provide a foundation for informing future research and policy decisions (Gough et al., 2017). Additionally, the systematic review assisted in exploring SA Audiologists' , perceived knowledge, views and reported practice compared to international findings in the discussion section of the main study.

The aim, adaptations and rationale for the survey adaptation based on the systematic review findings are further detailed in **Section 3.6.1.3.**

3.6.1.3 Adaptations made to the survey based on systematic review findings. The survey entitled "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (See **Appendix 1**), created by Patterson and Honaker (2014) was adapted for this study. Permission was obtained from Dr Patterson to use and adapt the survey (See **Appendix 3**).

3.6.1.3.1 Aim. To adapt the survey to ensure that any additional and relevant information identified in literature (e.g., varying views expressed on FRS, fall risk barriers mentioned and FRS tools discussed) was included in the survey questions (and question-answer options), ensuring that the study objectives could be effectively achieved.

3.6.1.3.2 Adaptations and rationale. To realize this aim, modifications were made in line with findings from the systematic review. In the systematic data collection process, all data related to audiologists' perceived knowledge, views and reported practice were collected and separated accordingly. These data were compared to the original survey, and additional ideas/concepts pertaining to audiologists' perceived knowledge views, and reported practice were added to the survey. Details of these adaptations are documented in **Table 3.2.**

Table 3.2
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the systematic review findings

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	ADAPTIONS MADE BASED ON SYSTEMATIC REVIEW FINDINGS	RATIONALE FOR CHANGES
11	Please indicate resources used when solely assessing your patients of falling risk ☐ Fall history question(s) on intake questionnaire (e.g., Have you fallen?) ☐ Performance-based gait assessment tools (e.g., Gait Speed, Timed Up & Go, Berg Balance Scale, Dynamic Gait Index, Functional Gait Assessment, and Functional Reach) ☐ Fear of Falling/Balance Confidence Questionnaire (e.g., Activities-specific Balance Confidence Scale ☐ Computerised dynamic posturography ☐ Vestibular function testing (i.e.: ENG/VNG, VEMP, and rotational chair) ☐ Geriatric depression scale or equivalent behavioural assessment scale ☐ Cognitive function scale (e.g., mini-mental state examination) ☐ Reaction time assessment ☐ Review of medication history ☐ Orthostatic hypotension evaluation ☐ Proprioception and vibration senses screening ☐ Vision screening ☐ Home hazard assessment ☐ Other ☐ In addition to RoF assessment, I typically refer on to another specialist for further evaluation ☐ None at this time, I refer to another specialist for RoF assessment None at this time and I do not make recommendations for an RoF assessment.	-	45. Please select the fall risk-factor measures you use for fall risk screening. ☐ I do not use any of the fall risk-factor measures listed below ☐ International classification of functioning and disability (ICF) checklist ☐ Observation of patient's gait and steadiness ☐ History of falls or fear of falling ☐ Case history ☐ Medication review ☐ Risk factor checklist ☐ STEADI Questionnaire ☐ Presence of dizziness/imbalance ☐ Use of ambulatory device ☐ Morse fall scale ☐ Questions about inactivity ☐ St. Thomas Risk Assessment (STRATIFY) ☐ Family member interviews about falls ☐ Other 46. Please select the performance-based screening tools you use for fall risk screening. ☐ I do not use performance-based screening tools ☐ Timed Up and Go (TUG) ☐ Computerised dynamic posturography (CDP) ☐ Dynamic Gait Index (DGI) ☐ Modified Clinical test of Sensory Integration on Balance (mCTSIB) ☐ Berg Balance Scale (BBS) ☐ Tinnetti Balance Assessment Tool (TBAT) ☐ Gait ☐ 30 second sit-to-stand ☐ Fukuda stepping test ☐ Functional Reach Test (FRT) ☐ Functional Gait Assessment (FGA) ☐ Other_____	In the original survey, participants were not afforded the opportunity to select specific tests. Rather, they indicated if they used any tools within a particular category, e.g., performance-based tools. For this research study, the selection of specific tests was desired so that the researcher could observe what the most used tools for FRS were in SA (as part of the objective of identifying what the reported practice of audiologists was in FRS). Currently it is unknown what tools SA audiologists are using as no research has explored this, to the researcher's knowledge. Identifying this information is foundational for future education planning - to recognise in which fall risk tools audiologists may require training. Additionally, this information may be important as a starting point for research wanting to identify effective FRS protocols within the SA audiology setting.

Table 3.2
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the systematic review findings

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	ADAPTIONS MADE BASED ON SYSTEMATIC REVIEW FINDINGS	RATIONALE FOR CHANGES
			47. Please select the self-reported measures you use for fall risk screening tools you use. ☐ I do not use self-reported measures ☐ Activities Specific Balance Confidence Scale (ABC Scale) ☐ Geriatric Depression Scale (GDS) ☐ Dizziness Handicap Inventory (DHI) ☐ Hospital Anxiety and Depression Scale (HADS) ☐ Beck Anxiety Inventory ☐ Falls Efficacy Scale (FES) ☐ Falls Efficacy Scale-International (FES-I) ☐ Hearing Handicap Inventory for the Elderly (HHIE) ☐ Other_____ 48. Please select the tests of vestibular functioning you include in fall risk screening. ☐ I do not use tests of vestibular functioning ☐ VNG/ENG ☐ Rotatory chair ☐ Dynamic Visual Acuity (DVA) ☐ Vestibular evoked myogenic potentials ☐ Benign Paroxysmal Positional Vertigo (BPPV) assessment ☐ Video Head Impulse Test (vHIT). ☐ Caloric ☐ Gaze Stabilization Testing (GST) ☐ Other_____ 49. Please select any 'other' measures you use for fall risk screening. ☐ I do not use any 'other' measures ☐ Mini-Mental State Examination/ Montreal Cognitive Assessment ☐ Postural blood pressure ☐ Vision screening ☐ Home fall Hazards/ environmental assessment ☐ Sensation, proprioception, somesthesis ☐ Vibration ☐ Reaction time ☐ Other_____	

Table 3.2
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the systematic review findings

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	ADAPTIONS MADE BASED ON SYSTEMATIC REVIEW FINDINGS		RATIONALE FOR CHANGES
29	An RoF assessment programme can be challenging to implement because: a. Training is needed. b. Funds are needed to support assessment and/or intervention, c. Additional personnel may be needed. d. Workload may be too demanding e. Administrative leadership is needed. f. Collaboration and planning is necessary g. Everyone needs to be "on board"	**28**	A fall risk screening programme can be challenging to implement because (select the options you agree with): ☐ It does not fall within the audiologist's scope of practice ☐ Additional resources would be needed, which could be costly ☐ There is minimal remuneration for fall risk screening ☐ Additional training is needed. ☐ There is limited time with each patient - the workload may be too demanding ☐ There is not enough research defining a sensitive screening protocol which audiologists can use routinely ☐ Collaboration and planning with other professionals is necessary ☐ I don't know who to refer to if I identify risk factors outside the audiologist's scope of practice ☐ I have not connected with medical professionals who could treat the patient with me as part of a multidisciplinary team approach ☐ I am not comfortable with balance or vestibular testing, and therefore feel like I won't be comfortable with fall risk screening.	Additional options were added based on findings of potential barriers identified within the systematic review (see **Figure 3.4** within the systematic review). This information was important to obtain and understand because audiologists' views on the barriers will shed light on which factors need to change in order to improve the successful implementation of FRS (e.g., additional training, remuneration advocacy, etc.).
		29	Do you believe there are other reasons not mentioned above that would make the implementation of a fall risk screening programme challenging? If so, please list them below.		
/	/	**8**	***ADDED*** It is important to evaluate older adults' balance if they complain about having poor balance/had a fall. SA MA U MD SD	-	An article included in the systematic review mentioned that imbalance, dizziness, and fear of falling are already known risk factors of falls and suggests that further screening may be warranted (Krager, 2018). Identifying if audiologists attributed importance to imbalance complaints was important because it may explain views which they hold towards FRS practice in audiology.
/	/	**10**	***ADDED*** Fall risk screening is an opportunity for expansion of our profession. SA MA U MD SD	-	An article in the systematic review stated that an opportunity for us as a field exists if we, as a profession, can expand how we think about balance (McCaslin, 2013). If audiologists do not view FRS as an opportunity for expansion of the profession, this will impact

Table 3.2
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the systematic review findings

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	ADAPTIONS MADE BASED ON SYSTEMATIC REVIEW FINDINGS		RATIONALE FOR CHANGES
					successful implementation. This may indicate that barriers firstly need to be addressed and further education may be necessary.
/	/	**11**	***ADDED*** Clear guidelines exist for the role of the audiologist in fall risk screenings nationally SA MA U MD SD	-	Review of professional body documentation within the systematic review revealed no guidelines for audiologists. This question was added to gauge if audiologists have shown an interest in searching for SA guidelines. Interest in FRS is integral to the initiation of knowledge acquisition and implementation thereof (Paul, 2013).
		12	Clear guidelines exist for the role of the audiologist in fall risk screenings internationally SA MA U MD SD.		
/	/	**27**	***ADDED*** Audiologists playing a part in fall prevention through screening their older adult patients may have a significant impact on their patients' future quality of life. SA MA U MD SD	-	To establish if audiologists are aware of the importance of their role in FRS, as Criter and Honaker (2017) stated that audiologists possess the necessary tools and skills to identify patients at risk of falls, thereby potentially improving their QoL. The recognition of importance may affect audiologists' views hereon and subsequently their desire to implement FRS.
/	/	**32B**	***ADDED*** I feel I have sufficient knowledge of all the factors that may put a patient at risk of falling SA MA U MD SD		Audiologists' perception of the need for additional training in FRS may have implications for graduate training and Continuous Professional Development (CPD) programmes in SA. Bassett et al. (2018) mentioned that audiologists may not have the knowledge of the risk factors for falls outside of hearing and vestibular contributors.
/	/	**32C**	***ADDED*** I feel I have sufficient knowledge to perform fall risk screenings SA MA U MD SD	-	According to Bassett et al. (2018), audiologists have limited knowledge of fall risk. The researcher wanted to determine if this is true for SA audiologists as this may impact on their views and willingness to perform FRSs. (In line with the conceptual framework of this study.)
/	/	**32D**	***ADDED*** I feel I have sufficient knowledge to counsel patients to reduce their risk of falling SA MA U MD SD	-	This particular question was important as concluding screening with counselling is an important part of primary prevention and reflects the audiologist's understanding of the FRS results (Martins et al., 2018).
/	/	**32F**	***ADDED*** I have heard/read that patients with hearing loss are more at risk of falling	-	According to Chiarella et al. (2020) and Jiam et al. (2016), hearing loss is a fall risk factor in itself. The researcher wanted to identify if

Table 3.2
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the systematic review findings

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	ADAPTIONS MADE BASED ON SYSTEMATIC REVIEW FINDINGS		RATIONALE FOR CHANGES
			SA MA U MD SD		SA audiologists were aware of this as it may impact on their understanding accountability in FRS.
/	/	35	***ADDED*** Do you have informational resources for patients on fall risk in your waiting room? ☐ Yes ☐ Usually yes, but not currently due to COVID-19 ☐ No	-	This was important to identify because if informational resources are available, this would suggest that audiologists have knowledge of fall risk and believe it is within their scope of practice. Johnson et al. (2009) also recommended that informational resources be present to assist with starting the conversation about falls.
/	/	36	***ADDED*** Have you ever spoken to a general practitioner about the fall risk of older adult patients with hearing loss? ☐ Yes ☐ No	-	Baxter et al. (2017) reported a need for audiologists to become stronger members within MDT. Most importantly with GPs because "primary health care is the most appropriate service delivery model for an effective falls prevention strategy as all older people living in the community will be connected to a GP" (Mackenzie & McIntyre, 2019, p. 32).
/	/	37	***ADDED*** If you do not conduct fall risk screenings with your older adult patients, do you know of an audiologist or physiotherapist whom you could refer them to? ☐ Yes ☐ No ☐ No need -I screen my patients for fall risk and make the appropriate recommendations	-	According to reports, audiologists in the USA may lack knowledge regarding when and how to make appropriate referrals to other professionals. Additionally, they may feel constrained by time limitations, hindering their ability to engage in collaborative discussions regarding these matters (Bassett, 2018; Lindsey, 2015). The researcher wanted to determine if this was also the case in SA as a multidisciplinary approach is vital for the success of a FRS implementation (Honaker, 2021).
/	/	38	***ADDED*** When you suspect a patient is at risk of falling, which professionals do you commonly refer them to and collaborate with? (Multiple answers may be selected) ☐ Physiotherapist ☐ General physician ☐ Otolaryngologist/Ear nose and throat specialist ☐ Occupational therapist ☐ Pharmacist ☐ Neurologist ☐ Cardiologist ☐ Optometrist/ophthalmologist ☐ Geriatrician ☐ Psychologist ☐ Exercise instructors ☐ None at this time	-	These were all the professionals mentioned within the articles reviewed in the systematic review. Because a multidisciplinary approach to fall risk is most effective (Honaker, 2021), the researcher wanted to identify which of these professionals SA audiologists commonly consider as part of the fall risk team.

3.6.1.3.3 Summary of changes made. To summarise **Table 3.2** the following changes were made to the survey based on the systematic review findings: The survey was adapted to include the most regularly reported tools as options for audiologists to select when reporting which tools they regularly included within FRS protocols (Question 11 of the original survey was adapted and became questions 44-48 in the new survey). The systematic review also documented reported barriers to fall risk assessment in audiology. These barriers were incorporated into the options available for audiologists to select when requested to provide their view on why a FRS programme may be challenging to implement (Question 28 in the new survey). Additionally, five questions were added to the "Views of Fall risk Screening within Audiology" section (Questions 8, 10, 11, 12, 27); five questions to the "Perceived Knowledge of Fall risk" section (Questions 32B, 32C, 32D, 32F, 32N); and lastly, four questions were added to the "Reported Practice of Fall risk Screening" section (Questions 34-37).

Thereafter, further contextual adaptations were made to the survey. This is detailed in the next sub- section.

3.6.2 Contextual Adaptation of the Survey

3.6.2.1 Aims

a) To adapt the survey, ensuring that the terminology used was familiar within the SA context and that appropriate biographical questions were asked so that results could be interpreted within audiologists' context.

b) To adapt the current survey to ensure that each question contributed to answering the objectives of this research study, especially as the purpose of the current study differed from that of Patterson and Honaker (2014) in terms of the study focus. This study was specifically interested in obtaining data related to FRS, whereas Patterson and Honaker's (2014) study collected data for assessment, intervention and prevention.

To exemplify content and construct validity for the survey, it was necessary to check the questions against the conceptual definition of the constructs within this study and its context (Chiang et al., 2015).

3.6.2.2 Adaptations and rationale. The changes made to the survey and the rationale for these changes are documented in **Table 3.3.**

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
1	Date of completion of highest degree □ Before 1970 □ Between 1971 and 1980 □ Between 1981 and 1990 □ Between 1991 and 2000 □ Between 2001 and 2011	**1**	When did you complete your undergraduate degree? □ 1970 or before □ Between 1971 and 1980 □ Between 1981 and 1990 □ Between 1991 and 2000 □ Between 2001 and 2011 □ Between 2012 and 2022	- -	Between 2012 and 2022 was added as data were collected in 2022. Changed to undergraduate degree to gain understanding of how long the audiologists have been qualified to practice, as this could have an impact on their perception and knowledge of FRS.
2	Highest degree earned □ B.A, B.S. □ M.A., MSc. □ Ed.D. □ Au.D. □ Ph.D.	**3**	Highest degree obtained □ B.A (SP & H)/ BSC (AUD) □ M.A., MSc. □ AU.D. □ Ph.D. □ Other	- - -	B.A (SP & H)/ BSC (AUD) are the degree abbreviations for most universities in SA. Ed. D was removed as it is not commonly obtained by audiologists in SA and would not impact on fall risk perception and/or knowledge. 'Other' was added to give audiologists the option to add less commonly obtained degrees and to obtain a more comprehensive biographical understanding of the participants.
3	Geographic location □ Rural and/or small town □ Suburban □ City	**5**	What geographic location do you work in? □ Rural area □ Semi-urban area (built-up residential area) □ Urban area (within a main city/town)	-	Terms were changed to fit the SA context, specifically in terms of geographic locations (STATS SA., 2001).
4	Describe your clinical environment: □ Hospital setting □ University setting □ Hearing aid dispenser □ ENT practice/outpatient facility □ School setting □ Private practice □ Other	**6**	What environment(s) do you work in? (Multiple answers may be selected) □ Hospital setting □ Clinic setting □ Private practice □ School setting □ ENT/ outpatient facility □ University (lecturer / researcher / clinical supervisor) □ Corporate audiology □ Occupational audiology □ Other	-	Additional options were given to include all environments within the SA context. This was also done to determine how many audiologists are currently conducting fall risk assessments in their varying work environments.

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
5	As an audiologist, I primarily: □ Dispense hearing aids □ Administer vestibular testing □ Work with the paediatric population □ Work with adult diagnostic testing □ Work with cochlea implant patients □ Conduct research □ Teach □ Other	**7**	Please select the services you regularly provide to the older adult population: □ Diagnostic audiological assessment □ Diagnostic vestibular assessment □ Hearing screening □ Vestibular screening □ Hearing aid fittings □ Aural rehabilitation □ Vestibular rehabilitation □ Cochlea implant services	- -	"Services to the older adult population" were specified so that the question was in line with the objectives of this research. Collecting data on whether audiologists work with paediatrics/research or teach did not aid in answering the research questions, as this research primarily wanted to identify clinical services offered to the older adult population. Removing these options was important to improve the content validity of the survey. "Dispense hearing aids" was changed to "hearing aid fittings", as this terminology is more familiar to SA audiologists and within SA literature (Pienaar et al., 2010; Ratanjee-Vanmali et al., 2020)
6	Please indicate the primary age(s) of patients served in your practice: □ 0-20 □ 21-40 □ 41-60 □ 61+ □ I do not see patients in a clinical setting	**B**	Do you have clinical audiological experience with older adults (>65 years old)? □ Yes □ A limited amount (< 6 months' experience) □ No	-	Options pertaining to younger ages did not aid in answering the research question, as the focus of the study relates to services provided to the older adult population. Removing other age group options was important to improve the content validity of the survey.
7	Please indicate any professional preparation that focused on RoF assessment □ Graduate coursework □ In-service training provided by an employer □ Workshop training □ Conference presentations □ Other (please specify) □ None at this time	**30**	Please indicate any professional preparation that focused on fall risk screening: (Multiple answers may be selected) □ Undergraduate coursework □ In-service training provided by employer □ Postgraduate workshop training □ Conference presentations □ None at this time □ Other (please specify)	-	Changes were made to ensure that options were in line with learning and training opportunities in SA(HPCSA, 2017).
8	Approximate number of hours of RoF training/education.	**31**	Approximate total number of hours of fall risk training/education you have received (undergraduate and postgraduate)	-	To ensure that audiologists include hours of training/education for both undergraduate and postgraduate. This was done so that the researcher could identify if adequate undergraduate and postgraduate training opportunities had been available, with the aim to establish if further training opportunities were required.
9	Please indicate your experience with RoF assessment □ Currently implementing RoF assessment □ Previously implemented RoF assessment □ Planning to implement RoF in the future □ No experience with RoF □ Other_____	**41**	Please indicate your clinical experience in fall risk screening: □ I have never heard of or thought about conducting fall risk screening as an audiologist. □ Currently implementing fall risk screenings □ I have previously implemented a fall risk screening.	-	Changes were made to improve response options to allow for a more in-depth understanding of audiologists' clinical experience with fall risk. This insight will help explain their views and practice in FRS.

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
	.		☐ I am planning on implementing fall risk screenings in the future. ☐ I have no experience in fall risk and do not think I will implement fall risk screening with my patients. ☐ I have heard of fall risk screening but have no experience and am not confident to conduct fall risk screening without further training. ☐ Other_____		
10	Approximate number of years' experience with RoF assessment: _____	**43**	Approximate the number of years' experience with fall risk screenings: _____	-	Changed from assessment to screening in line with the focus of this study.
12	Approximate time allocated for RoF assessment: _____	**44**	Approximate time allocated for fall risk screening (If no time is generally allocated, please insert '0') _____	- -	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS Additional information was added to guide the participants who do not allocate time for FRS, so that the question was not left 'blank', which would complicate the interpretation of this question.
13	If you are presently involved in RoF assessment, please feel free to comment on your assessment technique used in practice.	/	REMOVED	-	This question was moved to the qualitative phase (Interviews) of the study.
14	Please indicate the resources used when counselling your patients on fall risk/fall prevention: ☐ Fear of Falling/Balance Confidence Questionnaire (e.g., Activities-specific Balance Confidence Scale and Modified Falls Efficacy Scale) ☐ Verbal discussion on avoiding and/or modifying falling -risk factors ☐ Written instruction on avoiding and/or modifying falling -risk factors ☐ Referral to a specific website addressing falling -risk factors/fall prevention ☐ Other_____ ☐ None at this time	/	REMOVED	-	The current study did not include counselling as a focus point.
15	Approximate time allocated for RoF counselling: _____	/	REMOVED	-	The question did not aid in answering the research question. This research focused on FRS, not fall risk counselling.

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
1	RoF assessment is part of the audiologist's scope of practice SA MA U MD SD	**9**	Fall risk screening (to identify fall risk factors) is part of the audiologist's scope of practice. SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
				-	Additional information was added to minimise ambiguity in that participants could misinterpret the question because their definition of FRS may vary.
2	Learning new ways to administer risk of falling would be helpful to me SA MA U MD SD	**20**	Learning new ways to administer fall risk screening would be helpful to me. SA MA U MD SD	-	Specified FRS so that the question remained in line with the research objectives.
3	Audiologists have opportunities to learn about RoF assessment SA MA U MD SD	**22**	I had the opportunity to learn about fall risk screening in my undergraduate studies coursework SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
		23	I had the opportunity to learn about fall risk screening in postgraduate courses or through self-study SA MA U MD SD	-	The question was changed to first person to gauge the audiologists' personal perception of their fall risk learning opportunities. This finding may aid in explaining their views, and practice in FRS.
				-	Undergraduate and postgraduate opportunities were separated with the aim of identifying where opportunities existed.
4	Audiologists are knowledgeable about RoF assessment SA MA U MD SD	**32A**	Audiologists are knowledgeable about fall risk screening. SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
5	All older adults can benefit from RoF assessment. SA MA U MD SD	**32H**	All older adults (>65) adults can benefit from fall risk screening. SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
6	Audiologists are sufficiently trained to provide RoF assessment SA MA U MD SD	**14**	Audiologists are sufficiently trained to conduct fall risk screenings in undergraduate curricula SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
7	RoF assessment should be applied to all patients served in the audiology clinic SA MA U MD SD	**17**	Fall risk screenings should be conducted with all older adults served in the audiology clinic SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
8	Multidisciplinary screening is important in RoF assessment SA MA U MD SD	**32G**	Multidisciplinary screening is important when conducting fall risk screening SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.

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ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE	RATIONALE FOR CHANGES
9	RoF assessment is necessary to determine candidacy for a rehabilitation programme (e.g., physical therapy) SA MA U MD SD	/	REMOVED	- This survey is focused on screening to prevent falls and not the diagnostic assessment which would assist in determining candidacy for a rehabilitation programme.
10	Changing my practice to better support risk of falling would take a lot of time SA MA U MD SD	**18**	Changing my practice to include fall risk screening in consultations would take a lot of time SA MA U MD SD	- Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
11	RoF assessment is important but uncontrollable variables (e.g., time, reimbursement, etc.) may prevent involvement in this service. SA MA U MD SD	**19**	Fall risk screening is important, but uncontrollable variables (e.g., time, reimbursement, etc.) may prevent involvement in this service. SA MA U MD SD	- Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
12	RoF assessment can change how we assess and identify patients in the vestibular clinic SA MA U MD SD	**32L**	Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the vestibular clinic. SA MA U MD SD	- Changed from "assessment" to "screening" in line with this study specifically focusing on fall- risk screening. - It is not fall risk assessment itself, but rather the knowledge hereof which may shift an audiologist's perspective on how patients presenting with imbalance should be assessed. - "At risk" was added as the reader may be confused about what is being "identified" in the vestibular clinic.
13	I typically ask about fear of falling at the initial audiology appointment SA MA U MD SD	**40**	Do you typically ask about fear of falling at the initial audiology appointment? Always Often Rarely Never	- Changed from a Likert scale which obtained a scale of agreement, to a scale which obtained a scale of frequency, to enable the researcher to comment more specifically on how often audiologists asked about fear of falling.
14	RoF assessment can change how we assess and identify patients in the hearing/diagnostic clinic SA MA U MD SD	**32M**	Knowledge of fall risk screening will change how we assess and identify "at risk" patients consulted in the hearing clinic. SA MA U MD SD	- Changed from "assessment" to "screening" in line with this study specifically focusing on FRS. - It is not fall risk assessment itself, but rather the knowledge hereof which may shift an audiologist's perspective on how patients presenting with imbalance should be screened/assessed. - "At risk" was added as the reader may be confused about what is being "identified" in the vestibular clinic.

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
15	RoF assessment services are preventative in that they can decrease the number of individuals who experience a falling event. SA MA U MD SD	**32I**	Fall risk screening services are preventative in that they can decrease the number of individuals who may experience a falling event SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
16	Changing my practice to better support risk of falling would require more time/resources. SA MA U MD SD	/	REMOVED	-	To reduce redundancy in questions asked. Questions 10 and 16 (Original survey were similar.
17	RoF assessment connects audiology and physical therapy services. SA MA U MD SD	**32J**	Fall risk screening connects audiology and physiotherapy services. SA MA U MD SD	-	Physical therapy is more commonly referred to as physiotherapy in SA(Louw et al., 2021)
18	I enjoy learning new ways to support my older patients' needs. SA MA U MD SD	/	REMOVED	-	Questions 18 and 20 (Original survey were redundant as they were both assessing the audiologist's enthusiasm to learn more to support older adult patients better. Question 18 was removed and Question 20 was retained.
20	I am interested in learning more about how to support patients at risk of falling. SA MA U MD SD	**21**	I am interested in learning more about how to support older adults patients who are at risk of falling. SA MA U MD SD	-	Focus is placed on older adults for this study.
21	RoF assessment services are more prevalent in the vestibular disorder clinical setting compared to "general" audiology clinical setting SA MA U MD SD	**15**	Fall risk screening services should be more prevalent in the vestibular disorder clinical setting compared to the "general" audiology clinical setting. SA MA U MD SD	-	Changed to "screening" in line with the focus of this study.
22	Negative consequences due to falls may be prevented if RoF assessment was implemented in all audiology clinics. SA MA U MD SD	**32K**	Negative consequences due to falls may be prevented if fall risk screenings were implemented in all audiology clinics. SA MA U MD SD	-	Changed from "assessment" to "screening" in line with this study specifically focusing on FRS.
23	RoF assessment is important in addressing the needs of our aging population. SA MA U MD SD	**32E**	Fall risk screenings are important in addressing the needs of our aging population. SA MA U MD SD	-	Changed to "screening" in line with the focus of this study.
24	RoF assessment is restricted to specific areas of audiological practice, such as vestibular and balance disorders. SA MA U MD SD	**16**	Fall risk screening should only be done by audiologists practising in vestibular and balance audiology. SA MA U MD SD	-	Changed to "screening" in line with the focus of this study.
25	Audiologists have an important role in RoF assessment. SA MA U MD SD	**13**	Audiologists play an important role in screening the older adults to identify if they are at risk of falling SA MA U MD SD	-	Changed to "screening" in line with the focus of this study.

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
26	I typically ask about history of falls at the initial audiology appointment. SA MA U MD SD	**39**	Do you typically ask about history of falls at the initial audiology appointment? Always Often Rarely Never	-	Changed from a Likert scale which obtained a scale of agreement, to a scale which obtained a scale of frequency, to enable the researcher to comment more specifically on how often audiologists asked about the history of falling.
27	Implementing an RoF assessment programme may add to my job stress and/or lead to burnout. SA MA U MD SD	**25**	Implementing a fall risk screening programme may increase my job stress and workload. SA MA U MD SD	- -	Changed to "screening" in line with the focus of this study "Burnout" changed to "workload" to identify if audiologists anticipate that FRS would increase their workload (which precedes burnout) (Emanuel, 2021).
28	Across the U.S., large numbers of audiologists are having discussions about RoF assessment and fall prevention. SA MA U MD SD	**26**	Across the world, large numbers of audiologists are having discussions about fall risk screening and fall prevention. SA MA U MD SD	- - - -	"U.S." changed to "across the world", as discussion is not only present in the U.S. Although discussions regarding FRS have begun arising in SA, very little has been published or documented in SA(Rogers, 2020). For this reason," U.S." was not changed to "USA", but rather to "across the world". Sources of information (Journals, Facebook groups, LinkedIn, webinars, etc.) for audiologists in SAare not limited to national content and exposure. Therefore this question was asked to identify if audiologists had been exposed to or been aware of discussions of FRS in audiology internationally. Changed to "screening" in line with the focus of this study.
30	Optional: What are your additional comments regarding RoF assessment services for older adults in the audiology clinic?	**50**	What are your additional comments regarding fall risk screening services for older adults in the audiology clinic? _____	-	Changed to "screening" in line with the focus of this study.
/	/	**A**	A. Are you registered with the HPCSA? ☐ Yes, as an audiologist ☐ Yes, as an audiologist and speech therapist ☐ No	-	This question was added as it was part of the inclusion/ exclusion criteria.

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE		RATIONALE FOR CHANGES
/	/	**4**	Which province(s) do you practice in? ☐ Gauteng ☐ Free State ☐ Limpopo ☐ Mpumalanga ☐ Northern Cape ☐ Western Cape ☐ North West ☐ KwaZulu-Natal ☐ Eastern Cape	-	Biographical information added to describe the sample.
/	/	**33**	***ADDED*** When screening for fall risk, I believe it would be important to consider the following : - Personal factors (case history, falls history, medical conditions etc) SA MA U MD SD - Biological factors (balance system structures and function) SA MA U MD SD - Psychological and cognitive factors SA MA U MD SD - Social factors (participation and activity) SA MA U MD SD - Environmental factors (living conditions) SA MA U MD SD	- - -	This was an important question to ask to fulfil objective D. This question assisted in describing if audiologist's viewed FRS from a univariate medical perspective (where biological factors are prioritized) or from a multivariate biopsychosocial perspective, where the patient is viewed holistically. This will assist in establishing if audiologists believe they have a responsibility to view a patient holistically when considering health-care delivery. This information will possibly also explain why audiologists have chosen the FRS protocols they have (for those who are conducting FRS).
/	/	**32. N**	***ADDED*** I feel I have sufficient knowledge of the International Classification of Function, Disability and Health Framework (ICF) to use it as a model for fall risk screening.	-	It was important to understand how much perceived knowledge audiologists had of the ICF, because this would influence their views and practice in FRS.
/	/	**34**	If you notice that your patient has an unsteady gait, what do you generally do? (Multiple answers may be selected)	-	In order to effectively answer the objective of identifying audiologists' reported practice in FRS, this question was

Table 3.3
Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014)

ORIGINAL NO	ORIGINAL SURVEY QUESTION	NEW NO	SURVEY ADAPTATION PHASE	RATIONALE FOR CHANGES
			☐ Nothing, I trust that their general practitioner has discussed fall risk and fall prevention with them ☐ Often nothing, unsteady gait is to be expected with age ☐ Discuss fall risk factors and prevention with them ☐ I conduct a fall risk screening and make the appropriate recommendations ☐ I refer them to a physiotherapist ☐ Other_____	added to identify the first step that is taken when audiologists identify that their patient may be at risk of falling.

3.6.2.3 Summary of changes made. To summarise the adaptations made to the survey in **Table 3.3**, the term “assessment” was changed to “screening” for 22 questions in line with this study specifically focusing on FRS. Six questions were removed because three of them did not aid in answering the research questions; two provided redundant answers to other questions also asked in the survey; and one question was qualitative in nature. Six questions were rephrased to improve their clarity and specificity, as ambiguity may have affected the reliability of the response; nine questions were adapted or added to better fit the SA context. Response options were changed for three of the questions to improve the interpretation of the questions. Two questions were added to incorporate questions about the ICF into the survey, and lastly, six ”other” changes (which could not be categorised into the above changes) were made.

These contextual adaptations were integrated with the adaptations made after the systematic review, and this adapted survey was then used for the pilot study (**Appendix 4**).

3.6.3 Pilot Study

3.6.3.1 Aim and objectives. The aim of the pilot study was to pre-test the adapted survey (**Appendix 4**) and the interview questions and process.

The main aim of the pilot study was addressed through the specific objectives presented in **Table 3.4.**

Table 3.4

Pilot Study Objectives

Survey Pilot Study Objectives	Interview Pilot Study Objectives
I. Revealing deficiencies (e.g., ambiguous instructions, inadequate time limits, etc.) prior to the use in the main study. II. Improving the quality and efficiency of the measuring instrument by determining changes needed to be made in terms of the: a. Technical aspects of the survey. b. Layout and visual representation of the survey. c. Clarity of the instructions provided. d. Language, terminology, or phrasing of the adapted survey items. e. Response options provided. f. General aspects of the survey, such as the length of time the survey required. g. Face validity and content validity**.**	I. Familiarising the researcher with the procedures included in conducting an in-depth interview. II. To highlight ambiguities in the way questions are asked and discarding or modifying questions accordingly. III. To identify if any questions were potentially leading or unintentionally affected the way the participants answered (i.e.: all participants are answering in a certain way). IV. To record the time taken to complete the Interview to determine whether it is reasonable. V. To identify any technical issues with the online interview platform being utilised (Zoom). VI. To allow the researcher to practise and refine interviewing techniques.

3.6.3.2 Rationale. The pilot study was used as a small-scale feasibility trial to pre-test the adapted survey and the interview questions/process. By conducting a pilot study, the proposed data collection materials and processes could be trialled to alert the researcher to issues which may negatively affect the main study. Consequently, the likelihood of meaningful data collection and analysis in the main study was enhanced (In, 2017).

3.6.3.3 Method.

3.6.3.3.1 Participants.

Sampling and Recruitment. Six participants were purposively selected and recruited for the pilot study. The same participants who completed the survey also completed the interview, thus the sampling method and selection criteria of participants for the survey and interview were the same.

Participant Selection Criteria. The same participant selection criteria as used for the main study (see **Table 3.14**) were applied. In addition, participants were selected in terms of language, their working context (public/private) and their experience in FRS. The selection criteria and theoretical justification hereof is detailed in **Table 3.5.**

Table 3.5

Pilot Study- Additional Participant Selection Criteria

Inclusion criteria	Theoretical Justification	Method
Representation of both audiologists whose first language is English and audiologists whose first language is not English	It was important to also include participants whose first language was not English. Since SA has 11 official languages, there are many audiologists in SA whose first language is not English. Therefore, it was crucial to present the questions in a manner that would not be ambiguous for audiologists who speak English as a second or third language (Hassan et al., 2006).	Asked within the biological questionnaire before the participant could commence with the survey
Representation of both audiologists working in the public sector and audiologists working in the private sector	It was important to also include audiologists from both the public and private sector because perceptions and views of the questions may differ depending on working environments. Specifically, because the workload distribution between private and government audiologists is unbalanced. 78% of audiologists are working in public healthcare, serving 16% of the population. Whereas 22% of audiologists are working in the public healthcare sector, serving 84% of the population (Pillay et al., 2020). As a result, the participants may also suggest additional facilitators or barriers based on their context that the original survey may not have considered.	Asked within the biological questionnaire before the participant could commence with the survey
Representation of both audiologists who have experience in fall risk assessment and those who do not have experience in fall risk assessment.	This inclusion criteria were incorporated for practical reasons namely: 1. The survey and interview items may be perceived differently by those who have experience versus those who do not. 2. If the audiologist does not have experience in FRS, they are exempt from answering the last section. Audiologists with experience in FRS are required to answer the last section to obtain practical answers regarding fall risk measures being used in practice.	Asked within the biological questionnaire before the participant could commence with the survey

All eligible participants who provided their consent were included in the data collection process, without any geographic limitations within SA, given the electronic/online nature of data collection.

3.6.3.3.2 Materials. The survey was created using Google Forms. Participants were provided with the link to the survey. The survey comprised 49 multiple-choice and Likert scale questions (**Appendix 4**). The interview was semi-structured. The participants' survey responses were reviewed, and individualised Interview questions were composed for each participant to obtain further insight into their answers provided in the survey. An example of an Interview Plan for the Pilot Study can be viewed in **Figure 3.5.**

Figure 3.3:

Example of an Interview Plan for the Pilot Study

A. Interview Preamble:

You have been asked to participate in this interview as part of a research project conducted by me, Kayla van Rie, a postgraduate student at WITS university. The research project is called "South African Audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults." In order to participate in this study, you do not have to have any prior knowledge or experience in fall risk. Your knowledge will not be tested- I merely want to gain an understanding of your views, perception, and reported practice (even if you are not practicing) in fall risk.

Your responses in this interview are entirely voluntary, and you may refuse to answer any or all of the questions in this interview. I expect that the interview will last approximately 30 minutes, with an additional 10 minutes for post interview questions to discuss your experience of the interview process.

You have already completed the consent form. Thus, by agreeing to participate in the interview, you affirm that you give your consent for me, [INSERT NAME], to record this interview and to use your answers in my research. All responses will be anonymized, and there will be no way to trace your responses back to you.

B. Example of interview questions

V=Views; K= perceived knowledge; P: reported practice

1. K: Where have you heard about fall risk screening being conducted by audiologists before? (If at all)
2. V: What do you think the audiologist's role in fall risk screening is (if any)?
   - If uncertain- what do you feel is the reason for your uncertainty?
3. P: Do you conduct fall risk screenings on your elderly patients?
   - If you conduct fall risk screenings, what tools do you use to assess your patients?
4. P: If you do not conduct fall risk screenings, what do you feel you would need to start?
5. V: Why is fall risk either within or not within the audiologist's the scope of practice?
6. *K:* What factors do you feel would help contribute to an audiologist feeling confident and knowledgeable in fall risk screening and counselling?
7. V: If you were to look for guidelines on how to conduct fall risk screening within audiology, where would you look?
8. V: In your opinion, should fall risk screening with the elderly be done by all audiologists, or just those practicing in vestibular audiology? If so, why?
9. K: What has your formal/informal training in the area of fall risk screening looked like? (EG: graduate course, CPDs, conferences)?
10. V: Where, if any, do opportunities exist to learn more about fall risk screening?
    - V: Would you be interest to learn more?
11. V: fall risk screening program can be challenging to implement because…
12. K: Why should/should not all patients over the age of 65 be assessed for fall risk by their audiologist?
    - V: Why? Do you think this is feasible?
13. V: What would encourage you to begin implementing fall risk screening into your everyday practice?
14. P: Have you referred elderly patients in the past to other professionals due to fall risk concerns?
    - If so, who do you refer to?

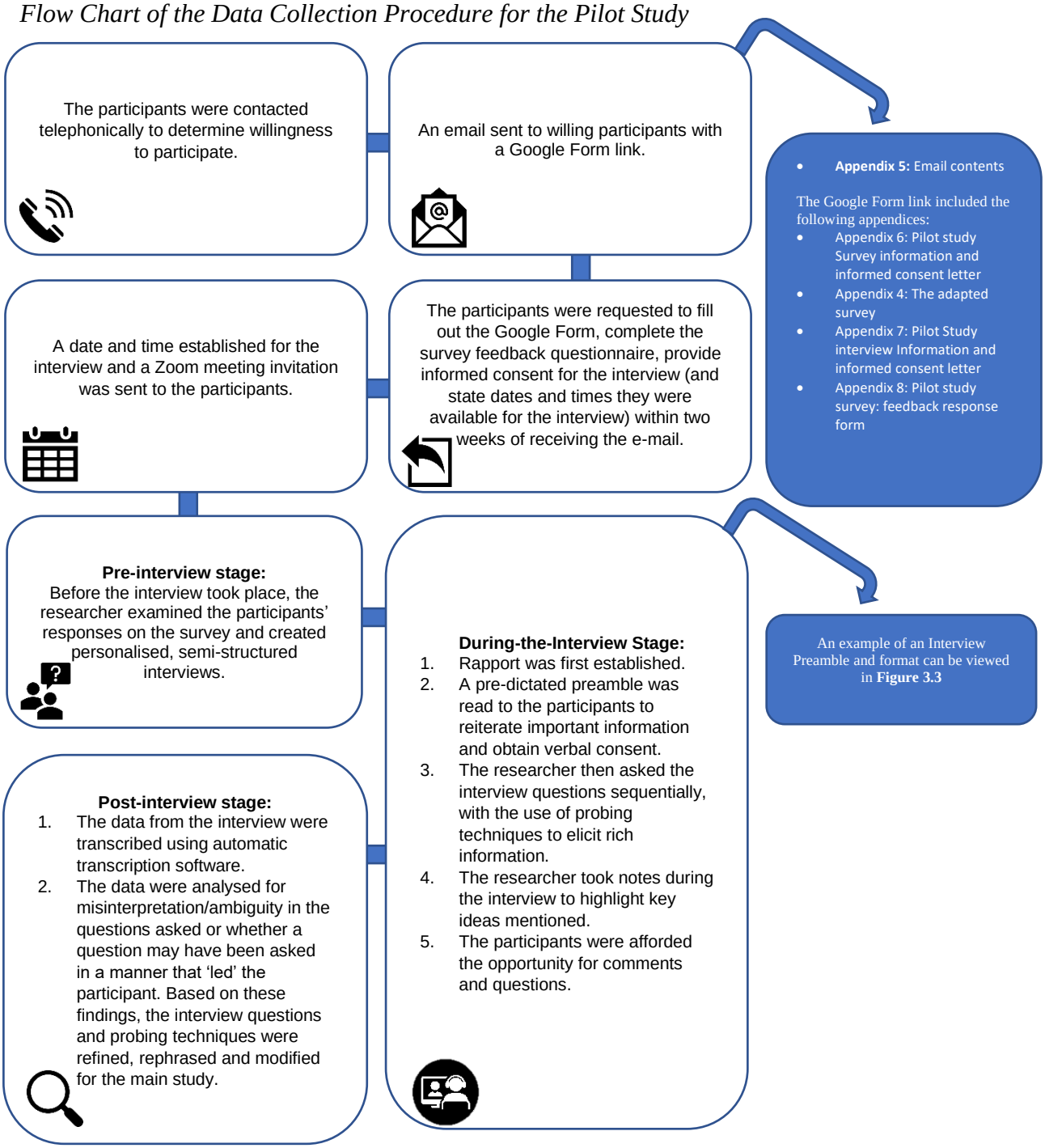
C. <u>Wrapping up</u>

✓ Researcher summarises the interview.
✓ Opportunity to ask any questions or provide suggestions or thoughts of the interview provided
✓ Appreciation for participating in the interview expressed.
✓ Greeting
✓ End meeting

3.6.3.3.3 Data collection procedures. Initially, six potential participants were identified for the pilot study and contacted telephonically by the researcher to determine willingness to participate. Five participants communicated their willingness. An additional participant was then identified through the researcher's professional network. Verbal consent was obtained from all participants who expressed their willingness to participate in the pilot study. The data collection procedure is summarised in **Figure 3.4**.

Figure 3.4

Flow Chart of the Data Collection Procedure for the Pilot Study



Once all six study participants were contacted and the process described in **Figure 3.4** followed through, the researcher examined the survey feedback response form whereby the participants' comments were reviewed to identify if survey adaptations were warranted. Thereafter, the researcher examined the interview process, the interview questions and their successive answers. Using the Interview pilot study objectives as a guide, the researcher identified if and where adaptations to the Interview were required.

3.6.3.4 Results and Adaptations: Survey. Six participants were included in the pilot study. Their biographical information and self-reported clinical experience are detailed in **Table 3.6.**

Table 3.6

Description of the Pilot Study Participants (N=6)

	Survey aspect	Participant response	Number of participants
Biographical information	Registered with the HPCSA	+ Registered with the HPCSA	6
		- Registered with the HPCSA	0
	Working context (public/private)	Private	3
		Public	3
	Participants' first language	English	3
		Siswati	1
		Afrikaans	2
	Gender	Female	5
		Male	1
	Age	20-29 years old	2
		30-39 years old	3
		40-49 years old	1
Reported clinical experience	Experience in clinical audiological assessment of adult patients	Has experience in clinical audiological assessment of adult patients	6
	Experience in FRS	Yes - has experience (Is conducting fall risk assessments clinically)	2
		A limited amount of experience (Is conducting fall risk assessments clinically)	1
		A limited amount of experience (Is not conducting fall risk assessments clinically)	1
		Has no experience (Is not conducting fall risk assessments clinically)	2

As detailed in **Table 3.6**, all but one of the participants were female (5/6), which is not unusual in the field of audiology in SA (Pillay et al., 2020). Additionally, the mean age of the participants was 34 years, which was also representative of the profession, as 63.6% of

audiologists practising in SA are said to be under 40 years of age (Pillay et al., 2020). To obtain pilot study participants who would be representative of participants in the main study, the six pilot study participants were also representative of different working contexts, first languages and clinical experience.

A summary of the pilot study objectives of the survey and changes made based on the participants' feedback within the survey Feedback Questionnaire (**Appendix 9**), can be viewed in **Table 3.7.**

Table 3.7

Summary of the Pilot Study Objectives and Changes Made to the Survey

Survey Pilot Study Objectives	Results/Participant Comments	Changes applied
a. Technical aspects of the survey.	No technical issues were reported	NA
b. Layout and visual representation of the survey.	"Above Question 8: the instructions are much smaller than the question text. I missed the instructions because of this and needed to go back to check what I needed to do."	The instructions text (font size) was made larger
c. Clarity of the instructions provided.	No difficulties were reported about the instructions provided. All participants followed the instructions perfectly, without clarification necessary.	NA
d. Language, terminology, or phrasing of the adapted survey items.	- "Perhaps giving a good definition of fall risk at the start of the survey may be helpful as some practitioners may be screening for it without even knowing that they are doing so" - Comments applicable to the language, terminology, or phrasing of the survey items were recorded and addressed in **Table 3.8**	Definitions of falls and fall risk were added before Question 1: See **Table 3.8**
e. The response options provided.	Addressed in **Table 3.8**	See **Table 3.8**
f. General aspects of the survey such as the length of time the survey required.	Participant 1: 20 minutes; Participant 2: 12 minutes; Participant 3: 25 minutes; Participant 4: 18 minutes; Participant 5: 15 minutes; Participant 6: 22 minutes All participants completed the survey in maximum 25 minutes.	NA
g. Face validity and content validity.	All participants reported that they found the questions to be relevant to the research title. No face/content validity recommendations were suggested.	NA
To gather additional suggestions and comments from participants how the survey could be improved.	Participant 4: "Perhaps at the end, to provide a few lines on what fall risk is and the scope of practice for audiology. This is as people who have limited experience in this area may feel as if they are answering "No" to everything, without being given the opportunity to improve their knowledge"	Additional reading resources were not provided after the survey, as this may have influenced the way in which questions were answered in the subsequent interviews, and not represent a true reflection of the audiologists' original views and perceived knowledge on FRS.

Table 3.7 summarises the changes made to the survey which were *not related* to the survey items. Overall, changes made included: instruction text (font size) was made larger; definitions of falls and fall risk were added before Question 1; and a note was inserted at the end of the survey as guideline for participants where to access the write-up of the completed study. Changes to the survey items based on: language and terminology used or changes to the response options provided, are documented in detail in **Table 3.8.**

Table 3.8

Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the pilot study findings

ORIGINAL NO.	QUESTION BEFORE PILOT STUDY CHANGES	NEW NO	ADAPTIONS MADE BASED ON PILOT STUDY FINDINGS	RATIONALE FOR CHANGES
7	***Initially adapted in the survey adaption phase*** 30. Please indicate any professional preparation that focused on fall risk screening: (Multiple answers may be selected) ☐ Undergraduate coursework ☐ In-service training provided by employer ☐ Postgraduate workshop training ☐ Conference presentations ☐ None at this time ☐ Other (please specify)	**30**	Please indicate any professional preparation that focused on fall risk screening (Multiple answers may be selected) ☐ Undergraduate coursework ☐ Postgraduate coursework ☐ In-service training provided by employer ☐ Conference/workshop/course presentations ☐ Online course/webinar ☐ None at this time	- Participant 2 in the pilot study stated that postgraduate coursework and workshops should be separated as they are considered to be two separate forms of learning. The researcher agreed with this statement and applied the change. - Additionally, these are listed as separate forms of learning within HPCSA documentation (HPCSA, 2017).
12	***Initially adapted in the survey adaption phase*** Approximate time allocated for fall risk screening (If no time is generally allocated, please insert '0')	**44**	Approximately, how much time do you generally take to conduct a fall risk screening with your patients? _____	- The question was reworded based on Participant 1's suggestion. Practically, time is not always allocated beforehand, as the clinician may only be aware of the need to screen for fall risk after discussion with the patient.
10	***Initially adapted in the survey adaption phase*** 18. Changing my practice to include fall risk screening in consultations would take a lot of time SA MA U MD SD	**18**	Fall risk screening in consultations takes a lot of time SA MA U MD SD	- Participants may already be including FRS in their consultations. Rewording this question ensured that perceptions could be identified of the time span of FRS from both those who are conducting FRSs and those who are not conducting FRSs.
12	***Initially adapted in the survey adaption phase*** 32M. Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the vestibular clinic. SA MA U MD SD	**32L**	Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the VESTIBULAR clinic	- 32L and M are similar- Pilot Participant 2 commented that they were the same question. - Differences were highlighted in capital letters to prevent the main study participants from misreading 32L and 32M as being the same question.

Table 3.8

Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the pilot study findings

ORIGINAL NO.	QUESTION BEFORE PILOT STUDY CHANGES	NEW NO	ADAPTIONS MADE BASED ON PILOT STUDY FINDINGS	RATIONALE FOR CHANGES
13	***Initially adapted in the survey adaption phase*** 39. Do you typically ask about fear of falling at the initial audiology appointment? Always Often Rarely Never	**40**	Do you typically ask about FEAR OF FALLING in the initial audiology appointment with your older adult patients?	- Participant 4 stated: "It sometimes felt like the questions were repetitive. One had to re-read to find the subtle differences in questions posed." - The differences were therefore highlighted in capital letters to indicate subtle differences, so prevent confusing the main study participants.
14	***Initially adapted in the survey adaption phase*** 32N. Knowledge of fall risk screening will change how we assess and identify "at risk" patients seen in the hearing clinic. SA MA U MD SD	**32M**	Knowledge of fall risk screening will change how we assess and identify "at-risk" patients in the HEARING clinic.	- Participant 2 reported "Questions 32: L and M are the same". - Differences were highlighted in capital letters to prevent the main study participants from misreading 32L and 32M as being the same question.
26	***Initially adapted in the survey adaption phase*** 38. Do you typically ask about history of falls at the initial audiology appointment? Always Often Rarely Never	**39**	Do you typically ask about HISTORY OF FALLS at the initial audiology appointment with your older adult patients?	- Participant 4 stated: "It sometimes felt like the questions were repetitive. One had to re-read to find the subtle differences in questions posed." - The differences were therefore highlighted in capital letters to indicate subtle differences, to prevent confusing the main study participants.
27	***Initially adapted in the survey adaption phase*** 25. Implementing a fall risk screening programme may increase my job stress and workload. SA MA U MD SD	**25**	Implementing a fall risk screening programme increases/may increase my job stress and workload.	- Participants may already be including FRS in their consultations. Rewording this question avoided the assumption that they are not implementing a FRS programme (Khan, 2018).

Table 3.8

Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the pilot study findings

ORIGINAL NO.	QUESTION BEFORE PILOT STUDY CHANGES	NEW NO	ADAPTIONS MADE BASED ON PILOT STUDY FINDINGS	RATIONALE FOR CHANGES
29	***Initially adapted in the systematic review phase*** 28. A fall risk screening programme can be challenging to implement because (select the options you agree with):	**28**	28. A fall risk screening programme may be challenging to implement in my consultations with older adults because (select the options you agree with): The following option was also added: ☐ I don't believe it would be challenging	- Participant 1 stated: "Q28 could be clearer – I read it as what do I think, in general, is the issue with not implementing FRSs/what could be possible reasons. Maybe edit to '…challenging for me to implement in my practice…' or something to clarify if you want the participant's own reasons for not doing it. Same with Q29." - Changes were made to the way the question was asked to receive an answer from participants that describes the challenges they perceive for their personal practice in FRS with older adults and not just general practice. - It was important to add this option as audiologists may already be conducting FRS programmes and not experiencing challenges. Adding this option therefore removed bias from the response options presented (Khan, 2018).
/	***Added at the systematic review phase*** 8. It is important to evaluate older adults balance if they complain about having problems SA MA U MD SD	**8**	For me as an audiologist, I believe that it is important that audiologists conduct a fall risk screening when an older adult patient reports experiencing poor balance/has had a fall. SA MA U MD SD	- This change was suggested by Participant 6 and was made to identify the personal views of the audiologist and if they perceived that they had a personal responsibility to conduct FRS.

Table 3.8

Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the pilot study findings

ORIGINAL NO.	QUESTION BEFORE PILOT STUDY CHANGES	NEW NO	ADAPTIONS MADE BASED ON PILOT STUDY FINDINGS	RATIONALE FOR CHANGES
/	***Added at the systematic review phase*** 11. Clear guidelines exist for the role of the audiologist in fall risk screenings nationally SA MA U MD SD	**11**	11. Clear guidelines exist for the role of the audiologist in fall risk screenings NATIONALLY SA MA U MD SD	- Participant 4 stated: "It sometimes felt like the questions were repetitive. One had to re-read to find the subtle differences in questions posed." - The differences were therefore highlighted in capital letters to indicate subtle differences, to prevent confusing the main study participants.
	12. Clear guidelines exist for the role of the audiologist in fall risk screenings nationally SA MA U MD SD	**12**	12. Clear guidelines exist for the role of the audiologist in fall risk screenings INTERNATIONALLY SA MA U MD SD	
/	***Added at the systematic review phase*** 29. Do you believe there are other reasons not mentioned above that would make the implementation of a fall risk screening programme challenging? If so, please list them below.	**29**	29. Do you believe there are other reasons not mentioned above that would make the implementation of a fall risk screening programme in your consultations challenging? If so, please list them below. _____	- Participant 1 stated: "Q28 could be clearer – I read it as what do I think, in general, is the issue with not implementing FRSs/what could be possible reasons. Maybe edit to '…challenging for me to implement in my practice…' or something to clarify if you want the participant's own reasons for not doing it. Same with Q29." - Changes were made to the way the question was asked to receive an answer from participants that described the challenges they perceived for their personal practice in FRS with older adults and not just general practice.

Table 3.8

Adaptions made to "Survey of Audiologists' Best Practice for Assessing Risk of Fall" (Appendix 2), created by Patterson and Honaker (2014) based on the pilot study findings

ORIGINAL NO.	QUESTION BEFORE PILOT STUDY CHANGES	NEW NO	ADAPTIONS MADE BASED ON PILOT STUDY FINDINGS	RATIONALE FOR CHANGES
/	***Initially added in the survey adaption phase*** 33. If you notice that your patient has an unsteady gait, what do you generally do? (Multiple answers may be selected) □ Nothing, I trust that their general practitioner has discussed fall risk and prevention with them □ Often nothing, unsteady gait is to be expected with age □ Discuss fall risk factors and prevention with them □ I conduct a fall risk screening and make the appropriate recommendations □ I refer them to a physiotherapist □ Other_____	**34**	An additional response item was added: □ I refer for vestibular testing	- Participant 6 added vestibular testing as an 'other' answer. - Although SA degrees in audiology started including vestibular training as an exit level outcome, many audiologists are not practising in 'vestibular audiology' (Seedat et al., 2018), and would thus often refer to another audiologist who practises in this area when patients are presenting with dizziness symptoms or imbalance (Seedat et al., 2018).

To summarise the changes made to survey questions based on the pilot study findings (as detailed in **Table 3.8**), three changes to the questions were made based on participant suggestions (Questions 30, 12 and 34). Namely, three questions were adapted to reduce bias within the question (Questions 18. 25 and 28); six questions were adapted to highlight subtle differences within the questions (28 & 29; 32L & 32M; 11 & 12); and three questions were reworded to ensure that participants were answering based on their personal views, and not on a generalized view of 'audiologists' (Questions 8, 28 and 29).

Overall, the collective changes made to the survey based on the systematic review findings, the contextual adaptations, and the pilot study findings contributed to the researcher's confidence in the survey's feasibility in accurately and effectively answering the research questions (In, 2017). This was vital because the survey responses guided the questions asked within the Interview. The next section discusses the pilot study findings and adaptations made to interviews.

3.6.3.5 Results and adaptations: interview. The specific objectives, results and applied changes following the pilot study interview are presented in **Table 3.9**. Participants were afforded the opportunity to comment on the interview questions and post-interview experience, however, no additional changes were recommended. The changes to the interview process and questions were made after the researcher had transcribed and analysed the interviews to identify any signs of ambiguity or confusion. For example, requests for repetition/rewording of a question, or if a participant did not provide the information that the question intended on extracting. Furthermore, the wording of questions was examined in terms of whether it unintentionally affected the way in which the participant responded.

Table 3.9

Objectives, results and recommendations of the pilot study interview.

OBJECTIVE		RESULTS		
		Original question	**Adapted question**	**Rationale for change**
III.	To highlight ambiguities in the way questions are asked and discard or modify questions accordingly.	*The following questions required clarification or did not elicit responses which answered the research questions.*		
		"Internationally, who do you feel provides guidelines for fall risk screening?"	"Internationally, who do you think provides audiology-specific guidelines for fall risk screening?"	Rewording the questions was in line with the focus of the study and the objectives related to audiologists in SA. (As there are several general guidelines for FRS available, but few audiology-specific guidelines.)
		"Do you always incorporate diagnostic vestibular tests when screening for fall risk?"	"How do you decide on which tests to include or exclude in your protocol?"	Rewording the question in this way allowed for the question to be open ended, providing deeper insight into how audiologists decided on which tests to include or exclude in their protocol (Neuert et al., 2021).
		"Basically, what do you feel audiologists need to start fall risk screening?"	"What do you feel audiologists need in order to commence with fall risk screening?" *Probing: In terms of resources, training, time considerations, etc.	Participant 3 was not sure how to answer the question. Thus, it was identified that probing might be necessary for participants who are unfamiliar with fall risk.
		"What has your formal/informal training in the area of fall risk post grad looked like?"	Can you describe the formal/informal training that you received?	'Postgraduate' appeared to have been vague. Participant 1 explained that some people considered this to be Master's/ PhD studies, and others just as 'time after qualifying'. The researcher recognised that this could cause ambiguity and therefore reworded this question.
		8. "For what reasons do you believe it is important for an audiologist to conduct a fall risk screening on an older adult if they report imbalance?"	8. "I was glad to see you recognised the importance of fall risk screening. In your opinion, why is it important for an audiologist to conduct a fall risk screening on an older adult if they report imbalance?"	Confusion arose because several participants could not remember what they had answered in the survey. Therefore, a statement was added to remind the participants of their answers before expecting them to answer questions based on their answers. *(The statement will be adapted depending on the participant's answer.)*

Note: all questions were asked as a follow-up question to the participant's survey responses

Table 3.9

Objectives, results and recommendations of the pilot study interview.

OBJECTIVE		RESULTS		
		Observation/ Original question	**Adapted question**	**Rationale for change**
III.	Continued…	30. "Could you please elaborate on what this preparation looked like and summarise what you took away from these training opportunities"	30. "Could you please elaborate on what this preparation looked like?"	The last portion of this question was removed as participants displayed uncertainty in how to answer this question.
		General aspect requiring change During the pilot study interviews, it was noted that the participants often required repetition of the questions.	*Change made:* While the interview is in progress, the question that is being asked will be presented on the screen (A PowerPoint presentation will be created before each interview, displaying each question that will be asked, based on the prescribed questions from the interview template script- (**Appendix 10**).	To present the questions both verbally and visually would ensure that participants do not forget what is being asked and confirm that they have heard the question correctly, resulting in more reliable responses (Glegg, 2019).
IV.	To identify if any questions are potentially leading or unintentionally affected the way the participant answered (i.e.: all participants are answering in a certain way).	*It was identified that the wording of some questions which were asked may have probed the participant to answer in a certain direction. Examples of when this occurred are discussed below:*	*The researcher removed all information which leaned towards a certain answer so that the question remained neutral.*	*Identifying and removing leading questions ensured that the answers provided were a reflection of the participants' own thoughts, beliefs and practice* (Nehyba & Lawley, 2020).
		"Training has caused a bit of a ripple effect… so lack of training in lecturers creates lack of training in the current students as well… do you feel like that could possibly be a contributing factor?"	"What effect do you feel that the lack of training has on future audiologists and their practice in fall risk screening?"	When the question was asked in this manner, the participants responded with a short "Yes, I do" answer and did not provide further information on their own opinions regarding training. The changes made were done to prevent this question from leading audiologists to an answer and to make the question more open-ended, leaving room for them to voice and explore their own thoughts on this topic (Nehyba & Lawley, 2020).

Note: all questions were asked as a follow-up question to the participant's survey responses

Table 3.9

Objectives, results and recommendations of the pilot study interview.

	OBJECTIVE	RESULTS		
IV.	Continued…	**Observation/ Original question**	**Adapted question**	**Rationale for change**
		"Do you feel like we should only be screening patients for fall risk if we suspect there is something vestibular going on?"	"As audiologists, should we only be screening patients for fall risk if we suspect there is something vestibular going on or when we suspect there may be general fall risk present?"	Providing options in the question may allow the participant to offer a broader response, comparing thoughts on both vestibular-specific patients and general fall risk patients.
		"Would you feel comfortable in doing that or would you feel you would need extra training, or a webinar or a … would you feel you could take those tools and without extra input implement it?"	"What enabled you to feel comfortable in conducting these 'other' measures?"	Initially the participants stated that they were comfortable in conducting 'other' measures. After the researcher probed further, the participants changed their responses. The probing should seek deeper insight into the participant's response and not alter the participant's response (Seidman, 2019b).
		Overall, where possible, why questions were reworded. *For example: Original question to two participants:* "Why do you feel uncertain as to whether fall risk screening is actually within the scope of the audiologist?"	What contributes to making you feel that fall risk screening is/is not within the scope of the audiologist?	In general, it was observed that the inclusion of "why" type questions might have elicited a defensive response from some participants, leading them to feel the need to justify their answers. This could have potentially hindered their responses to both the current and subsequent questions (Seidman, 2019b).
V.	To record the time taken to complete the interview to determine whether it is reasonable.	Participant 1: 20.48 minutes Participant 2: 16.11 minutes Participant 3: 26.35 minutes Participant 4: 20:07 minutes Participant 5: 29.36 minutes Participant 6: 25 Minutes	The time stated in the participant information sheet was sufficient (No longer than 30 minutes).	NA
VI.	To identify any technical issues with the online interview	No technical issues arose with any of the participants.	No changes were necessary.	NA

Note: all questions were asked as a follow-up question to the participant's survey responses

Table 3.9

Objectives, results and recommendations of the pilot study interview.

	OBJECTIVE	RESULTS		
	platform being utilised (Zoom).			
VII.	To allow the researcher to practice and perfect interviewing techniques.	*Areas for improvement were noted as follows:* - Note-taking – it was difficult to identify which notes correlated with which questions when reviewing the notes afterwards. - The pilot study allowed the researcher to practice how to probe and ask questions in a non-leading/ unambiguous manner.	*Change made to improve these areas:* A template was made with blocks and question numbers, so that notes for each question could easily be referred to. Changes are discussed in the above results.	*Rationale for the changes made:* Taking notes assists with precise details and documenting ideas that stood out to you during the interview. This may assist with theme development at a later stage (Roller & Lavrakas, 2015). This allowed for precautions to be made to minimise bias in the research(Roller & Lavrakas, 2015).

Note: all questions were asked as a follow-up question to the participant's survey responses

Additional interview findings from the pilot study. **Table 3.9** displays the findings and changes made to the objectives of the pilot study for the interview. In addition to these findings, the pilot study identified that the personalised and successive questions asked varied due to each participant answering the survey differently; and that this method would not provide substantial answers to specific questions or be representative of the multiple viewpoints, thus running the risk of presenting an individual and biased perspective. Furthermore, it would be difficult to determine when data saturation would have been obtained. To prevent this, the interview questions were structured for the main study. A template script with interview questions was created (**Appendix 10**), whereby participants' survey responses dictated which pre-established questions from the template interview schedule would be asked. To summarise, for the main study interview, the changes discussed in **Table 3.9** were applied and a template interview schedule was created.

3.6.3.6 Conclusion. Conducting a pilot study before the main study proved to be highly valuable. The pilot study assisted in mitigating risks associated with the data collection procedure and confirmed the feasibility of the research process and tools used. Furthermore, making the recommended changes strengthened the research tools by ensuring that the survey and interviews measured the research objectives effectively, robustly and accurately (In, 2017). The researcher could also confidently recognise that the interview questions (**Appendix 10**) acted as a good supplementary tool to the survey by explaining why certain responses may have been obtained in the survey. This strengthened the content and face validity of the interview process for the main study (Flick, 2018). Lastly, having alleviated the identified issues in the pilot study, the researcher's confidence, clarity and skills in the data collection process were refined (Roller & Lavrakas, 2015).

3.6.3.7 Trustworthiness and Dependability. The following measures were taken to enhance reliability and validity during the pilot study process (**Table 3.10**).

Table 3.10

Strategies to Ensure Trustworthiness in The Pilot Study

Strategy	Technique	Application of technique in the pilot study
Credibility/internal validity	Audio recordings and verbatim transcripts	All interview discussions were audio recorded for verbatim transcription as reviewing the recorded data increased the credibility of the data and the study by ensuring that no comments were omitted by the researcher. Transcription of the data allowed the researcher to closely analyse any deficiencies in the interview questions by checking if the participants' responses revealed confusion, or requests for clarification (Seidman, 2019a)
	Member checking	Member checking was not necessary as the content of the responses given was not analysed at this stage. The researcher was mainly interested in identifying inadequacies in the way the questions were asked and in the interview process.
Transferability/ external validity	Representative of participants.	The pilot study participants were carefully selected, to be representative of audiologists of varying ages, first languages, working contexts and work experience in FRS. Ensuring that the pilot study participants were representative of the audiologists who would participate in the main study was crucial. This would enable the findings to be generalizable, and any changes made would be appropriate for the main study as well (Varpio et al., 2021).
	Thick description	Biographical information was obtained from each participant so that the results obtained could be presented within context, and that readers could observe how the pilot study participants were representative of the population expected to take part in the main study (Korstjens & Moser, 2017).
Content and construct validity	Participant feedback form	To ensure that participants' feedback form (**Appendix 8)** was representative of what the pilot study aimed to achieve, each objective for the pilot study of the survey included a corresponding question on the participant's feedback form (Plano Clark & Ivankova, 2016).

The pilot study aimed to improve the trustworthiness as well as the dependability of the study by also employing the strategies indicated in **Table 3.11**.

Table 3.11

Increasing Dependability in the Pilot Study

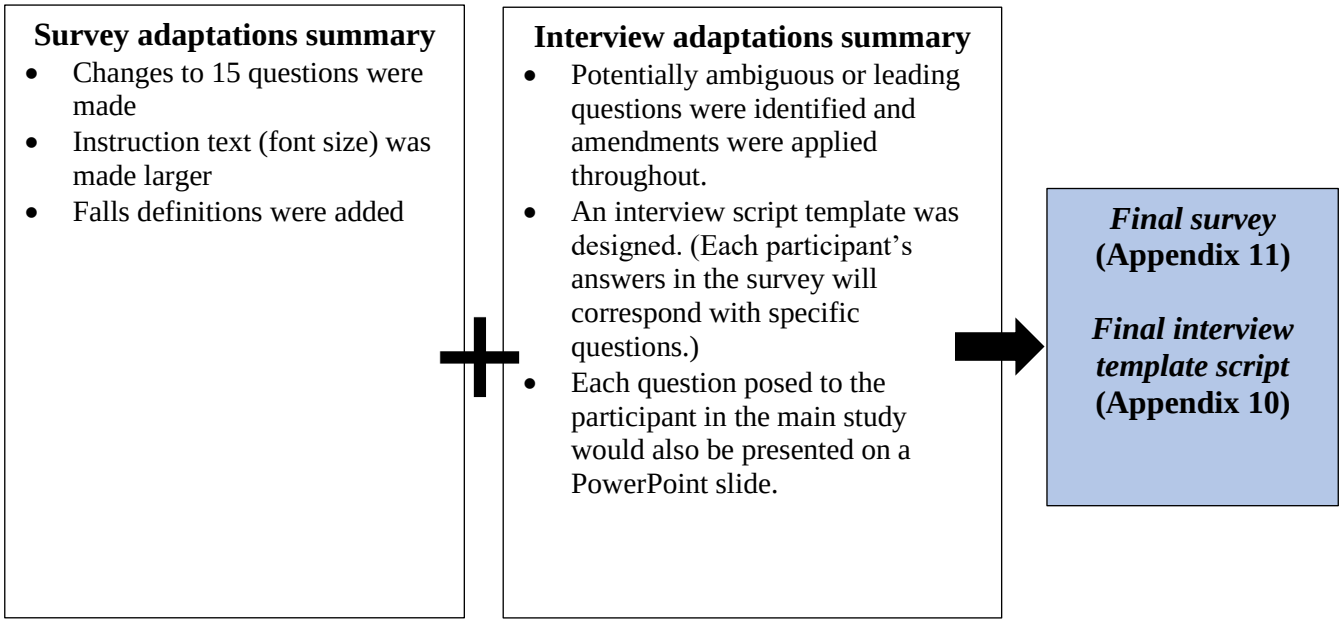
Strategy	Technique	Application of technique in the pilot study
External reliability	Dependability of the data/audit trail	To ensure the dependability of the data, meticulous records were maintained, and an audit trail was created, documenting all the steps undertaken throughout the process of data collection and analysis (Seidman, 2019a).This was done so that this study could be repeated in future, if required.
	Interviewing consistency	The pilot study utilised a semi-structured interview process whereby the researcher examined the participant's survey responses and identified questions requiring further explanation. This however yielded poor consistency of the questions asked for each participant, resulting in poor external reliability, therefore, for the main study, an interview script template was used.
Internal reliability	Interview pre-amble	To reduce participant bias, before the interviews began, the researcher expressed that no answers were "correct" or "incorrect", and that the researcher merely required the participants' honest views on the questions asked to identify the current status of FRS amongst SA audiologists.
	Audit trail	By recording and preserving the interviews, the data can be readily reanalyzed or replicated by any independent researcher, thereby enhancing the internal reliability of both the data and the resulting findings (Seidman, 2019a).

Through evaluating the influence of each of these strategies on the trustworthiness and dependability of the pilot study, the overall quality and accuracy of the obtained data were improved.

3.6.3.8 Refining the research tools. After the pilot study adaptations were made to the survey and the interview questions (see **Figure 3.5** for a summary of the changes made in the pilot study), the tools were ultimately reviewed and finalised. See **Appendix 11** for the final survey used in the main study and **Appendix 10** for the template interview Schedule.

Figure 3.5

Overall Summary of the Changes made Based on the Pilot Study Results



3.7 Stage Two- Main Study

3.7.1 Main study objectives

The specific objectives of the main study can be viewed at the beginning of this chapter, in Section 3.3 (Objectives C, D and E).

3.7.2 Description of the participants

3.7.2.1 The sample. A sample is a set of data taken from the population of interest, which in this case constituted audiologists practicing in SA. When identifying an appropriate sample, it was important to consider the size of the population and how many participants were necessary to generalise the results. Additionally, the researcher needed to consider how many participants would realistically participate in the study looking at average response rates for online surveys.

According to the health professions council (HPCSA) database in 2021, there were 840 audiologists and 645 dually qualified audiologists and speech therapists registered with the HPCSA in SA (HPCSA, 2021). Realistically, it was expected that on average, the

response rate to the online surveys would be between 30-33% (Lindemann, 2019). Generally, it is accepted that a good sample size would be around 10% of the population size (148 audiologists) which would have given the study a confidence level of 95% and a margin error of 7.64% (see **Table 3.12**). Based on ideal confidence levels and error margins, to achieve the purposes of this study, the ideal sample size for the surveys was 306 audiologists and the minimum was 91 audiologists.

Table 3.12

Minimum and maximum sample sizes for the survey and their corresponding confidence levels and margin of error

	Confidence level (%)	Margin of Error (%)	Sample Size (N)
Maximum sample size	95	5	327
Ideal sample size (10% of the population)	95	7.64	148
Actual sample size obtained	95	9	106
Minimum sample size	95	10	91

In this study, the sample size comprised 106 participants for the survey (**Table 3.12**), resulting in a margin error of 9% with a confidence level of 95%.

For the interview component of this study, ideally, interviews would have been terminated when data saturation was met, however, due to time constraints and a limited number of participants indicating willingness to participate in the interview portion of this study, only participants who indicated willingness and had availability before a cut off time period were interviewed, in order to meet the research timeline.

3.7.2.2 The sampling procedure. The sampling procedure is summarised in **Table 3.13**

Table 3.13

A Summary of the Research Tools, Recruitment Methods and Sampling Methods

Research Tool	Recruitment method	Sampling method
Surveys	**The survey link and the interview invitation was shared using the following methods:** **1) E-mail:** - SA Association of Audiology (SAAA) database - National Speech Therapy and Audiology Forum **2) Facebook groups:** - SAAA - SA Audiologists and Speech-Language Therapists - Speech-language Therapists and Audiologists Private practitioners' group - Amtronix Diagnostics - STs, PTs, OTs, DTs and Audios* * Speech therapists, physical therapists, occupational therapists, dieticians and audiologists **3) LinkedIn** - Shared via the researcher's personal profile **4) WhatsApp** - The National Speech Therapy and Audiology Forum WhatsApp groups	Nonprobability, purposive sampling
Zoom Interview with audiologists	At the end of the survey, participants were given the option to also participate in the interview. If selected, the participants were taken to the next section in the form where they are required to provide their contact details.	Non-probability

The survey and interview participation requests reached audiologists by the recruitment methods mentioned in **Table 3.13**. A letter requesting permission for distribution of the research invitation from SAAA, SASLHA (South African Speech, Language and Hearing Association), and the National Speech Therapy and Audiology Forum was sent to the relevant persons at each organisation **(Appendix 12).** Permission was granted from SAAA and the National Speech Therapy and Audiology. Permission was rejected by SASLHA due to the researcher not being a member of the association **(Appendix 13)**.

A non-probability, purposive sampling method was used for the survey distribution, as this study was focused on obtaining information from a very specific portion of the population, namely: audiologists. Multiple communication distribution platforms for SA audiologists were utilised to reduce bias as far as possible. Furthermore, the survey participants were also invited to participate in the interviews (optional). According to Pillay et al. (2020), for every 1.3 audiologists (single or dual qualification) working in the public sector, there are 8.7 audiologists working in the private sector. Thus, a ratio of 1:9 was aimed for. To ensure that audiologists from both the public and private sectors were reached, communication platforms for both private (SAAA database) and public (National Speech Therapy and Audiology Forum) audiologists were used for recruitment.

The research invitation was supplemented by both text and an infographic (**Appendix 14)**. An infographic was included for the following reasons:

- Infographics are commonly regarded as a more engaging and pleasurable format for reading compared to textual content. (Buljan et al., 2018).
- The literature has explored the potential of infographics as a rapid, efficient, and visually captivating approach to conveying intricate information in a more approachable, succinct, and compelling manner (Joshi & Gupta, 2021).
- Research findings indicate that presenting information in a graphical format improves our comprehension and decision-making capabilities (McCrorie et al., 2016).
- The human brain processes images more rapidly than text (Smiciklas, 2012).
- Presenting information in an infographic format was linked to reduced cognitive load scores compared to the text-only format, thereby necessitating less cognitive effort for information processing (Martin et al., 2019). This could potentially improve the number of participants engaging with the information.

The guidelines provided by Joshi and Gupta (2021) for Infographic creation were used to ensure that the Infographic's content and visual appeal were of a high quality.

3.7.2.3 The selection criteria. The selection criteria for audiologists to complete the online surveys and participate in the interviews were as follows (**Table 3.14**):

Table 3.14

Participant Selection Criteria

Inclusion Criteria	Method	Justification
Registered Audiologist with the HPCSA	As part of the biographical survey, audiologists were asked if they are registered with the HPCSA	- Professionals registered with the HPCSA are expected to be informed regarding their scope of practice and keep up to date with professional development. - The **HPCSA** will not **register** anyone holding a qualification from an unaccredited institution and monitors CPD.
Audiologists must have adult patients in their caseload or have had experience with adult patients.	As part of the biographical survey, audiologists were asked if had experience (more than 6 months) with adult patients	- The research focuses on views, knowledge and practice of fall risk in older adults.

If participants did not meet the inclusion criteria, they were excluded from the study (no other exclusion criteria was applied).

3.7.3 Equipment and Material

3.7.3.1 Survey. The survey by Patterson and Honaker (2014) (**Appendix 2**) which was adapted for the purposes of this study was used (**Appendix 11**). The adaptations that were made are documented in *Section 3.6.*

An online survey using Google Forms was opted for, to reduce physical contact due to the Covid-19 pandemic. Additionally, the survey was not limited by distance, so audiologists across all provinces could participate. Participants were provided with a link to access the survey. The survey comprised 49 multiple-choice and Likert scale questions (**Appendix 11**).

3.7.3.2 Interview: The participants' survey responses were reviewed, and a template interview script was used to identify which questions the participants would be asked (based on their survey responses). The interview template script (**Appendix 10**) ensured that participant-specific qualitative information was probed, which provided explanations for their relative survey responses.

3.7.4 Data collection procedures

Survey: Once participants clicked on the Google Forms link, an informed consent letter (**Appendix 15**) was displayed requiring the participant to provide informed consent. Once informed consent had been provided and the subsequent inclusion criteria answers established that they were appropriate candidates for this research, the participants were provided access to the survey questions (**Appendix 11**).

Interview: The last question of the survey asked participants if they wished to receive more information about the interview portion of the study and whether they would consider participating in the interview. If they selected "Yes", they were redirected to the next section in the Google Form where they were presented with the interview information letter (**Appendix 16**). After reading the information letter, participants were given the opportunity to provide informed consent and were requested to provide their contact details and dates and times where they would be available for the online interview. Once a suitable date and time had been established, a Zoom link was e-mailed to the participant. An online interview platform was opted for to reduce physical contact due to the Covid-19 pandemic. Additionally, this method

allowed audiologists to select any time of day that would suit them best (i.e. after working hours). Furthermore, doing interviews on an online platform allowed the researcher to interview participants from multiple provinces, which would determine if the same trends were present across provinces. Doing interviews via this platform also minimised costs and allowed the researcher to easily record the interview for transcription at a later stage. Conducting personal interviews was not necessary for this research, as it did not involve emotive aspects. Therefore, nonverbal cues were not analyzed.

The data collection procedure for the interview was separated into three stages as described by Gani et al. (2020), namely: 1. Pre-interview stage; 2. During-the-interview stage; and 3. Post-interview stage.

Pre-interview stage: Before the interview took place, the researcher examined the participants' responses on the survey and created a personalised interview (from the interview template script - **Appendix 10**) to establish further qualitative meaning and insights for the quantitative responses provided in the survey.

During-the-Interview Stage: The researcher first established good rapport with the interviewee (greetings and self-introduction from both interviewer and interviewee), which was important to create comfort and trust which may assist in aiding the interviewee to communicate freely (Gani et al., 2020). A pre-dictated preamble was then read to the participant to reiterate important information which was included in the informed consent form. Verbal informed consent was then requested – for record purposes. The personalised interview questions were presented to the participants via Microsoft PowerPoint, should they have had difficulties hearing or required repetition. The researcher then asked the interview questions sequentially. The Zoom sessions were video-recorded, accompanied by note-taking to highlight key ideas mentioned by the interviewee. After the interview, the researcher afforded

the interviewee the opportunity to ask questions and provide final views. Thereafter, appreciation for participating in the interview was expressed and the meeting was ended (Gani et al., 2020).

Post-Interview Stage: Data analysis, as described in the next section.

3.7.5 Data analysis procedures

For the survey, a similar data analysis procedure as that of Patterson and Honaker (2014) was used. Microsoft Excel was used to calculate descriptive statistics (means, standard deviations, frequencies, and percentages) to quantify survey responses on the views, perceived knowledge and reported practice of SA audiologists in the realm of FRS. Additionally, in order to identify if there was a statistical relationship between specific data responses, statistical software (RStudio) was used to inferential statistics using the Kruskal-Wallis Chi-squared test. The Kruskal-Wallis Chi-squared test is appropriate for when we are comparing more than 2 groups of participants, when these groups of participants are independent of one another, and when we are working with strictly ordinal data. On the basis of three facts: the fact that there were up to 5 unique responses to each question (scales), the fact that participants could only give one answer to a question (independence of the groups), and the fact that the data was ordinal in nature all pointed to the use of the Kruskal-Wallis Chi-squared test (Ostertagová et al., 2014).

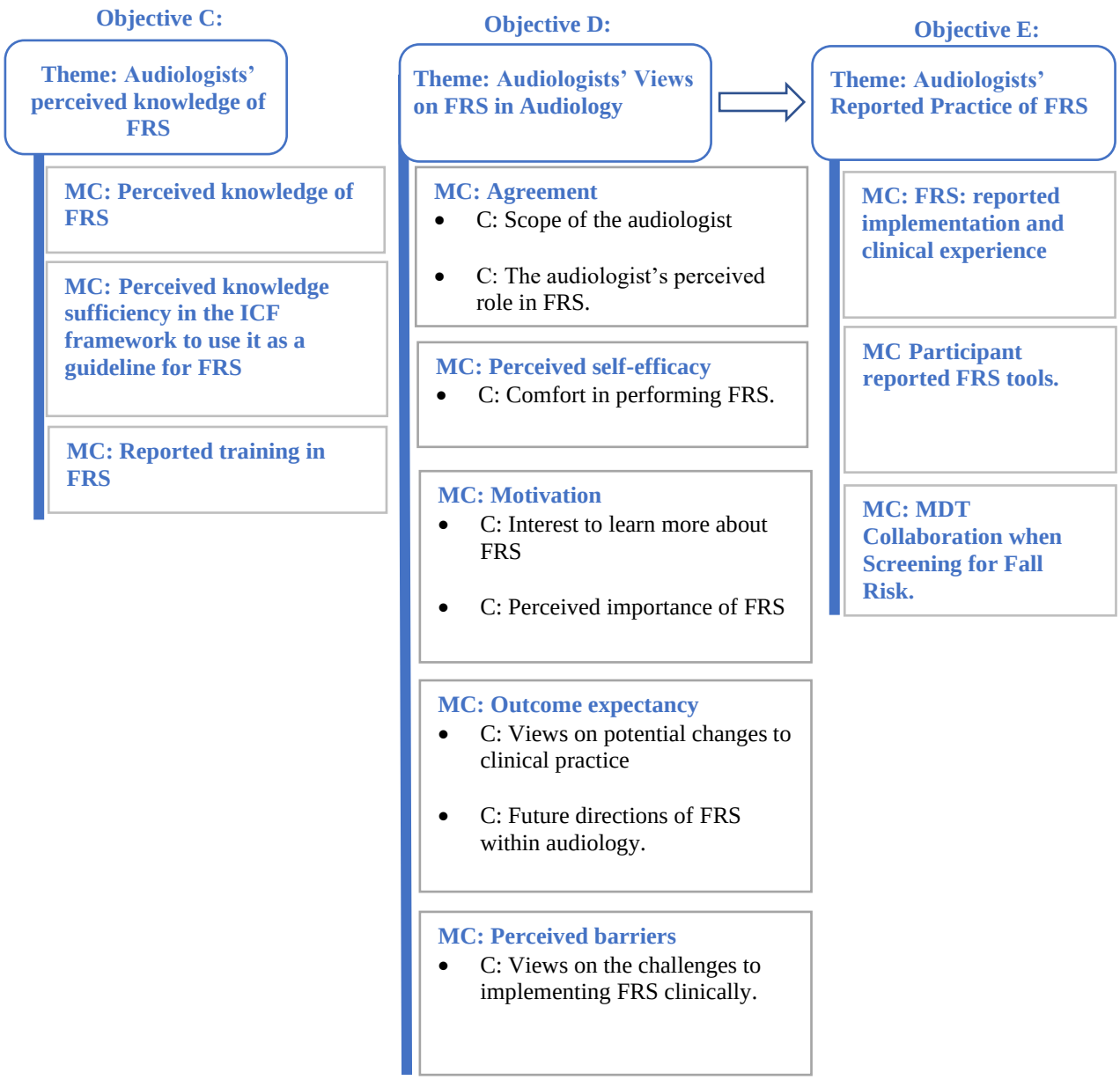
The transcribed qualitative data from the interviews were analyzed using deductive, thematic analysis. Thematic analysis was chosen as it is an appropriate and powerful method to use when seeking to understand views, perceptions, and behaviors across a data set (Terry et al., 2017). The thematic analysis method applied was outlined by Pearse (2019) and is detailed below:

Step one- conceptual framework:

The KAB framework was adapted from Roelens et al. (2006)'s study. This framework was ideal for adaptation and use within this study because it is primarily used to explain how knowledge influences views and subsequently influences practice. The three objectives within this study became the three main themes within the framework and underneath each theme, main constructs are listed (informed by the KAB framework). The survey questions were then analysed further to identify the key areas the questions aimed to explore. From this meaning, codes were developed underneath each main construct (see **Figure 3.6**). Due to the development of the adapted survey being driven by findings from the systematic review and guided by the KAB conceptual framework (Roelens et al., 2006), the codes correlated with preconceived notions suggested in literature. The codes were therefore theoretically-driven, which is important when conducting a deductive thematic analysis (Pearse, 2019).

Figure 3.6

Conceptual framework used based on the KAB Framework



MC= main construct; C=code

Step two- develop codes: The conceptual framework (**Figure 3.6**) provided the themes, main constructs and codes for deductive analysis of the interview data. When analysing the interview data, each data point was categorized under a theme, then a main construct and finally a code. This structure ensured that the interview data correlated with the data obtained

in the surveys and could thus assist in providing supportive qualitative data to help explain why certain observations may have been seen in the quantitative data.

Step three- develop the codebook: A codebook was created based on **Figure 3.6**, listing each code along with its corresponding definition. Additionally, the codebook provided a description of qualifiers and exclusions to indicate instances when the code applies or does not apply, as exemplified by Turner et al. (2021).

.**Step four- develop a question matrix**: Each interview question corresponded to asking for elaboration of the response the participant selected in the survey (see **Appendix 10**). Thus, the questions either asked for elaboration of a survey question which was categorized under the theme 'perceived knowledge', 'views' or reported practice theme. Once the interview data was transcribed, data was arranged in excel under separate tabs for each theme. Within each tab the survey responses were further categorized under their respective survey question numbers.

Step five- data analysis: The codebook was employed during the data analysis process, which entailed reviewing, revising, and/or confirming the presence of codes within the collected data by locating relevant examples (Turner et al., 2021). Once statements were given a theme-construct-code category, emergent codes were identified for each code. These emergent codes assisted in ensuring the narrative for the results and discussion write-up under each code was driven by the data collected.

Agreement on how the data was matched to the theme-construct-code categories was reached through a consensus approach between the primary researcher (KVR) and the two additional investigators (who were both audiologists with their master's degrees and had experience in research and in FRS). Both investigators used the codebook to independently code 25% of a randomly selected portion of the dataset individually (Turner et al., 2021). After the first round of coding, inter-rater reliability was calculated using on Cohen's kappa coefficient agreement (Wang & Xia, 2019). Investigator one and investigator two had an inter-rater reliability of 54% and 55%, with the researcher's codes respectively. Subsequently, where coding discrepancies existed, the investigators and the researcher arranged meetings to discuss and motivate their code choices. The researcher and investigators then came to an agreement regarding the most accurate codes for a particular data point. After this process the inter-rater reliability between the investigators and the researchers' codes was 100% and 92% respectively. Based on the motivations provided by the researcher/investigators during this process, deficiencies in the codebook were identified and refined to reduce any ambiguity. Hereafter, the researcher then re-coded the full dataset using the updated codebook to improve the reliability of the results. Notably, the interviews did not achieve data saturation primarily due to the limited sample size. As a result, the generalizability of the interview results is not feasible, necessitating further research to evaluate the statistical significance of the statements provided amongst the interview participants.

3.7.6 Trustworthiness and dependability

Trustworthiness and dependability in a mixed methods approach is the process of ensuring the rigor of the methodological procedures. Furthermore, the researcher should strive to guarantee that inferences made are accurate and transferable, ascertaining that the research is persuasive and credible to others (Creswell & Plano Clark, 2016).

Trustworthiness refers to the degree to which the research accurately measures what it claims to measure, while dependability refers to the extent of consistency in the research process and outcomes (Chiang et al., 2015). Trustworthiness was obtained using internal validity, content validity and external validity strategies (**Table 3.15**). Dependability, on the other hand, was obtained through the use of external reliability and internal reliability strategies (**Table 3.16**).

Table 3.15

Strategies to Ensure Trustworthiness in the Main Study

Strategy	Technique	Application of technique in the present research study
Credibility / internal validity *The extent to which the research demonstrates a causal relationship between variables*	Audio recordings and verbatim transcripts	To enhance the credibility and validity of the data and the study, all interview discussions were recorded in audio format for verbatim transcription. Reviewing the recorded data served the purpose of ensuring that no comments were inadvertently excluded by the researcher. Furthermore, it facilitated accurate transcription of the data and minimized the potential for misinterpretation (Gregory & Radovinsky, 2012).
	Maturation	It was identified that between the survey and the interview, it was possible that the participants' opinions/views changed as the survey may have spurred further thought towards the subject or initiated interest which prompted the participant to seek further information(Baldwin, 2018). To as far as possible avoid this from influencing the interview responses, the researcher stated "If you have done some reading up on FRS between the survey and this interview, please answer the questions with the knowledge and opinions you had before doing additional reading prior to this interview".
	Member checking	At the conclusion of each interview, member checking was performed to validate the participants' responses. The participants provided feedback on the accuracy of the transcript in reflecting their perceptions. This process helped establish the credibility and truthfulness of the information, supporting its plausibility (Zohrabi, 2013).
	Peer examination	Research data and findings were reviewed by two audiologists with knowledge in fall risk and research. This improved the credibility of the data analysis and interpretations (Zohrabi, 2013).
	Triangulation	Data triangulation: Different data sources (systematic review, surveys and interviews) were used at the interpretation stage to analyse and interpret the data (Korstjens & Moser, 2017) Investigator triangulation: the researcher and two other investigators were involved with generating and analysing the coding and interpretation thereof (Korstjens & Moser, 2017).

Table 3.15

Strategies to Ensure Trustworthiness in the Main Study

Strategy	Technique	Application of technique in the present research study
Transferability/ external validity *External validity is the extent to which you can generalize the findings of a study to other measures, settings, or groups.*	Representative of participants.	Transferability depends on the appropriateness of the participants who participated in representing the greater population (Varpio et al., 2021). The data collection techniques allowed for all audiologists across provinces and contexts to participate in this study. Furthermore, the selection criteria were relatively broad, which meant that most audiologists would have been able to participate. This permitted audiologists with varying experience in FRS and biographical information to participate, which made the research more representative and generalisable.
	Thick description	In-depth biographical information was obtained from each participant so that the results obtained in the interviews could be presented within its context (Korstjens & Moser, 2017)
Content and construct validity *Content validity: Is the test fully representative of what it aims to measure?* *Construct validity: Does the test measure the concept that it is intended to measure?*	Rigorous evaluation of the research tools	The survey and interview questions used in this study promoted validity of the information obtained (Plano Clark & Ivankova, 2016). To ensure that construct validity was established, each section of the survey or question in the interview was linked to a specific objective in the study (if the question was not relevant to either views, perceived knowledge or reported practice, the question was removed). Content validity was realized through the systematic review findings.
	Systematic review	A systematic review of the literature exploring fall risk assessment in audiology was conducted. The survey was further adapted based on these findings to ensure that it included pertinent points on FRS which were identified in audiology literature. This strengthened the content validity of the research tools.
	Pilot study	A pilot study of the survey and interview protocols was also done to determine whether the methodology, sampling instrument and analysis were adequate (Rose & Johnson, 2020). In the Pilot study, the content and face validity of the survey was further addressed through a review by six (6) audiologists. -

This study aimed to improve the trustworthiness as well as the dependability thereof by employing the strategies indicated in **Table 3.16.**

Table 3.16

Increasing Dependability in the Main Study

Strategy	Technique	Application of technique in present research study
External reliability *The extent to which a measure varies from one use to another*	Dependability of the data/audit trail	To ensure the dependability of the data, thorough documentation and an audit trail were maintained, capturing all the procedures undertaken during data collection and analysis (Zohrabi, 2013).This was done so that this study could be repeated in future, if required.
	Script template	The interviews were conducted using a template that was created so that standardised questions could be asked based on each participant's survey answers. This ensured the consistent interviewing of each participant. Additionally, this minimised the researcher's own interjections which may have influenced the discussions in any way, reducing researcher bias.
Internal reliability *The extent to which a measure is consistent within itself*	Peer debriefing	To reinforce reliability, discussions were held with fellow Master's students and supervisors, ensuring consistency and transparency in the interpretation of the data (Wium & Louw, 2018).
	Inter-rater agreement	To decrease researcher bias, the researcher collected, analysed, and interpreted the data as impartially as possible. This was done through analysing qualitative and quantitative data using scientific processes and ensuring agreement among multiple reviewers when coding qualitative data during interviews (Rose & Johnson, 2020).
	Interview pre-amble	To reduce participant bias, before the interviews began, the researcher expressed that no answers were "correct" or "incorrect' and that the researcher merely required the participants' honest views on the questions asked to identify the current status of FRS in amongst SA audiologists.
	Audit trail	The interviews were recorded and preserved, enabling easy reanalysis or replication of the data by independent investigators. This enhances the internal reliability of the data and findings (Zohrabi, 2013).

3.7.7 Summary

Chapter three began by describing the main aim, objectives, research design and ethical considerations of this study. The two stages of this study were then presented sequentially. Stage one described the research tool adaptation, including : the systematic review, contextual adaptation of the survey and the pilot study, which were used to strengthen the validity and reliability of the survey and interview process used for the main study. Stage two detailed the main study's methodology.

CHAPTER 4: RESULTS

4.1 Introduction

The results of the online survey and virtual interviews are presented against the background of the objectives and in line with the KAB Framework adapted for this study (Chapter 3, 3.7.5, p84, Figure 3.6.). The participant demographics are presented first. Thereafter the first objective (C) is presented, which related to audiologists' perceived knowledge of FRS, more specifically: participant's perceived knowledge and training in the area of FRS and whether participants felt they had sufficient knowledge in the ICF framework to use it as a model to screen for fall risk. The second objective (D) presented describes the participants' views on FRS, more specifically, their views on the scope of practice and role, perceived self-efficacy, motivation to implement FRS and their perceived outcome expectancy and feasibility. Finally, the last objective (E) presented describes the participants' reported practice in FRS.

4.2 Description of the participants

Demographic and biographical data of the participants were collected at the onset of the survey. **Table 4.1** describes the participants in terms of their qualifications, place of employment and services which they regularly provide to older adults.

Table 4.1

Description of Audiology Participants (N=106)

Demographic and biological information				Surveys		Interviews	
Registered profession with the HPCSA				**N=106**	**%**	**n=18**	**%**
Speech Therapist & Audiologist (STA)				53	50	6	33.3
Audiologist (AU)				53	50	12	66.7
Year and institution for completed undergraduate studies							
Sefako Makgatho Health Sciences University (SMU)				***9***	***8.5***	***0***	***/***
Between 2001 and 2011				3	2.8	/	/
Between 2012 and 2022				6	5.7	/	/
University of Cape Town (UCT)				***17***	***16***	***4***	**22.2**
Between 1981 and 1990				1	0.9	1	5.6
Between 2001 and 2011				4	3.8	/	/
Between 2012 and 2022				12	11.3	3	16.7
University of KwaZulu-Natal (UKZN)				***9***	***8.5***	***4***	***22.2***
Between 1981 and 1990				2	1.9	2	11.1
Between 2012 and 2022				7	6.6	2	11.1
University of Pretoria (UP)				***45***	***42.4***	***6***	***33.3***
Between 1971 and 1980				1	0.9	/	/
Between 1981 and 1990				2	1.9	1	5.6
Between 1991 and 2000				5	4.7	/	/
Between 2001 and 2011				13	12.3	/	/
Between 2012 and 2022				24	22.6	5	27.8
University of the Witwatersrand (WITS)				***26***	***24.5***	***4***	***22.2***
Between 1991 and 2000				3	2.8	1	5.6
Between 2001 and 2011				6	5.7	1	5.6
Between 2012 and 2022				17	16	2	11.1
Highest Qualification							
B.A (SP & H)/ BSC (AUD)/ BA (AUD)				82	77.3	11	61.1
M.A., MSc				18	17	5	27.8
Doctorate of Audiology (Au.D.)				2	1.9	1	5.6
Ph.D.				4	3.8	1	5.6
Provinces of current employment*	***Rural***	***Semi-urban***	***Urban***				
Gauteng	4	12	48	64	60	10	55.6
Western Cape			14	14	13.2	3	16.6
Kwa-Zulu Natal	3	3	2	8	7.5	4	22.2
Eastern Cape			8	8	7.5	/	
Free State			4	4	3.8	1	5.5
Limpopo	4	1	1	6	5.7	1	5.5
Mpumalanga		2	2	4	3.8	1	5.5
Northwest		3	5	9	8.5	1	5.5
Northern Cape			1	1	0.9	/	
Sector of current employment*							
Private clinical practice				58	55	11	61.1
Public clinical practice				43	41	6	33.3
Both public and private clinical practice				5	4	2	11.1
Clinical environments audiologists are currently working in*							
Hospital setting				62	58.5	8	44.4
Private practice				58	54.7	6	33.3
Clinic setting				28	26.4	7	38.9
Ear Nose and Throat Doctors (ENT)/ outpatient facility				23	21.7	4	22.2
School setting				14	13.2	2	11.1
University (lecturer / researcher / clinical supervisor)				9	8.5	2	11.1
Corporate audiology				6	5.7	2	11.1
Occupational audiology				5	4.7	1	5.5

Table 4.1 continued

Demographic and biological information	Surveys		Interviews	
Service delivery to the elderly*	**N=106**	**%**	**n=18**	**%**
Diagnostic audiological assessments	99	93.4	15	83.3
Hearing aid fittings	99	93.4	16	88.9
Hearing screening	75	70.8	10	55.6
Aural rehabilitation	50	47.2	8	44.4
Cochlea implant services	7	6.6	2	11.1
Vestibular services offered	39	36.7	9	50
Vestibular screening	*28*	*26.4*	*7*	*38.9*
Diagnostic vestibular assessment	*19*	*17.9*	*7*	*38.9*
Vestibular rehabilitation	*13*	*12.3*	*4*	*22.2*

***Note**: values do not sum up to 100% as participants may have selected more than one option*

A total of 106 participants completed the online survey. In SA, 1485 audiologists are reportedly registered with the HPCSA (including dually qualified speech therapists and audiologists) (HPCSA, 2021). Hence, this dataset represents approximately 7% of the audiologist population in SA. Using Cochran's formula to identify the margin of error (corresponding to a confidence level of 95% and the size of the study sample), a margin of error of 9.2% was obtained. Only 18 of the 106 individuals participated in the follow-up virtual interviews, representing 17% of the surveyed participants and 1.2% of all audiologists in SA.

The sample size for the interviews was not sufficient to make generalized conclusions about audiologists' perceived knowledge, views or practice in FRS. The interview data did however aid in establishing a possible explanation for the survey data obtained.

The survey was representative of 50% STA and 50% AU undergraduate qualifications. The results revealed that there was no statistical difference between the number of STA and AU qualified audiologists conducting FRSs. Furthermore, the participants received their undergraduate degrees from various universities in SA, with the largest representation being from Gauteng, more specifically UP (42%; n=45). Sixty two percent of participants who completed the surveys qualified in the last decade, with 77% (n=82) reporting their undergraduate degree as their highest qualification. The data obtained from the surveys was

also representative of audiologists working in both the private (55%; n=58) and the public healthcare sector (41%; n=43). A correlation calculation revealed no statistical significance in the number of audiologists in the private versus public sector conducting FRSs. Increasing the validity of the results was the fact that most of the participants worked in hospital, private practice, clinic and ENT settings (where FRS is more likely to be conducted clinically), as opposed to the schools, academic, corporate or occupational settings. The survey was also representative of audiologists working in all nine provinces and varying geographical locations was obtained, with over half being in Gauteng (60%; n=64). Within the various settings, the most provided services to older adults included diagnostic audiological assessments (93%; n=99) and hearing aid fittings (93%; n=99). Vestibular services (screening, diagnostics and rehabilitation) were less commonly provided at the time of completing the survey (37%; n=39).

Similarly, for the interviews (n=18), Gauteng held the highest representation (56%; n=10). Sixty one percent of the interview participants worked in private practice (n=11), 33% (n=6) in the public sector, and 11% (n=2) worked in both sectors. Of the participants who opted for the interviews, 50% (n=9) provided vestibular services (50%; n=9).

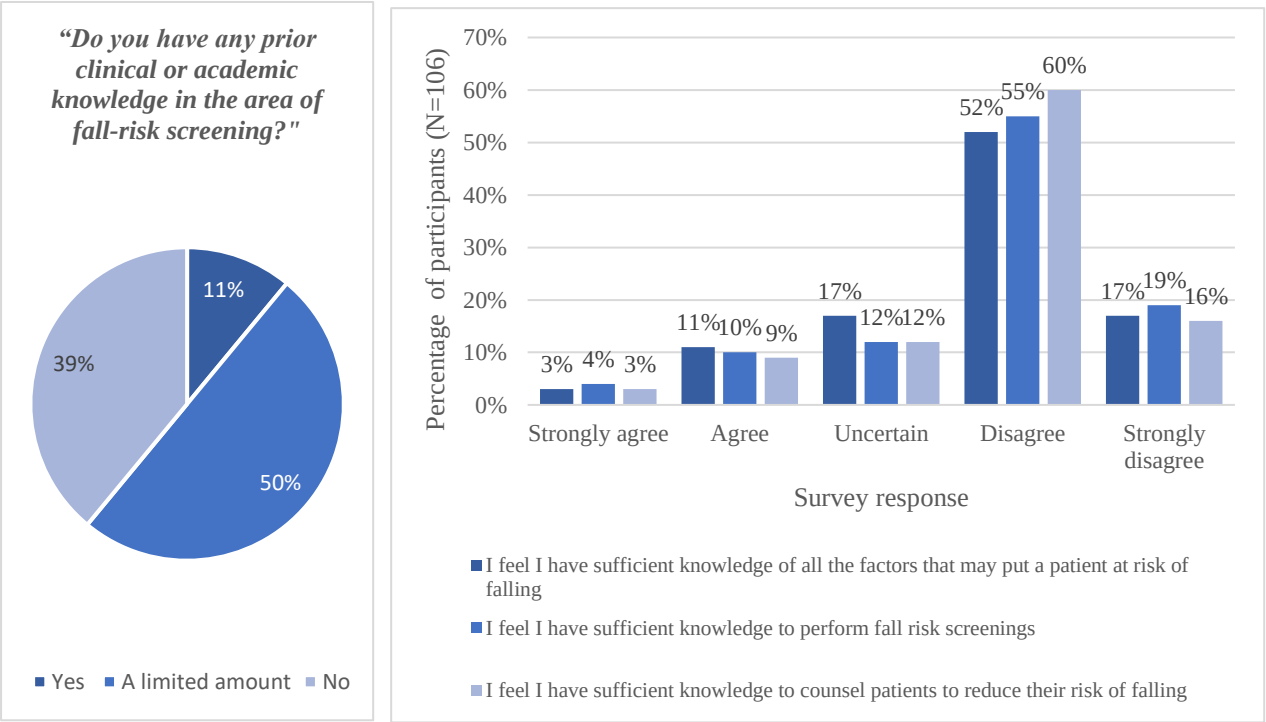
4.3 Online Survey and Virtual Interview Results

4.3.1 Objective C: To determine SA audiologists' perceived knowledge of FRS of older adults.

4.3.1.1 Perceived knowledge of FRS. The research firstly sought to identify what the participants perceived knowledge (see **Figure 4.1**) was in FRS of the elderly, because according to the KAB Framework, knowledge will also influence both views and practice in FRS.

Figure 4.1

Participants' Perceived Knowledge in FRS

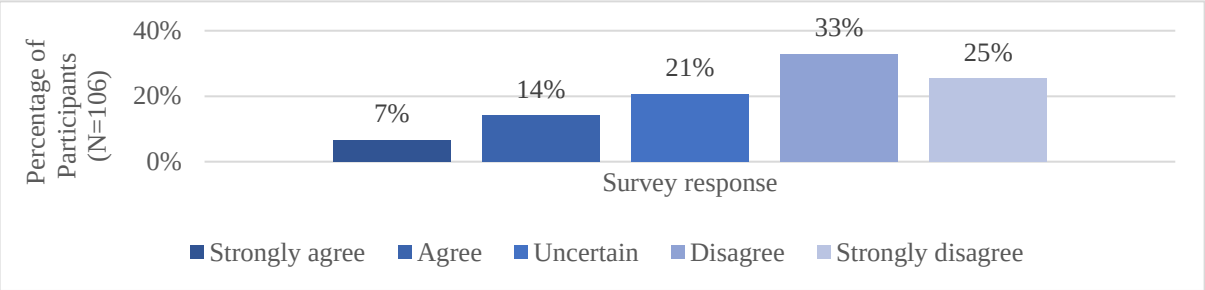


Only 11% of participants indicated that they had prior knowledge on FRS, with 50% indicating that they had a limited amount and 39% indicating that they had no prior knowledge (**Figure 4.1).** The majority of participants (69-74%) perceived their knowledge as insufficient to manage (identify, screen or counsel) older adults who are at risk of falling (see **Figure 4.1**). Upon further analysis, it was identified that 27% of participants who had insufficient knowledge to perform a fall risk screening were providing vestibular services in their clinics at the time of completing the survey.

4.3.1.2 Perceived knowledge sufficiency in the ICF framework to use it as a guideline for FRS. Participants were asked if they felt they had sufficient knowledge on the ICF to use it as a guideline for FRS (**Figure 4.2).**

Figure 4.2

Survey Response: "I feel I have sufficient knowledge on the ICF to use it as a guideline for FRS"



Only 21% of the participants perceived their knowledge of the ICF to be sufficient to use as a guide to screen for fall risk. Further analysis revealed that these participants seem to be more likely to be conducting FRSs with their patients, with a statistically significant p -value of 0.00927 and a Chi-squared statistic of 11.50985.

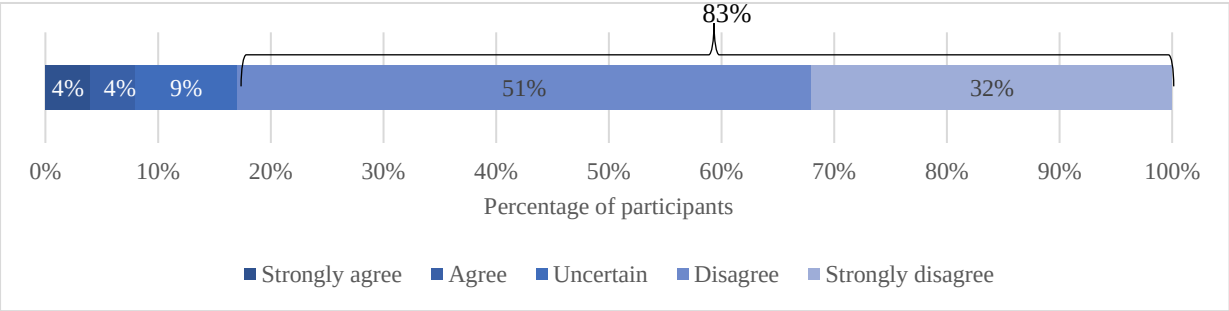
Seven interview participants indicated on their surveys that they agreed that they had sufficient knowledge in the ICF. When asked how they would incorporate the ICF framework into their approach if they were to screen for fall risk, five participants discussed how the ICF would help them view the patient 'holistically'. In keeping with this, 12 responses suggested that it would aid audiologists in being more aware of the patients' overall functioning and how their fall risk may limit their ADL and participation. Two participants also mentioned that incorporating the ICF would place more focus on improving the patients' overall QoL. In addition, three participants noted that in their opinion, the use of the ICF would lead to more MDT member referrals.

*(Additional exemplars of quotes supporting the above information can be found in **Appendix 18**.)*

4.3.1.3 Reported training in FRS. The survey further sought to identify how many participants viewed that audiologists are sufficiently trained to conduct FRS in the undergraduate curriculum (**Figure 4.3**).

Figure 4.3

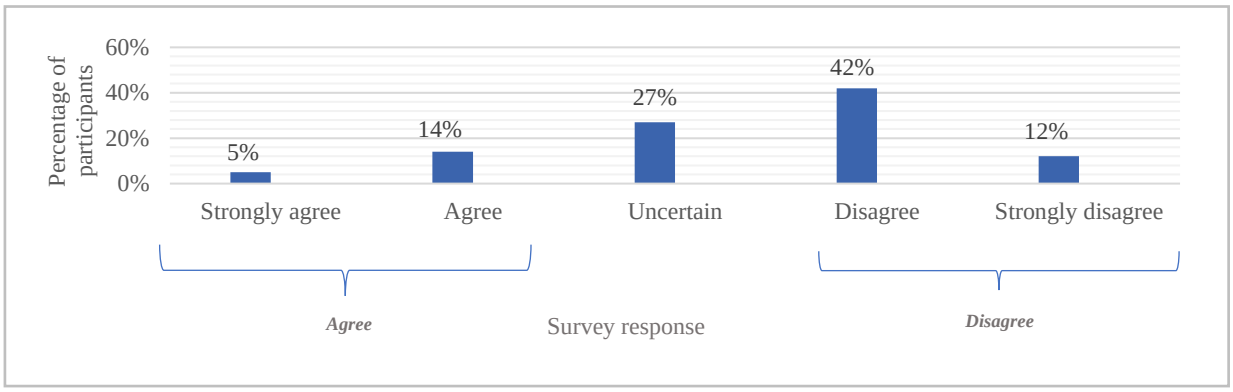
Survey Response: "Audiologists are sufficiently trained to conduct FRSs in undergraduate curricula" (N=106)



Furthermore, the survey aimed to gauge how many participants agreed that they had personally had the opportunity to learn about FRS during their undergraduate studies (**Figure 4.4**).

Figure 4.4

Survey Responses: "I have had the opportunity to learn about FRS through my undergraduate studies"



Overall, perceived knowledge (specifically in terms of training received) was limited. Only 19% of participants indicated that they personally had the opportunity to learn about FRS in their undergraduate studies (**Figure 4.4).** Less than 8% of participants indicated that they agreed that audiologists are *sufficiently* trained in FRS in undergraduate training (**Figure 4.3**). Notably, only one-third of participants who had the chance to learn about FRS during their undergraduate studies considered the training to be adequate. Several perceived reasons were identified in the interview

data as to why participants agreed that fall risk training was limited in the undergraduate curriculum. These reasons are presented in **Figure 4.5**

Figure 4.5

Reasons Why Participants Believed Fall Risk Training was Limited in their Undergraduate Curriculum (n=18)

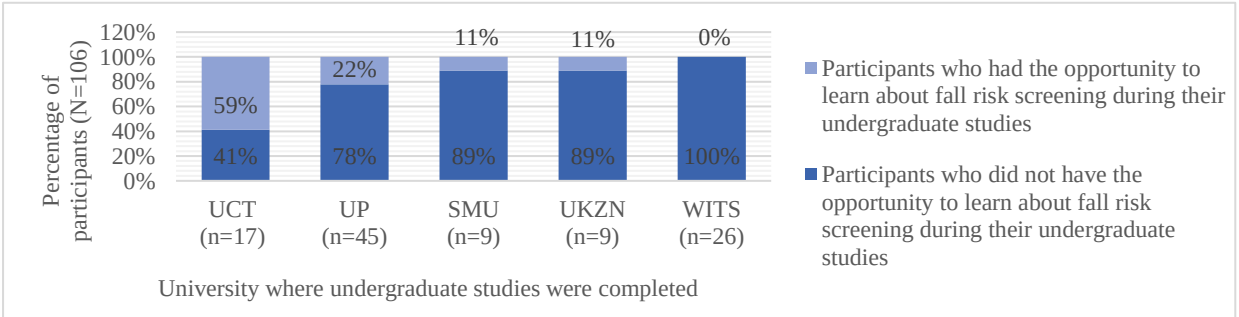
1. **Vestibular training is a relatively newer topic in the audiology field (n=3):** Audiologists who qualified several years ago would not have received training in the area of vestibular/balance assessments (let alone FRS specifically).
2. **Limited opportunities were provided to gain experience in FRS (n=2):** even participants who qualified in the last three years expressed that they felt that fall risk was a neglected area in their undergraduate studies. Two participants who did receive some level of training, reported that they received limited opportunities to practically gain experience in FRS. Reasons for limited experience with fall risk were provided by participants and were as follows:
   - **Focus of undergraduate curriculum (n=7):** Participants believed that the focus within undergraduate audiology curricula was firstly more on hearing than balance. Secondly, the primary focus of the balance training was on the assessment of the peripheral or central vestibular disorders, and not observing the patient's balance abilities holistically.
   - **FRS is associated with balance/vestibular patients(n=2):** If training was provided at an undergraduate level, FRS was primarily associated with balance/vestibular patients and not for the elderly patients within the hearing clinic setting. Therefore, if audiologists were not at vestibular clinic practical sites, it was not perceived as an area in which knowledge was required.
   - **Time limitations (n=3):** Participants articulated that the undergraduate curriculum was *"pushed for time"(P7),* particularly for those who were *"dually qualified" (P1).*
   - **FRS was not emphasised as being important (n=2):** Fall risk was not relayed as an important area of focus for the audiologist in their undergraduate training, diminishing its perceived value once the audiologists were qualified and practicing.
   - **Limited knowledge of educators at universities(n=4):** Participants reported that they believed educators at universities had limited knowledge and experience in FRS.

Participant statements supporting the points in **Figure 4.5** can be found in **Appendix 18**.

One of the perceived reasons why interview participants reported not receiving undergraduate training in fall risk was that vestibular training was not part of the curriculum in their years of studying. To further understand if participants' year and place of graduation influenced their perceived knowledge of FRS (**Figure 4.6**), correlational statistics were conducted.

Figure 4.6

Perceived Knowledge of FRS Related to University Attended

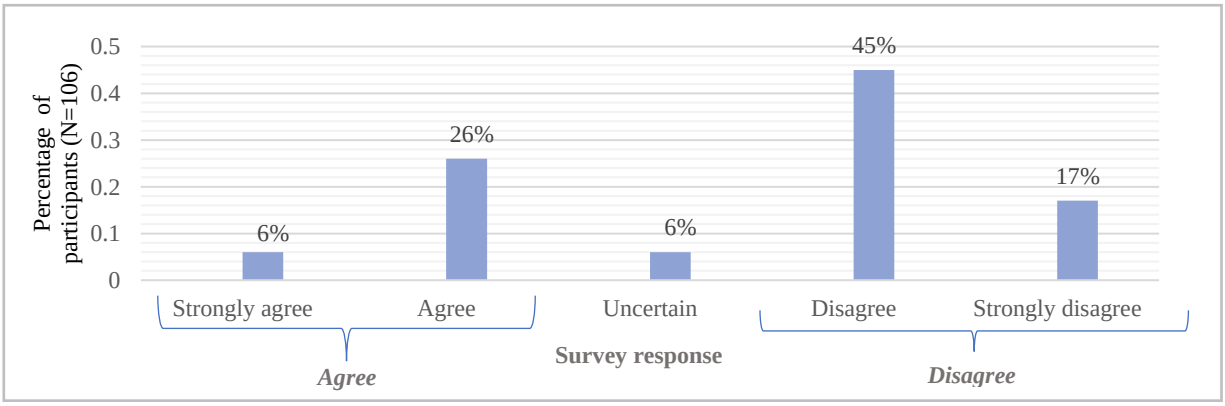


The survey results revealed that a significant p-value (p= 0.01996; Chi-squared statistic= 11.67264) existed between fall risk opportunities and the university the participant graduated from (see **Figure 4.6).** Results suggested that UCT and UP graduates were more likely to have received opportunities to learn about FRS. Results should however be interpreted with caution due to there being an unequal number of participants representing each university, which may have skewed the results. The Kruskal-Wallis Chi-Squared Test confirmed higher perceived FRS knowledge levels in those who graduated during the past decade versus those that graduated earlier, with a statistical significance of p=0.00013 and a Chi-squared statistic of 23.00339.

In comparison to undergraduate training, more participants had the opportunity to learn about FRS after they had graduated (see **Figure 4.7**).

Figure 4.7

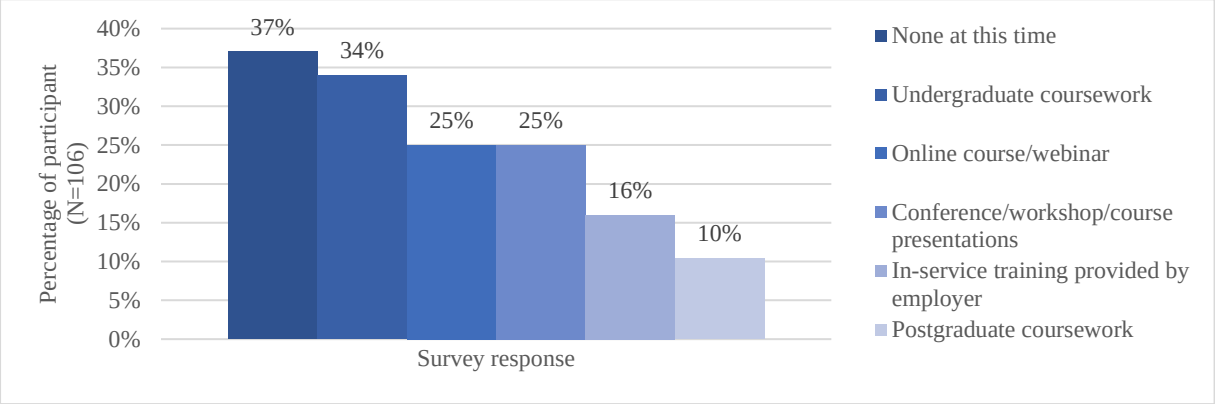
Survey Responses: "I have had the opportunity to learn about FRS in postgraduate courses or through self-study"



Thirty two percent of participants indicate that they had the opportunity to learn about FRS in postgraduate courses or through self-study (**Figure 4.7**). The types of learning opportunities that participants reported can be viewed in **Figure 4.8,** with the most common postgraduate opportunities reported by the participants being online courses/webinars (25%) and conferences/workshops/courses (24%)**.**

Figure 4.8

Survey Response: "Please indicate any professional preparation that focused on FRS (multiple answers may be selected)"

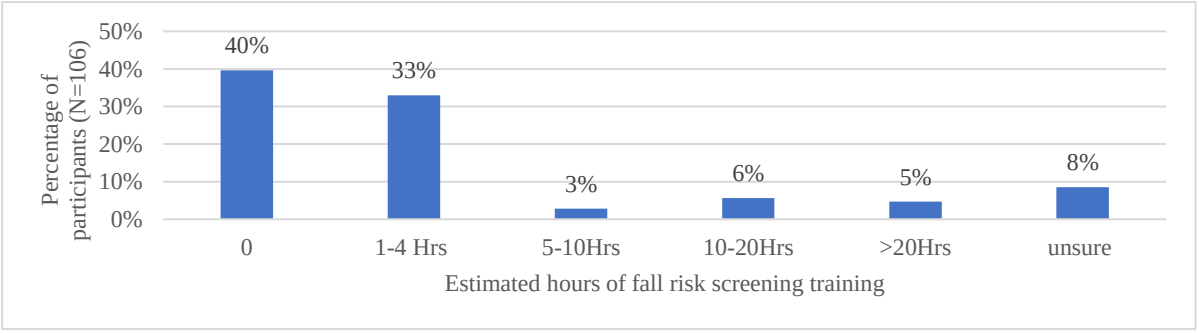


In relation to **Figure 4.8**, a discrepancy was noted in relation to **Figure 4.2.** In **Figure 4.2**, only 19% of participants reported having the opportunity to learn about FRS in their undergraduate studies. In **Figure 4.8**, however, 34% of participants indicated having the opportunity to learn about FRS in their undergraduate studies. This discrepancy will be further explored in the discussion.

Once it was established if the participants had received undergraduate or postgraduate training opportunities, participants were asked to estimate the summated time they had spent learning about FRS (**Figure 4.9**).

Figure 4.9

Survey Response: Total estimated number of training hours received in FRS pre- and postgraduation



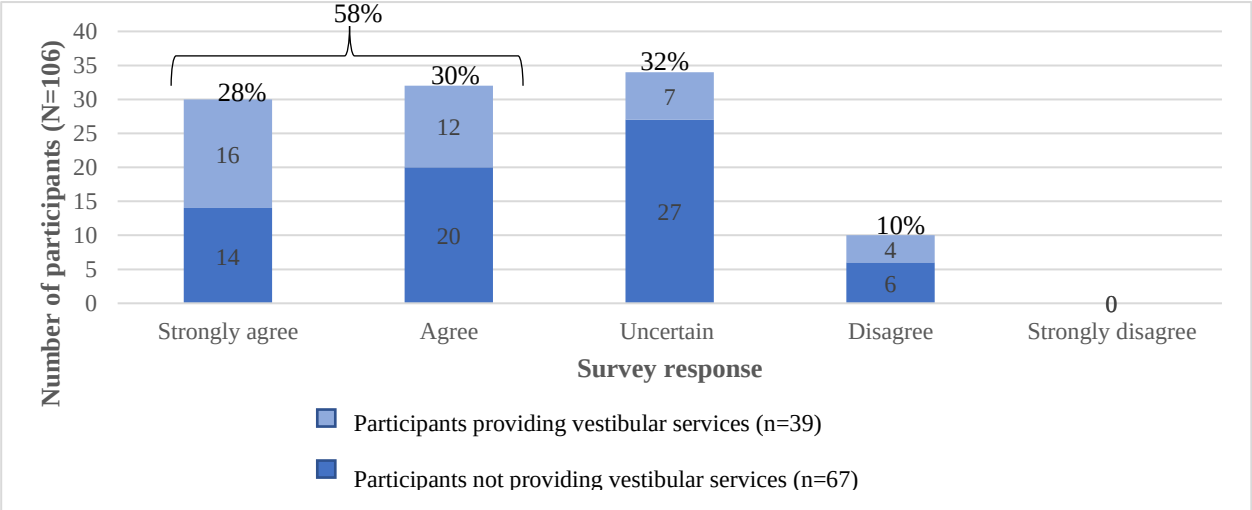
Of the participants who had received some level of training in FRS, 33% estimated that their summated pre- and post-graduation or self-training opportunities had been between 1-4 hours. Overall, 47% of participants indicated that they had been exposed to one hour or more of under- or postgraduate training opportunities in FRS.

4.3.2 Objective D: To describe SA audiologists' reported views on FRS of the older adult population.

4.3.2.1 Agreement: Views on the scope of the audiologist and their perceived role in FRS. When exploring what participants' views were on FRS, it was firstly important to establish if they viewed it to be within their scope of practice as it is not clearly defined in documentation provided by HPCSA. Secondly, the data was used to compare the views of participants (regarding FRS and the audiologist's scope of practice) providing balance and/or vestibular services to those who are not providing balance and/or vestibular services (See **Figure 4.10**).

Figure 4.10

Survey Response: "FRS (to identify fall risk factors) is part of the audiologist's scope of practice" (N=106)



More than half of the participants (58%) voiced that in their opinion FRS formed part of the audiologist's scope of practice. Only a small percentage (10%) indicated that they

perceived FRS as outside of the audiologist's scope of practice. Further calculations revealed that 72% of participants *providing* vestibular services agreed fall risk was within the audiologist's scope and 52% of participants *not providing* vestibular services agreed fall risk was within their scope. Participants not offering vestibular services were observed to be more likely to be 'uncertain' as to whether FRS was within the scope of the audiologist.

The interview data provided insight as to why participants viewed FRS to be within the scope of the audiologist or not. **Table 4.2** provides a summary of these findings.

Table 4.2

Reasons Why Participants Viewed FRS to be within the Scope of the Audiologist or Not

FRS is within the audiologist's scope	**Uncertain/disagree that FRS is not within the audiologist's scope**
a) Audiologists are trained in vestibular testing and thus have a good understanding of the pathophysiology behind dizziness descriptors (n=16)	a) FRS may not be viewed to be within the audiologist's scope of practice by other MDT members (n=5, P6)
b) Elderly audiology patients have a higher fall risk and work closely with the elderly (n=9)	b) It was not something that was taught or emphasised in graduate studies (n=1, P8)
c) FRS is an important ethical duty. Audiologists have a responsibility to promote QoL and holistic health for patients and prevent the harmful consequences a fall can have on their patients QoL (n=5)	c) Audiologists not practicing in vestibular audiology, may not have the expertise to screen and manage fall risk patients (n=1, P5)
d) By definition fall risk 'screening' is quick and simple and acts as a preventative measure which could in actual fact be conducted by all HCPs working with the elderly (n=4)	d) Fall risk is not a topic which is commonly discussed in professional audiology circles (n=1, P3)
e) Audiologists are well positioned and are thus an ideal profession to address fall risk, primarily because of how often audiologists come into contact with the elderly (n=4)	e) Uncertainty was raised as to whether screening for 'non-vestibular' risk-factors was within the audiologists' scope (n=1, P12)
f) Prevention of falls also subsequently decreases the burden of falls on the healthcare system (n=1, P6)	f) Audiologists should not be the first line of defence (n=1, P18)
	g) Elderly adults are expected to struggle with their balance as they age. Typical elderly adults are usually '*fine'* (n=1, P18).

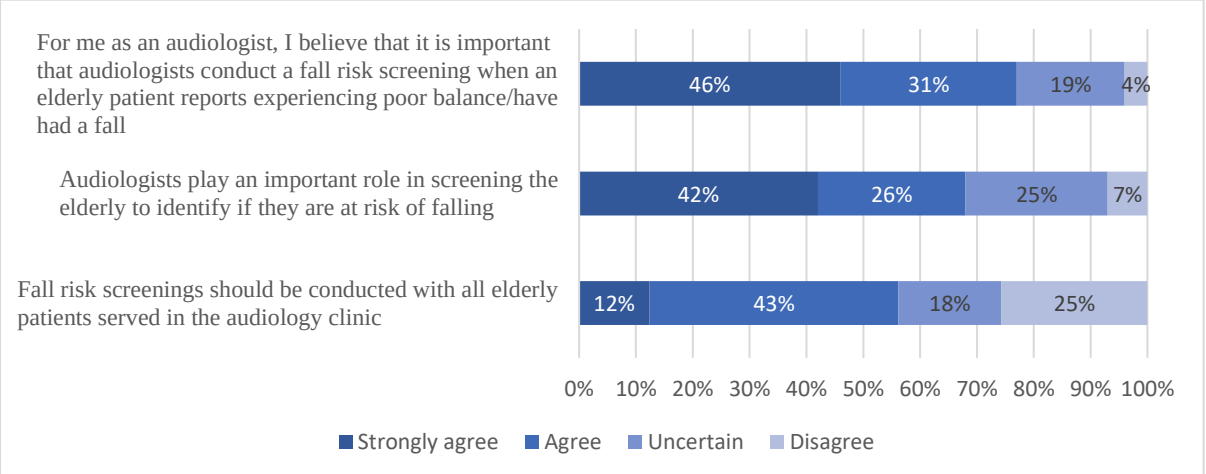
Refer to supporting participant quote exemplars in Appendix 18

As depicted in **Table 4.2**, participants in agreement that FRS was within the audiologist's scope of practice advocated for it by stating that audiologists have an ethical duty to play a role in fall risk due to their knowledge in balance and their interaction with at-risk elderly individuals. Participants particularly highlighted the positive impact of reducing fall risk on firstly a patient's QoL, and secondly on lowering the burden of fall consequences on the healthcare system. The positive benefit of FRS on patient's QoL coupled with the limited time needed to screen for fall risk, underscore the value of audiologists performing FRSs. Participants who expressed uncertainty towards FRS being within the audiologist's scope explained that the lack of training in vestibular assessment and FRS contributed to their view. Participants also expressed uncertainty as to whether screening for factors that were not related to the 'vestibular system' was within their scope of practice: *"if I don't think there's a 'balance balance' problem, you know, like a balance disorder that we treat in the vestib clinic, then I don't check for risk of falling because I kind of don't see it as in my scope." (P6).* Lastly, limited awareness amongst audiologists and MDT members of the audiologist's role in FRS also contributed to uncertainty regarding fall risk being within the audiologist's scope of practice.

If FRS were to be part of the audiologist's scope of practice, it was important to identify whether participants perceived they had a role to play in FRS. The results are presented in **Figure 4.11.**

Figure 4.11

Survey Participants' Views on the Audiologist's Role in FRS (N=106)



Seventy-seven percent of the survey participants agreed that it was important that the consulting audiologist conduct a FRS if an older adult reported imbalance. Furthermore, 68% agreed that audiologists to play an important role in FRS. Less participants (55%) however agreed that it would be important for FRSs to be conducted with all older adult patients served in the audiology clinic (See **Figure 4.11**).

Eight of the eighteen interview participants indicated that, in the survey they agreed audiologists had an important role to play. They were asked to specify what they perceived the audiologist's roles to be in FRS. Additionally, the full data set was carefully reviewed to identify if participants (n=18) made mention of the audiologist's perceived role elsewhere in the transcript. The full summary of all the possible roles participants mentioned can be found in **Appendix 18**, however, a summary of the three most commonly mentioned roles can be viewed in **Table 4.3** below:

Table 4.3

Interview Participants' Views on what the Role of the Audiologist would be in with Fall Risk Patients (n=18)

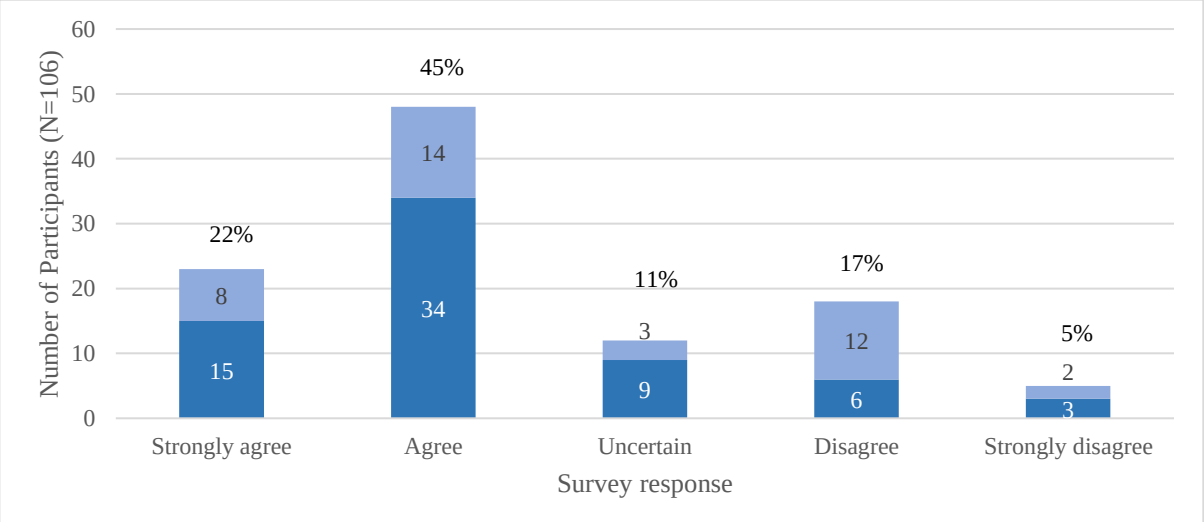
Audiologist's roles	n=18	Quote exemplars
• ***Preventative role***	**9**	• *"I think we certainly got a role in terms of prevention and promotion" (P2).* • *"I think the main thing is that nobody like slips through the system. And I think preventative. Yeah, and any healthcare professional can actually play a role in a preventive form." (P6)*
• ***Identifying fall risk (screening)***	***9***	• *"Our role is literally to say, you know, identify how at risk this person is. I think it's as easy as that." (P14)* • *"I do think we could be able to identify risks. Based on our knowledge of the patient. (P11)*
• ***Making referrals***	**11**	• *"I believe our role would then specifically be to refer" (P1)* • *"To define or to understand what that patient is describing, and to make decisions about does this patient require a referral."(P3)* • *"We need to be working well with our other team members I think we need to be working really well with physios and OTS" (P2)*
		See complete table (including all possible roles participants mentioned) in Appendix 18

The majority of the interview participants (n=11) suggested that audiologists had a role to play in making appropriate referrals once fall risk had been identified, prevention of falls (n=9) and the identification of fall risk (screening) (n=9).

It was further important to establish if the participants perceived their role in FRS to be the responsibility of all audiologists or just those who are offering vestibular services (**Figures 4.12**).

Figure 4.12

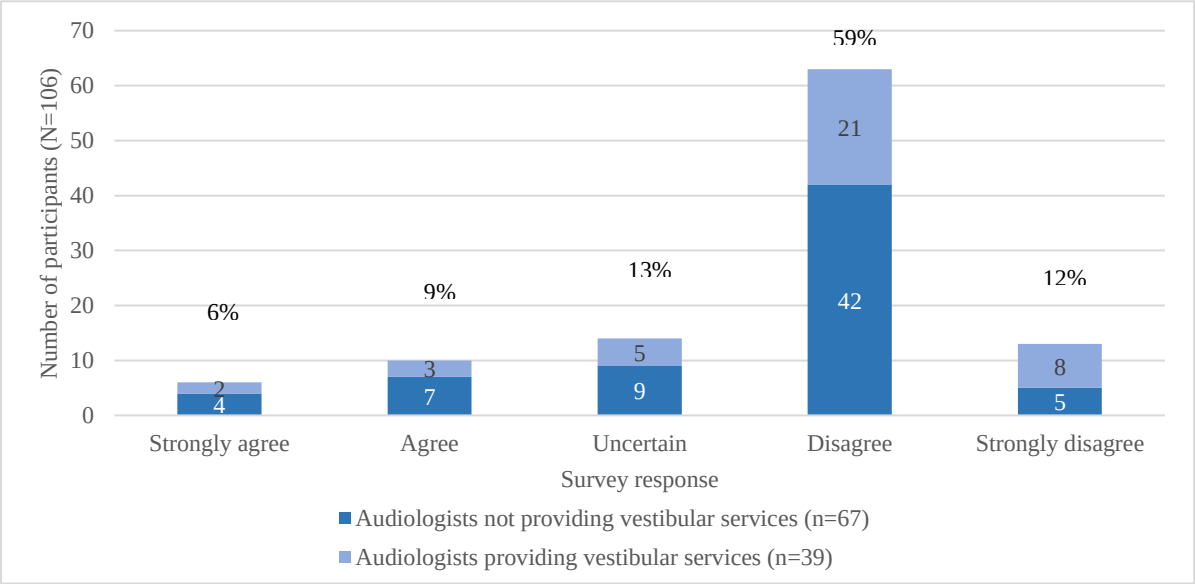
Survey Question: "FRS services should be more prevalent in the vestibular/ balance disorder clinical setting compared to the "general" audiology clinical setting"



The survey revealed that 67% of participants (both those providing vestibular services and those who are not) predominantly perceived that FRS should be more prevalent in a vestibular setting (as compared to the "general" hearing clinic) (**Figure 4.12**).Participants however also indicated that FRS should not *only* be conducted by audiologists practicing in vestibular audiology (**Figure 4.13).**

Figure 4.13

Survey Question: "FRS should ONLY be conducted by audiologists practicing in vestibular audiology"



As can be viewed in **Figure 4.13,** 71% of participants indicated that FRS should not *only* be conducted by audiologists practicing in vestibular audiology.

Interview participants who believed FRS should be more prevalent in the vestibular clinic (n=10/18), reasoned that firstly, vestibular audiologists are *"more qualified and equipped and competent to address it" (P9)*, secondly "*because people who experience balance disorders- or who are experiencing dizziness, are obviously more at risk of falling" (P6).* Lastly, it was expressed that *"it's just not feasible" (P18) within* the hearing clinic setting because time with each patient is limited. The interview data also provided further explanation as to why most participants in the survey may have indicated that they did not think FRS should

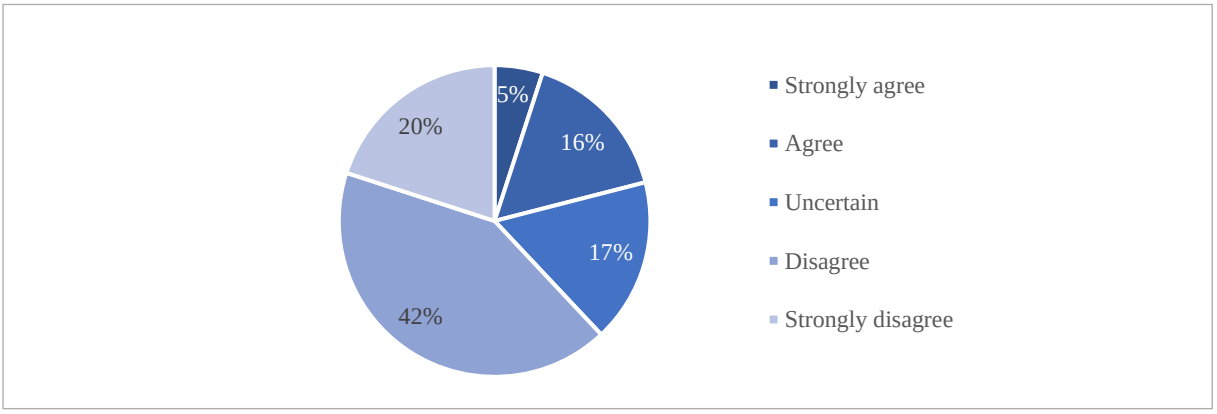
only be done by audiologists practicing in vestibular audiology. One interview participant mentioned: *"hearing loss is an independent risk factor for falls, and so therefore if you are in an audiology clinic, you need to actually be thinking about it (P2)".* Others pointed out that FRS within the vestibular clinic holds very little value in prevention- because if a patient has been referred to a vestibular audiologist, their risk for falls has already been identified or impacted their life (P3 & P7). Another explained: *"we should all be doing it. It's not precious. It's not complicated. It's something that everybody should be doing not only people who are specifically trained in vestibular" (P1).*

(Additional exemplars of quotes supporting the above information can be found in ***Appendix 18****.)*

4.3.2.2 Perceived self-efficacy: Comfort in performing FRS. Considering that 68% of the participants believed audiologists had a role to play in FRS, it was important to identify how comfortable they would feel in taking up this role (**Figure 4.14)**

Figure 4.14

Survey Response: "I feel comfortable identifying someone with fall risk" (N=106)



The survey revealed that only 21% of survey participants agreed that they would feel comfortable in identifying (viewed the same as 'screening' in this study) someone as being 'at-risk of falling' (**Figure 4.14**). The Kruskal-Wallis Chi-Squared test was used to identify if the

participants' level of comfort was influenced by their reported opportunities to learn about FRS. Results revealed that having received undergraduate training opportunities did not significantly influence comfort in conducting FRS at the 5% level (P= 0.08885; Chi-squared statistic= 6.52077).

Interview participants who indicated that they were comfortable to identify someone with fall risk in the survey (n=8), were asked to identify factors leading to this choice. Conversely, those who were uncomfortable or uncertain were asked what they would need to feel more comfortable in identifying a patient as being at risk of falling (n= 10). A summary of all the responses provided is displayed in **Figure 4.15.**

Figure 4.15

Interview Participants: Reasons Audiologists are Comfortable with FRS versus what Audiologists would Need to Feel more Comfortable in FRS



From **Figure 4.15** it was recognised that more training opportunities (both provided and self-sought) aided participants in feeling more comfortable with FRS. Correspondingly, the participants who were uncomfortable or uncertain about FRS described that they would need more training, information, experience and resources to feel comfortable in identifying someone as being at risk of falling. Moreover, it appeared that practicing in vestibular

audiology aided participants in feeling more comfortable with FRS. Similarly, four participants were observed to correlate their discomfort with vestibular testing to their discomfort with FRS- with one audiologist stating: *"I wouldn't be at all comfortable with the vestibular patient, let alone doing a further screening"(P5)* and another: *"Like I'm not vestibular trained… I just think it's out of my comfort zone and something that's unfamiliar and new." (P11)*

(Additional exemplars of quotes supporting the above information can be found in ***Appendix 18****.)*

4.3.2.3 Motivation: Interest to learn and perceived importance of FRS.

The survey further aimed to gauge how many participants would be interested in learning more about FRS (**Figure 4.16**) and how many perceived FRS to be important in addressing the needs of our aging population (**Figure 4.17).**

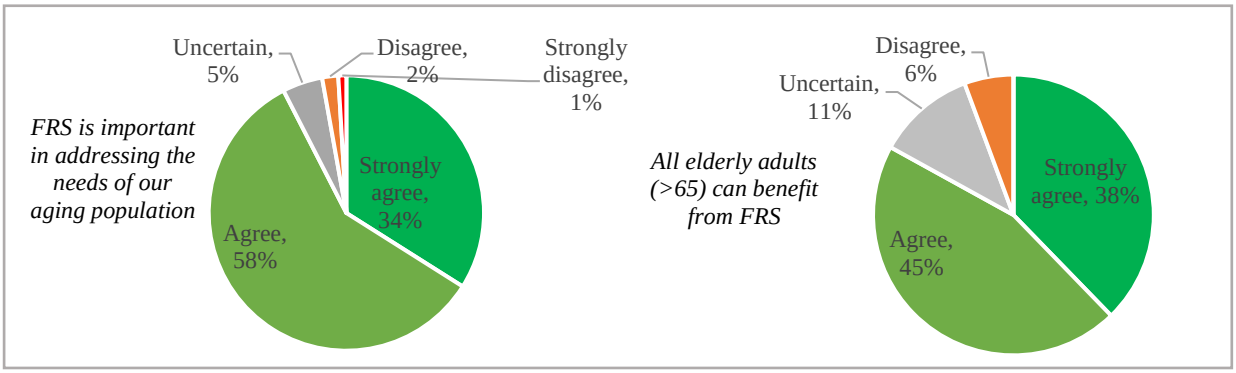
Figure 4.16

Participant's Interest to Learn More about FRS (N=106)



Figure 4.17

Participant's Perceived Importance of FRS (N=106)



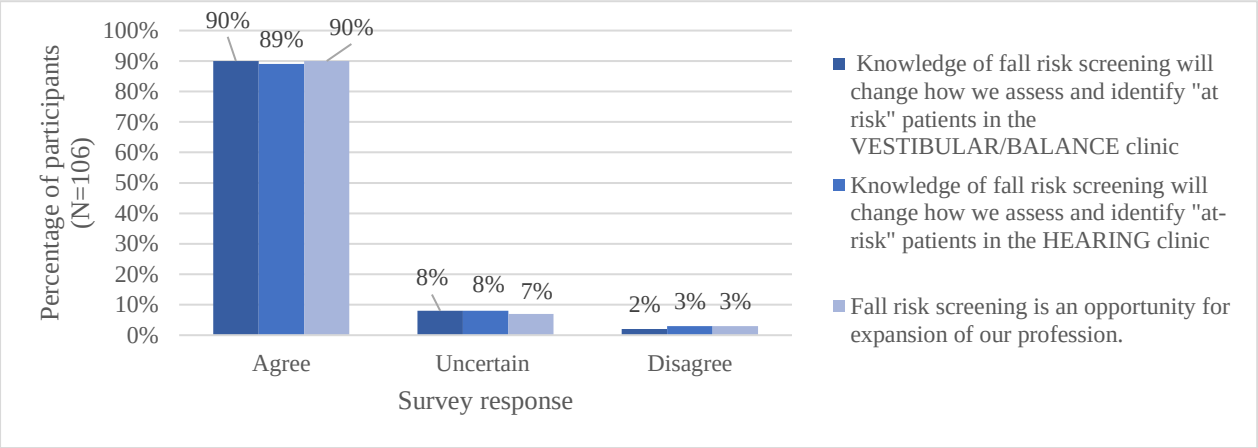
Almost all (98%) of the participants indicated that they were interested in learning more about how to support elderly patients who are at risk of falling and 96% agreed that learning new ways to administer FRS would be helpful to them (see **Figure 4.16**). Participants (92%) further indicated that they believed FRSs were important in addressing the needs of our aging population and 83% perceived that all elderly adults could benefit from FRS (**Figure 4.17).** More specifically, the survey revealed that participants agreed that the benefits of FRS would include decreasing the number of individuals who may experience a falling event (90%) and minimising any associated, negative consequences a fall may have on a patients' life (82%). Additionally, the perceived importance of FRS was further highlighted with 95% of participants agreeing that it may have a significant impact on their patients' future QoL.

4.3.2.4 Outcome expectancy: views on potential changes to clinical practice and future directions of FRS within audiology.

The majority of participants (89%) agreed that if audiologists had knowledge of FRS, it would change how 'at- risk' patients are identified and assessed in the both the hearing and vestibular clinic environments. These changes appeared to be viewed positively, as 90% of participants also believed that FRS implementation may offer opportunity for expansion of the audiology profession (see **Figure 4.18**).

Figure 4.18

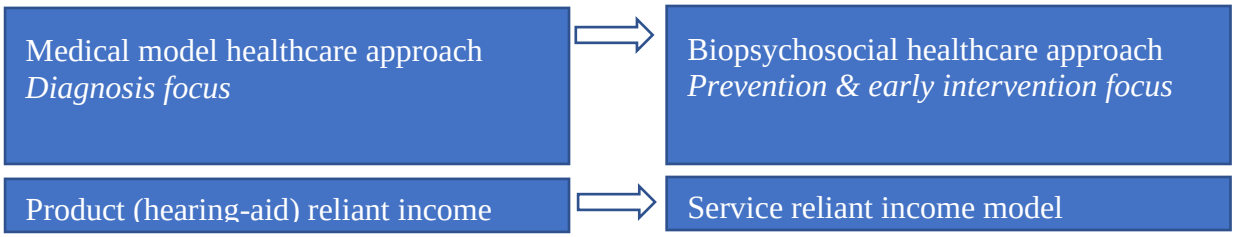
Survey Participants' Views on if FRS Would Change Clinical Practice and if FRS Offers an Opportunity for the Expansion of the Audiology Profession



Sixteen interview participants appeared to view the above discussed changes to practice as an opportunity for the expansion of the audiology profession. The interview sought to identify how participants believed the knowledge of FRS could change and expand clinical practice. Participants' responses highlighted two main shifts that may occur in practice if audiologists were knowledgeable in FRS (See **Figure 4.19**).

Figure 4.19

Interview Participants' Views on how the Knowledge of FRS may Change Clinical Practice



Participants believed that adding FRS as an additional service would allow audiologists to inhabit a more holistic and person-centred (biopsychosocial) healthcare approach. (n=6). In doing so, participants viewed that FRS knowledge may strengthen audiologists' clinical focus on prevention and early intervention of falls in both the hearing and vestibular clinic settings (n=6), as opposed to the strong diagnostic focus audiologists often have. Three participants

also mentioned that the inclusion of FRS may help shift their reliance on the sales of hearing aid devices, to relying more on providing services to sustain income and business.

Participants discussed that FRS could be an opportunity for expansion for the profession because it may be a simple way to incorporate balance into practice, even if an audiologist did not offer diagnostic vestibular testing (n=7). Adding this aspect to initial hearing evaluations may be beneficial for the profession of audiology. More specifically, the incorporation of FRS could generate more MDT collaboration and generate earlier and more referrals into the audiology clinic.

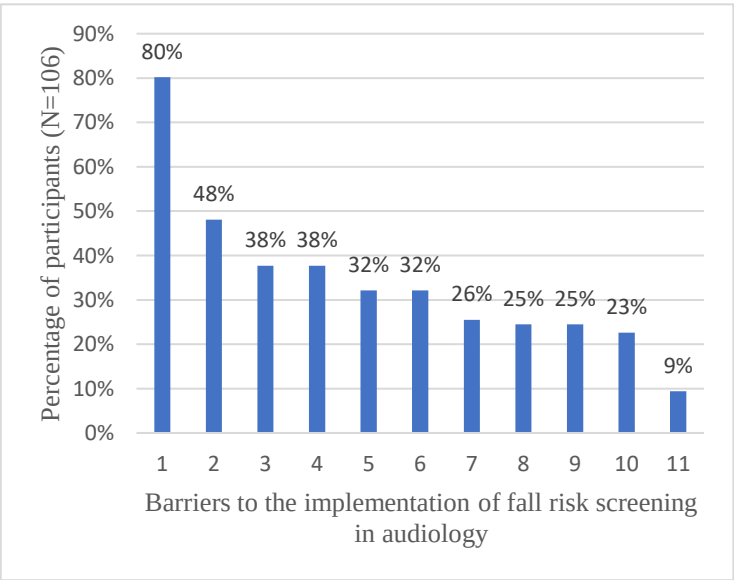
*(Additional exemplars of quotes supporting the above information can be found in **Appendix 18**.)*

4.3.2.5 Perceived barriers: Views on the barriers to implementing FRS clinically.

Although the potential for FRS to expand the audiology profession appeared to be recognised by the majority of participants (90%) (4.3.3.4), several perceived barriers to the implementation of FRS in clinical practice were reported (**See Figure 4.20**).

Figure 4.20

Survey: FRS Implementation Barriers for Audiologists (N=106)



Key:

1 Additional training needed.
2 Limited time with each patient- the workload may be too demanding
3 Collaboration and planning with other professionals are necessary
4 Uncomfortable with balance or vestibular testing,
5 Don't believe it would be challenging
6 Additional resources would be needed, which could be costly
7 There is minimal remuneration for FRS
8 Not knowing who to refer to if risk factors out of the audiologist's scope of practice are identified
9 Not connected with medical professionals who could treat the patient with me as part of an MDT approach
10 Not enough research defining a sensitive screening protocol which audiologists can use routinely
11 It does not fall within the scope of the audiologist

The most commonly perceived barrier reported by participants was audiologists' need for additional training (80%). This correlated with an earlier finding whereby participants reported that their training on FRS had been limited (section:4.3.2.2). Concerns regarding time-constraints and workload were the next most commonly reported barrier (48%). Participants also indicated that they believed that collaboration and planning with other professionals could be challenging (38%). Again in this section, participants associated FRS with vestibular practice competency, where 38% of participants indicated that they were not comfortable with balance or vestibular testing and would therefore not feel comfortable with FRS (38%). Notably, several participants [17/67 (25%) non-vestibular and 17/39 (44%) vestibular audiologists] believed that FRS would not be challenging to implement.

Additional barriers were also mentioned within the interview. The barriers which had not already been identified in the surveys are documented in **Table 4.4.**

Table 4.4

Interview Analysis: Additional Possible Barriers to the Implementation of FRS

1.	**Resistance to learn, change and take on additional responsibilities**	-	*"The last thing is the desire to actually want to do it...we are content about what we actually came out with at undergraduate, and we go like I'm doing something, and we stop there. So, wanting to grow. The desire to grow your own profession or your own skills is, I feel like it's a factor on a lot of audiologists because you can talk about vestibular, they won't show any interest in it and ya" (P17)*
		-	*"Other audiologists who don't have the privilege to expand their own knowledge, they just sit with what they have, and our profession doesn't grow with that, we will stay here as hearing therapists"(P17)*
		-	*"I think we got a long way to go before it's even accepted by the audiology profession never mind expanding it." (P2)*
		-	*"I think changing clinical practice is often an uphill battle" (P2)*
2.	**Conformity: audiologists will only do it if the majority seem to be doing it. (Group compliance)**	-	*"Because that's the thing I mean if you didn't see that it's something that a lot of people are doing. Then, you know, why would I do it you know, why would I be the only one that will waste a bit more time doing it if no one else is doing it? you know, but if you know that more people in the profession are doing it then that changes that."(P12)*
3.	**Audiologists don't always accept responsibility for their full scope of practice**	-	*"You are an audiologist you should be competent in everything. But audiologist pick and choose what they do, so now doing something is seen as additional work on top of what they have. So, I think it's a thing of 'there are people who are interested in that. So, I would rather send or leave that for them" (P18)*

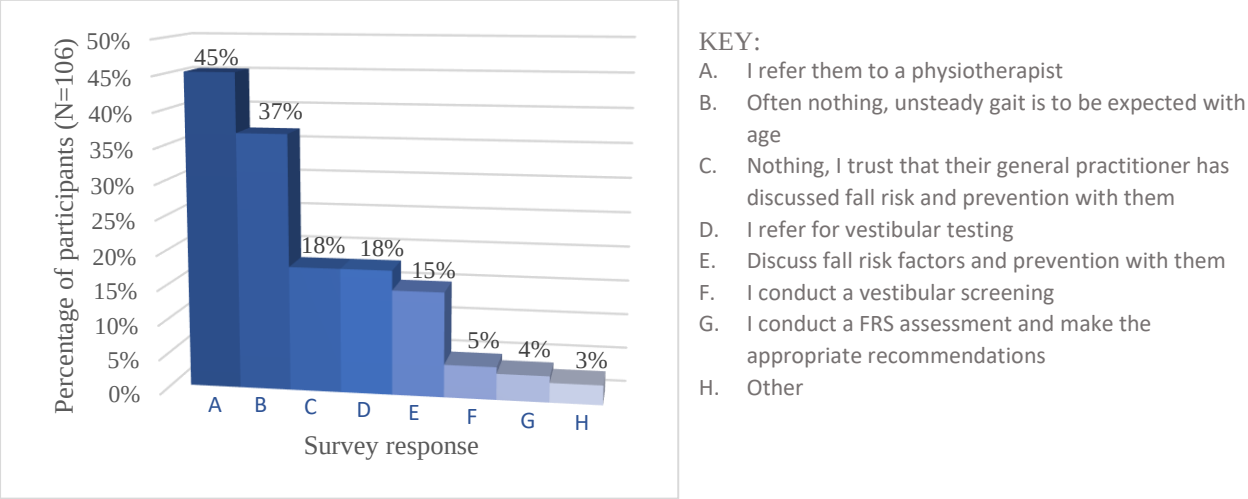
Table 4.4 highlights that there may be resistance to learning and taking on newer areas introduced within the profession of audiology. Additionally, one participant discussed how they believed that audiologists do not embrace nor accept responsibility for the vestibular aspect of the profession.

4.3.3 Objective E: To describe SA audiologist's reported practice in FRS of the older adult population

4.3.3.1 FRS: reported implementation and clinical experience. Participants were asked regarding their current practice when noticing an elderly patient with unsteady gait (**Figure 4.21**).

Figure 4.21

Actions Participants Currently take when they Notice their Patient has an Unsteady Gait



Several participants (45%) revealed that they would refer the patient to a physiotherapist, whereas, 55% indicated that they often do nothing because unsteady gait is to be expected with age or they trust that the patient's GP has discussed fall risk and prevention with them (See **Figure 4.21**). The responses revealed that FRS was the least likely action participants would take when they noticed their patient's gait was unsteady with only 4% indicating they would conduct a FRS.

Participants were further asked to indicate what their experience in FRS was (**Figure 4.22**) and if they are presently conducting FRSs with older adults (**Figure 4.23).**

Figure 4.22

Participants Reported Clinical Experience of FRS

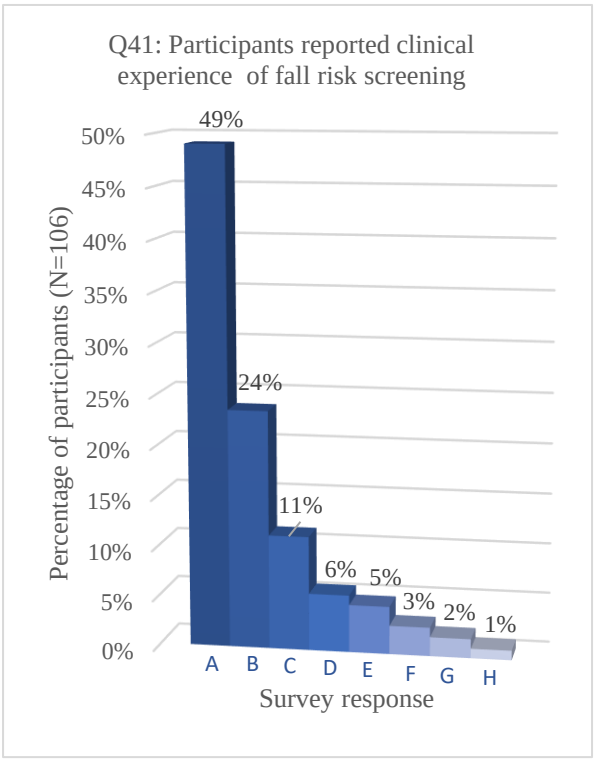
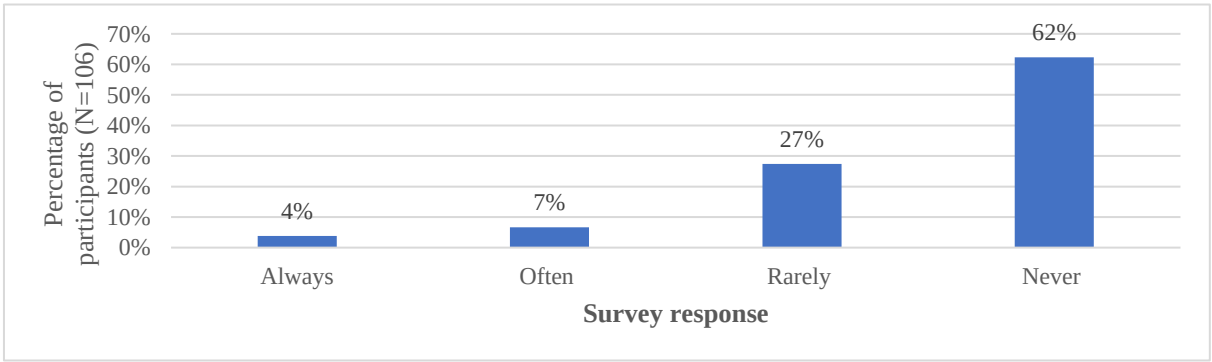


Figure 4.23

Participants response to whether they conduct formal or informal fall risk screenings on patients 65 years or older



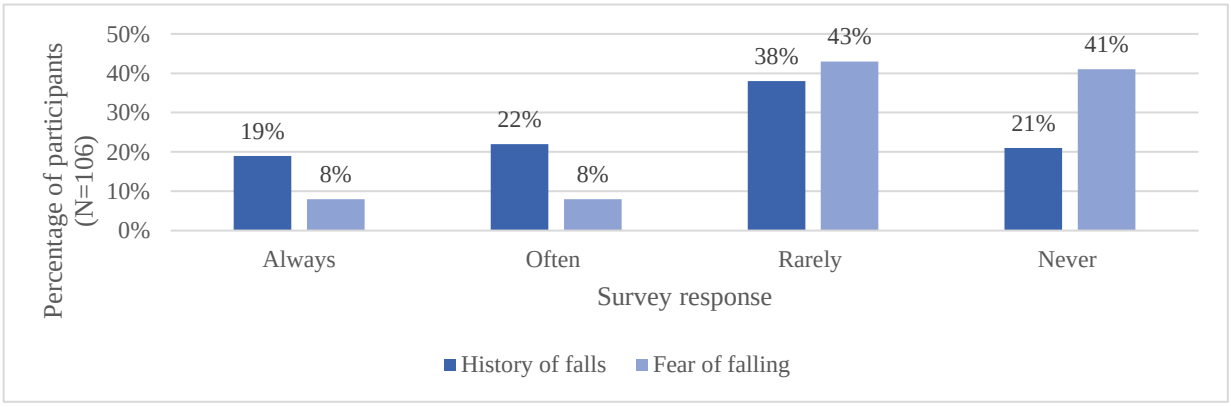
A discrepancy was noted between responses in **Figure 4.22** and **Figure 4.23** in terms of the number of participants who indicated that they conduct FRSs. Whilst only 6% indicated implementing FRS in practice in **Figure 4.22**, 11% of participants later stated that they often or always conduct FRSs (**Figure 4.23**). An important observation was that all of the participants who indicated that they are conducting FRSs in **Figure 4.22** and **4.23** were also providing vestibular services clinically.

Just under half of the participants (49%, n=51/106) indicated that they had heard of FRS but were still not confident to implement it without further training (see **Figure 4.22)**. An additional 24% specified that they had never heard of or thought about conducting FRS as an audiologist (see **Figure 4.22)**. As expected, the Kruskal-Wallis test revealed that those who had never heard of FRS as part of the audiologists' role were less likely to view FRS as being within the audiologist's scope of practice, with a statistical significance of p=0.0000175.

4.3.3.2 Participant reported FRS tools. In its simplest form, FRS could involve asking a few additional questions during the case history interview. Participants were thus asked if they inquire about their elderly patient's history of falls and fear of falling (**Figure 4.24**).

Figure 4.24

Inclusion of Falls History or Fear of Falling in Case History



Fifty nine percent of participants indicated that they never or rarely ask about history of falls and 83% indicated that they never or rarely ask about fear of falling in their case history session with elderly patients.

The participants who stated that they always, often or rarely conduct FRSs in Question 42 (**Figure 4.23**) were given the opportunity to disclose which tools they would use when choosing to conduct a FRS (n=40). To view the full list of FRS tools options participants indicated they would use in the survey, see **Appendix 18**. The tools the participants most commonly selected from this list can be viewed in **Table 4.5.**

Table 4.5:

Tools Participants (n=40) Stated they would use when Conducting a FRS with Elderly Adults

	FRS tools	**n=40**	**%**
1.	Case history	33	82.5
2.	Observation of patient's gait and steadiness	22	
	History of falls or fear of falling	22	55
	Presence of dizziness/imbalance	22	
3.	Dizziness Handicap inventory (DHI)	16	40
4.	Fukuda stepping test	13	33
	Benign Paroxysmal Positional Vertigo (BPPV) assessment	13	
5.	Family member interviews about falls	11	28
	Gait assessment	11	
6.	Modified Clinical test of Sensory Integration on Balance (mCTSIB)	10	25
	Dynamic Visual Acuity (DVA)	10	
7.	Videonystagmography/Electronystagmography (VNG/ENG)	9	22
8.	Timed Up and Go (TUG)	8	
	Dynamic Gait Index (DGI)	8	
	Hearing Handicap Inventory for the Elderly (HHIE)	8	20
	Vestibular Evoked Myogenic Potentials (VEMPS)	8	
	Gaze Stabilization Testing (GST)	8	
9.	Questions about inactivity	7	18
	Caloric	7	
10.	Use of ambulatory device	5	
	30 second sit-to-stand	5	13
	Video Head Impulse Test (vHIT)	5	
	Vision screening	5	

Note: All other FRS tool options were selected by less than 12.5% of participants
Percentages do not add up to 100% because participants selected multiple tools

As can be viewed in **Table 4.5**, 82.5% of participants indicated that they would use case history to identify fall risk factors. Highlighting earlier findings, it is significant to note that only 14% of participants expressed a sense of sufficient knowledge regarding the factors that contribute to the risk of falling among older adults. Therefore it is uncertain as to what

factors participants were considering to be risk factors within the collected case history. Additionally, more than 50% of participants would use observation of patient's gait and steadiness and questions about history of falls, fear of falling and presence of dizziness/imbalance in their FRS protocol.

If interview participants indicated that they conducted FRSs, they were asked about what informed their decision to include or exclude FRS tools in their FRS protocols. One participant explained that their protocol was dictated by what they knew and were comfortable with or what they were familiar with (from reading about it in literature or learning about it at courses). Four participants stated that their choice of tools is often guided by the details obtained within the case history session or from completed self-reported measures. Other participants further indicated that their choice of FRS tools was reliant on time, space, equipment available and the sensitivity and specificity of the tools. Lastly, two participants revealed that they were not entirely certain on which tools to select, with one stating: *"it's thumb suck and hope you're right- which is not good*" (P17).

Seven interview participants indicated that they included tests used to assess the vestibular system in their survey responses. When asked why these tests were selected as part of a 'fall risk' screening protocol, it was identified *"only vestibular patients are being considered for fall risk" (P10).* To establish if this finding was true for most survey participants, a correlation calculation was done. Participants who stated that they conducted screening/diagnostic vestibular services in their clinics, were more likely to be conducting FRSs, with a statistical significance of p=0.00029. This finding was further supported with the findings in section 4.3.3.2, where interview participants explained that their involvement in FRS was facilitated by their comfort in vestibular testing. Additionally, this finding perhaps also could be explained by a point raised in the interviews (see **Figure 4.4**) where it was discussed that undergraduate FRS training only emphasises the need for 'FRS' with vestibular

patients (and not necessarily with the elderly patients whose primary complaint is a hearing loss). One participant explained that in the hearing clinic setting *"you trained to when you're doing a diagnostic -it's case history, otoscopy, tymps and puretones. Never was it 'oh and maybe consider fall risk" (*P6). Plausibly, results suggested that in clinical practice, the participants strongly correlated 'fall risk' with 'vestibular pathologies' and did not often consider that a person's fall risk may be associated with alternative risk factors. Participant 10 confirmed: "*Only vestibular patients are being considered for fall risk."*

4.3.3.3 MDT collaboration when Screening for Fall Risk. The majority of participants (84%) agreed that multidisciplinary collaboration was important when conducting FRS. The MDT members that the participants indicated they would refer to and collaborate with when a patient is suspected to be at risk of falling can be viewed in **Table 4.6.**

Table 4.6

Multidisciplinary Professionals who Participants would Refer to and Collaborate with when a Patient is Suspected to be at Risk of Falling

Medical professional	N=106	%
Physiotherapist	77	73
Otolaryngologist/Ear nose and throat Specialist (ENT)	48	45
General practitioners (GP)	47	44
Neurologist	16	15
Occupational therapist	13	12
Optometry/ophthalmology	13	12
Geriatrician	9	8
Psychologist	7	7
Exercise instructors	5	5
Cardiologist	3	3
Pharmacist	2	2
None at this time	*13*	*12*

Others suggested: **Audiologist specializing in vestibular, Biokinetics and the Podiatrist**

When participants suspected a patient was at-risk of falling, physiotherapists (73%) were by far the most popular profession to refer to, followed by ENTs (45%) and GPs (44%). Although participants referred to GPs, another question revealed that only 12 of 106 participants (11%) indicated that they had spoken to a GP about fall risk of the elderly with

hearing loss. Cardiologists, exercise instructors and pharmacists were selected even though they are not traditionally recognised as part of the fall risk team.

Although the importance of MDT collaboration was highlighted by participants in the interviews, it was also emphasised that much more education and awareness-creation are necessary amongst MDT members before they can successfully refer to each other and collaborate in the area of fall risk. One participant stated: *"We work with other audios, physios, we work with the ENTs…and it's not being spoken about in any of those multi-disciplinary teams"(P11)*. Furthermore, education and discussions about the MDT members roles and when to refer to whom needs to be clarified: *"I don't know who to refer to- I think that links with not knowing what to do after I've identified the risk" (P11).*

Even with efforts to educate and bring awareness, one participant raised that fall risk may still not be prioritized amongst MDT members unless research is conducted to prove its importance. This participant stated: "*I definitely felt it won't be given any priority… but then if you are coming with statistics and actual things that happen in reality, then I think maybe it might expand that interest in everyone. Yes, only if it's a serious problem" (P18)*

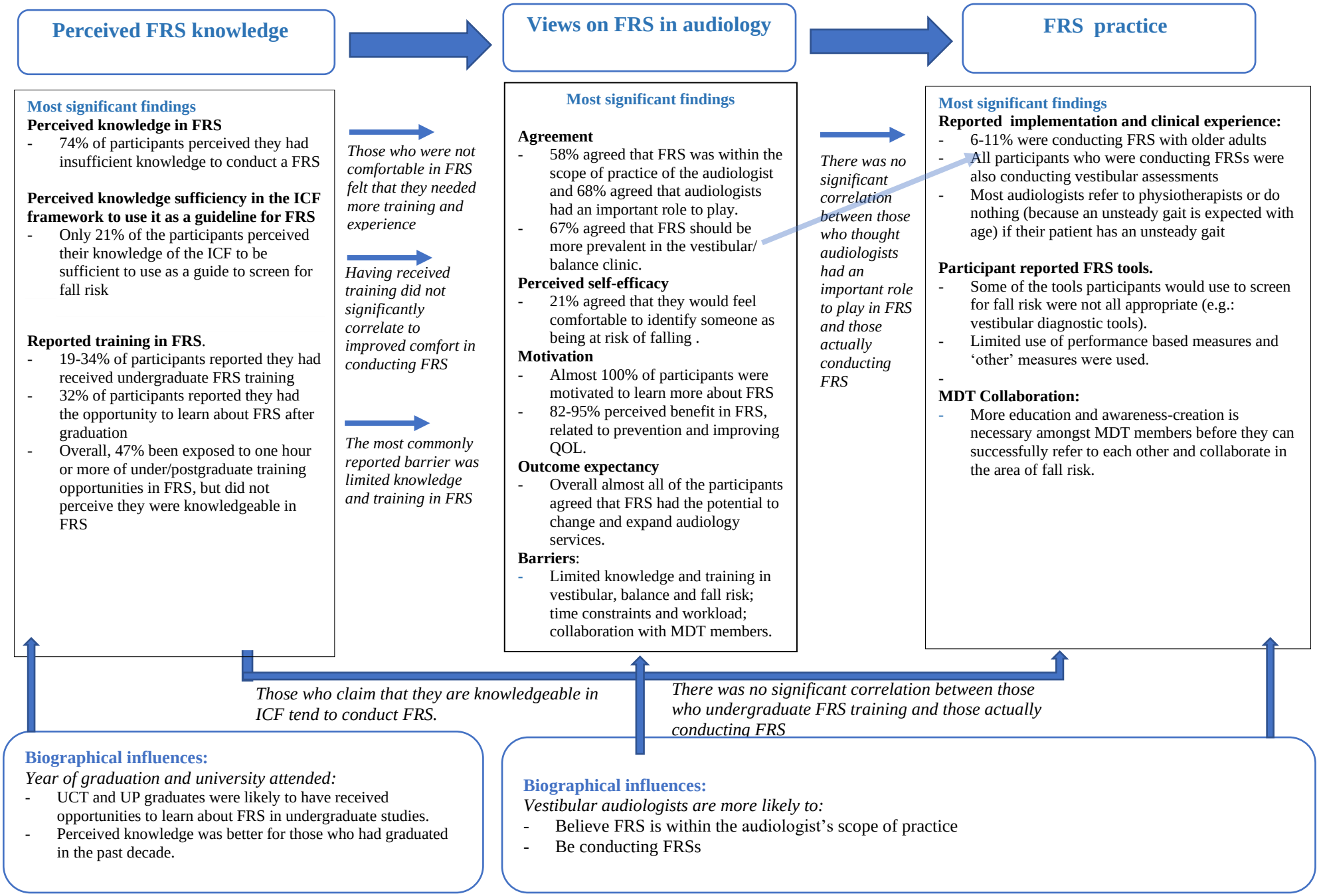
(Additional exemplars of quotes supporting the above information can be found in ***Appendix 18)***

4.4 Results Summary

The research question was addressed by investigating participants' perceived knowledge, views, and their reported practice in relation to FRS. A summary of the most significant results of this study is presented in **Figure 4.25**, in relation to the KAB Framework used for this study. Based on the results, the framework was further adapted to include the observed influence that demographics had on the results of this study.

Figure 4.25

The study results summarized in relation to the adapted Knowledge, Views and Behavior framework



As depicted in **Figure 4.25**, overall, the results showed limited perceived knowledge in FRS. This corresponded with the reported low levels of training opportunities received in undergraduate training programs or postgraduate opportunities. Most participants also reported that they did have sufficient knowledge in the ICF framework to be able to use it as a guide to screen for fall risk. Correlation calculations showed that both the year of graduation and the university which the participant attended played a significant role in the opportunities received to learn more about FRS.

Regarding views, two thirds agreed that audiologists had an important role to play in FRS and believed that conducting fall risks screening may benefit both the patient and the audiologist. The majority however expressed that they were not comfortable to conduct FRSs. The most common perceived barrier to implementation of FRS appeared to be limited knowledge and training in FRS. Overall however, participants were motivated to learn more and positive about the possible opportunities FRS offers in expanding audiology services. Nonetheless, several perceived barriers may need to be overcome before the implementation of FRS is viewed as feasible within audiology clinics.

Even though many participants believed that audiologists had an important role to play in FRS, these views did not translate into practice, with most participants reportedly not conducting FRSs. Those who were, however, conducting FRSs (6 to 11%) were also conducting vestibular assessments clinically. Thus, to be expected, several participants reported using diagnostic vestibular tools to screen for fall risk. Limited use of performance-based measures and ‘other’ measures (assessing for other intrinsic or extrinsic fall risk factors) were used to screen for fall risk. Furthermore, it was identified that additional education and awareness-creation is necessary amongst MDT members before they can successfully refer to each other and collaborate in the area of fall risk.

CHAPTER 5: DISCUSSION

5.1 Introduction

The purpose of this chapter is to discuss and integrate the results of the current study to answer the research question: “What is the perceived knowledge, views and reported practice of audiologists in terms of FRS with older adults, specifically in the SA context?”. This chapter will begin with an introduction which highlights how this research study addresses gaps in current research. Thereafter, the chapter emphasizes important participant information to consider so that result interpretations are made in context. Then the significant study findings highlighted in **Figure 4.25** of the results chapter will be discussed in relation to the relevant literature and in line with the framework for this study. The discussion also focuses on exploring the relationships (as depicted by the arrows in **Figure 4.25**) between perceived knowledge, views and reported practices of audiologists in the realm of FRS. Deeper exploration of the key findings believed to have impacted participants’ perceived knowledge, views and reported practices and the implications thereof are also discussed.

Audiologists should play a central role in the global movement towards the identification of fall risk amongst older adults(Honaker, 2021). This study aimed to establish what audiologists’ perceived knowledge, views and reported practices were in the realm of FRS. This study addressed several gaps in current research on FRS in audiology practice. Firstly, the study specifically focused on SA audiologists, which is an underrepresented profession in existing literature related to FRS. Furthermore, this research provided an overview of the current perceived state of FRS education and reported FRS practice in SA, which is currently undocumented in literature. By identifying the perceived barriers to implementation, this study further aided in informing the development of targeted interventions to promote the adoption of FRS in audiology practice. Findings also shed light on specific areas where improvement may be necessary in audiology curricula, within scope of practice and

guideline documentation and best practice guidelines for the profession of audiology. Overall, the findings from this study and discussion provided a baseline for future research and quality improvement initiatives.

5.2 Participant information

The survey response rate was low when considering the number of STAs and AUs in SA being estimated at 1485 (HPCSA, 2021). Obtaining a low response rate from HCPs for online surveys is, however, not uncommon (Meyer et al., 2022). It was however important to note that it cannot be ascertained as to whether all audiologists registered with the HPCSA were reached through the recruitment methods used as not all registered audiologists receive communication from SAAA or the National Speech Therapy and Audiology Forum. Literature has also shown that online survey responses may be low due to being inundated with emails daily which may be filtered out into their spam folder (Meyer et al., 2022). Furthermore, the number of registered SA audiologists that have Facebook or LinkedIn and are receiving post notifications from these online platforms cannot be confirmed. Patterson and Honaker (2014) also attribute low response rates to audiologists not feeling sufficiently knowledgeable in the topic of fall risk, believing the research topic may not be relevant to them.

Within the survey there was almost an equal representation of audiologists in public practice and in private practice. This was unexpected because only 12% of SA's audiologists are working within the public sector (Pillay et al., 2020). This could perhaps be explained by the National Speech Therapy and Audiology Forum having several WhatsApp groups, used for participant recruitment. Although this group seems small in comparison to privately employed audiologists, it is estimated that 80% of SA's population seek hearing and balance healthcare from the public sector (Seedat et al., 2018).

The majority of SA's population is served within Gauteng. Although Gauteng is the smallest province in SA, it holds the highest percentage of SA's population and resultantly, 42.6% of SA's audiologists are said to be practicing in Gauteng (Pillay et al., 2020). The survey responses reflected this, as most of the participants indicated that they were employed in Gauteng. Regarding services provided, less participants reported that they provided balance and vestibular assessment services in this study than what was reported in Seedat et al. (2018)'s study (36.7% versus 53%). Even though this study and Seedat et al. (2018)'s study used similar selection criteria, the discrepancy could be explained by the fact that Seedat et al. (2018)'s study had a smaller sample size (N=32). Nonetheless, this was an important observation because both Patterson and Honaker (2014) as well as this study identified that audiologists providing vestibular services clinically were statistically more likely to be conducting FRS assessments. Therefore, before interpreting the results, it was essential to contextualise that those currently conducting FRSs were likely to respond to the survey from the perspective of a vestibular audiologist. Vestibular audiologists may feel knowledgeable in understanding when a vestibular patient is at risk of falling but may not necessarily have perceived knowledge on how to identify if an older adult, attending a hearing evaluation consultation, is at risk of falling.

5.3 Objective C: Audiologists' Perceived Knowledge of FRS

Lack of adequate knowledge in undergraduate and postgraduate training related to FRS was perceived as the most common barrier to the implementation of FRS amongst participants within this study. Patterson et al. (2014) had a larger sample size (N= 228) and reported similar statistics to this study on training and knowledge. Only 14% of participants considered themselves adequately trained to conduct FRS, and only 12% perceived audiologists as knowledgeable in FRS. Existing literature has identified the perception of HCPs towards their inadequate knowledge and training as a crucial barrier to effectively managing fall risk among

elderly patients (Loganathan et al., 2015). The current study revealed that even the two thirds of participants who reported receiving undergraduate FRS training opportunities, indicated that they perceived their training to be insufficient. Lack of perceived knowledge may lead to HCPs doubting their decisions and being hesitant due to the possibility of providing substandard care for patients (McConville & Hooven, 2021). Overall, the fact that participants perceived training and knowledge in FRS to be insufficient was a significant finding. Literature states that limited perceived knowledge may influence practitioners' views and willingness to action a procedure, such as FRS (Kalu et al., 2018; Roelens et al., 2006). Identifying audiologists' perceived knowledge levels is crucial to gain insights into their training needs and foster future views that embrace and implement FRS within audiology in SA. (Kalu et al., 2018).

The limited undergraduate training in the vestibular and balance portion of the audiology curriculum may be attributed to its relatively recent inclusion in the profession, especially when compared to hearing healthcare (Seedat et al., 2018). This is because the HPCSA (HPCSA, 2021) only stipulated that students needed to have exit-level competency in vestibular assessment and management in 2011 (HPCSA, 2018; Seedat et al., 2018). This is likely the reason why audiologists who had qualified in the last 10 years were statistically more likely to be conducting FRS assessments than those who qualified prior. Vestibular audiology has been, assumedly, incorporated into the undergraduate curriculum in SA for approximately twelve years, aligning with the HPCSA (Health Professions Council of South Africa) exit level outcomes. This leads to the question: why is training in FRS perceived as inadequate, especially as it is not considered particularly complex (Criter & Honaker, 2017; Verge, 2021).

One possible reason could relate to outdated HPCSA documentation outlining the audiologist's scope of practice. The last update was in 2011 and although vestibular audiology is included, FRS is not specified as within part of the scope of audiology (HPCSA, 2012).

Audiology curriculum planning and development often relies on the guidance of research and governing bodies, such as the HPCSA to actively collate the latest evidence-based information to inform and guide curriculum development. The challenge in developing FRS curriculum arises from outdated scope of practice documentation and a lack of strong evidence to support sensitive, specific, and feasible protocols for the audiology clinic (Ciorba, 2015; Criter et al., 2013; Criter & Honaker, 2016; Lindsey, 2015). The lack of guidelines may result in inconsistent teaching of screening practices, leading to variability in the quality of care. Additionally, the absence of guidelines can make it difficult for audiologists to justify their screening practices when confronted with malpractice issues (Hall, 2019). Encouragingly, researchers have shown active engagement in developing FRS guidelines that are specifically tailored to the field of audiology (Criter & Honaker, 2013 & 2017). The current state of formal audiology training and education resources for FRS leaves considerable scope for improvement and warrants further research (Bassett, 2018; Bassett & Honaker, 2016; Baxter et al., 2017; Criter & Honaker, 2017; Criter et al., 2013; Jedlicka, 2020; Patterson & Honaker, 2014; Callahan, 2013).

Although comprehensive FRS guidelines specifically tailored for audiologists by professional bodies are currently unavailable, incorporating FRS into the audiology curriculum is recommended, with existing literature serving as a reference for guidance until formal guidelines are established (de Clercq, 2021; Hatton, 2016; Jedlicka, 2020; Rogers, 2021; Verge, 2021). The audiology curriculum of USA universities was analysed and it was found that even within doctoral programs (focusing on upskilling audiologists in the area of balance and vestibular services), insufficient FRS practical training was provided(Callahan et al., 2013a). Although there is no research analysing how balance and vestibular training (and particularly FRS) is incorporated into SA universities, concerns related to inadequate overall training and

practical experience in the balance and vestibular realm has been mentioned (Khoza-Shangase et al., 2020). Further research would be needed to explore how FRS is currently incorporated into the undergraduate curriculum. More specifically, it would need to identify if limited academic and practical exposure to FRS has contributed to audiologists poor perceived knowledge in FRS. In addition, it would also be valuable to establish if a biopsychosocial model embedded in the ICF framework is being used to teach vestibular audiology. Specifically because international literature highlights that balance and vestibular training in audiology predominantly follows a medical model approach, focusing on diagnosing central or peripheral vestibular pathology. This approach however neglects the essential consideration of biopsychosocial factors, such as functional balance abilities, impact on ADLs and QoL (Jacobson, 2001; McCaslin, 2013; Rogers, 2021). In line with the argument that FRS appears to be taught form a medical model approach, interview participants noted that training in balance and vestibular assessment prioritizes physiological vestibular assessment over the assessment of functional balance abilities and fall risk, possibly explaining the insufficient training in conducting FRSs during undergraduate education. The existing literature emphasizes transitioning from a diagnostic-intensive medical model to a biopsychosocial model for vestibular and balance training, which emphasizes screening, prevention, and rehabilitation of balance and hearing anomalies as crucial priorities (rather than solely focusing of the diagnostic aspects) (Jacobson, 2001; McCaslin, 2013; Rogers, 2021).

Although it can easily be argued that FRS is part of vestibular and balance testing, the findings of this study challenged the perception that fall risk training should only be taught as part of the vestibular and balance of the curriculum. In this study, participants associated their lack of fall risk training to their perceived insufficient training in the vestibular and balance portion of the curriculum. de Clercq (2021) found that a subset of audiologists expressed a

belief that acquiring specialised training in vestibular assessments was necessary before conducting FRS(de Clercq, 2021). Correspondingly, both this study as well as Patterson and Honaker (2014) identified that audiologists who were knowledgeable in the vestibular and balance realm of audiology, were more likely to be conducting FRSs. However, it was important to point out that this may be due to some participants perceiving 'fall risk' and 'balance/vestibular' screening to be synonymous (possibly contributing to result discrepancies when participants were asked if they conducted FRSs- 19% versus 34%). As a result of the perceived similarity between vestibular and FRS, it was further established that some participants perceived that only patients referred for vestibular testing required a FRS.

The confusion between fall risk and vestibular screening suggested that when reviewing how and where FRS is included in the undergraduate curriculum, it would be important to consider that including it *only* within the balance and vestibular portion of curriculum may imply to students that FRS is only important for obviously dizzy patients. It is, however, also important for older adults in the hearing clinic, where the probable impact of the prevention of falls is likely higher (Criter & Honaker, 2013, 2017). In summary, these findings indicated that FRS should not be limited to the teaching of vestibular assessments in the curriculum. It is essential to emphasise the importance of FRS for both patients in the vestibular and hearing clinics. Additionally, the differences between FRS for older adults and FRS for vestibular patients should be explicitly defined within the curriculum.

The utilization of the ICF framework to guide audiologists in FRS shows promise (De Clercq et al., 2022). De Clercq et al. (2022) found that audiologists could effectively screen for fall risk factors using the ICF code set. Compared to a diagnostic approach that is more focused on the medical aspects, this framework facilitates the incorporation of FRS into clinical practice

in a simplified manner (Honaker, 2021). However, only one-fifth of the participants in this study believed they had satisfactory knowledge of the ICF framework. de Clercq et al., (2022) also found that many of the SA audiologists in their study were not familiar with the ICF. Notably and significantly, this study found that one-fifth who possessed knowledge of the ICF framework were statistically more inclined to perform FRS in their clinical practice. This may be because the ICF framework promotes a holistic approach, considering personal factors and their impact on symptoms, participation, and activities of daily living (ADLs) (de Clercq et al., 2021; Leonardi et al., 2022). Existing literature has discussed how the comprehension of the ICF has been identified as a facilitator to improving audiologists' knowledge for screening patients for fall risk (Bassett, 2018; de Clercq et al., 2022). Given that knowledge of the ICF framework may be important to facilitate effective FRS practice, audiologists may require further training on the ICF framework prior to using the framework to guide FRS.

In line with WHO's global initiative to prevent falls in older adults (Montero-Odasso et al., 2022), research focusing on the development of evidence-based fall risk practice and simple screening protocols for the audiology context and subsequent training hereon should be prioritised. Obtaining sufficient research would also be necessary for accrediting bodies to provide, detailed guidelines on FRS, specifying the audiologist's role in FRS and best practice recommendations (Van Rie et al., 2022). Ultimately, without further research, the field of audiology may continue to witness a persistence of inadequate training and limited knowledge in FRS among professionals (Jedlicka, 2020).

5.4 Objective D: Audiologists' Views on FRS in Audiology

5.4.1 Agreement: Views on the scope of the audiologist and their perceived role in FRS

Although most of the participants did not feel knowledgeable in FRS, just over half of the participants perceived that FRS was within the audiologist's scope of practice (with the rest being mostly uncertain). Other studies which also investigated audiologists' views on FRS, reported more participants (75% and 73.5%) viewing it as part of the audiologist's scope of practice (Baxter et al., 2017a; Patterson & Honaker, 2014a). In the past decade in the USA, awareness of FRS may have been heightened amongst audiologists due to Medicare requiring audiologists to document FRSs with older adults for financial remuneration since 2014 [as part of the implementation of the PQRS] (Bassett, 2018). Furthermore, ASHA's Preferred Practice Patterns document described that evaluation of the balance system included FRS (ASHA, 2006).

Several interview participants motivated why they believed FRS to be within the scope of practice for audiologists. Motivations included that audiologists are trained to understand the balance system, and many are working with older adults, thus ideally placing them in a position to screen for fall risk (Bassett & Honaker, 2016a; Baxter et al., 2017; Jedlicka, 2020). This is particularly important because older adults seeking audiological services have been found to be more at risk of falling than others (Criter & Honaker, 2013). Furthermore, authors have motivated that FRS is an important aspect of the audiologists' responsibility to view the patient's hearing and balance holistically with the goal of maximising their future QoL (Danhauer et al., 2011; J. Honaker, 2021).

Contributing factors to participants' uncertainty about whether fall risk was within their scope of practice was possibly due to limited exposure to training opportunities, the scarcity of research available on the audiologist's role in FRS and it not being mentioned within the

HPCSA's scope of practice guidelines for audiologists (HPCSA, 2012). In comparison, physiotherapists are more familiar with FRS and it being within their scope of practice because the SA Society of Physiotherapy and international guidelines have specified that it is best practice for physiotherapists to routinely screen older adults for fall risk (Avin et al., 2015; SASP, 2018).

Considering that most participants either agreed or were uncertain as to whether FRS was within the audiologist's scope of practice, a similar response was obtained when asked if they believed audiologists had a role to play in FRS. According to the KAB framework, it is likely that those who disagreed or were uncertain had limited awareness and knowledge on FRS. Statistical analysis confirmed that those who did not agree that FRS was within the audiologist's scope of practice were significantly more likely to be part of the participants who had never heard of FRS in audiology, revealing that more awareness of FRS may be needed before it is embraced within the audiology profession. A lack of awareness of FRS has also been reported in audiologists from the USA (Bassett, 2018; Patterson & Honaker, 2014). Recent literature has also highlighted the importance of raising awareness of fall risk among audiologists before their attitudes towards FRS can foster progress towards clinical implementation. The objective of Rogers' (2021)'s article to improve audiologists' awareness of fall risk in older adults and the role audiologists may play in the identification and management of fall risk in SA. Recent research in audiology pertaining to FRS has suggested a shift in focus within the literature, which may indicate that audiologists are becoming increasingly cognisant of and comprehending the significance their role in FRS (Rogers, 2021; Verge, 2021).

The interview results established that the three most cited roles participants perceived they would need to adopt in fall risk would be prevention, identifying fall risk (screening) and making appropriate referrals to MDT members. Several other authors have also emphasised

these roles in literature (Criter et al., 2013; Lindsey, 2015; McCaslin, 2013; Mosheim, 2011; Rogers, 2021). It was however noted that 67% of participants within this study and 79% within Patterson and Honaker (2014)'s study believed that these roles in fall risk should predominantly be the role of the audiologists within the balance/vestibular clinical setting. This finding confirmed what was discussed under the discussion for objective C, where the interview data suggested that because fall risk was taught within the balance and vestibular undergraduate curriculum, it was perceived to be the responsibility of the vestibular audiologist. Several interview participants also reiterated that they distinctly differentiated between 'hearing clinic' and 'vestibular/balance clinic' responsibilities and did not consider FRS to be the role of an audiologist working in a 'hearing clinic' environment. With age, hearing loss and dizziness all being independent fall risk factors (Criter & Honaker, 2016b), all audiologists have a role to play in establishing a patient's fall risk factors early on to safeguard the patient by appropriately referring and ensuring proper care is obtained to prevent a potential fall (Criter & Honaker, 2017). The perception that vestibular audiologists should have a greater role to play in FRS implied that there is a need for greater clarity and education around the specific responsibilities and scope of practice for audiologists working in different clinical environments when it comes to fall risk.

The finding that only 39% of participants reported providing vestibular services clinically is a cause of concern if FRS is perceived to be solely the responsibility of the vestibular audiologist. The predicament with reliance on vestibular audiologists to screen for fall risk, is that most older adults seeking audiology services (who are at risk of falling) are unlikely to be identified as being at risk of falling. In addition, it is important to remember that the primary reason for conducting FRS is to prevent or reduce the probability of a fall (Montero-Odasso, van der Velde, Martin, Petrovic, Pin Tan, et al., 2022). Delaying FRS until a patient is referred to the vestibular clinic may indicate that symptoms have already reached

an advanced stage, which makes prevention more challenging. Audiologists with expertise in vestibular disorders are essential for the evaluation and management of patients with vestibulopathy contributing to their fall risk, however, it is important to note that their role in fall prevention goes beyond this. Other audiologists, who may not specialise in vestibular disorders, should also be involved in FRS as it is essential for the early detection, prevention, and management of falls in older adults (R. E. Gans & Rauterkus, 2019; Spinks et al., 2020). Given that falls prevention among the older adult population is a widespread issue, audiologists practicing in hearing clinics have a valuable opportunity to contribute to preventing falls (Criter & Honaker, 2016a; Patterson & Honaker, 2014).

5.4.2 Perceived self-efficacy: Comfort in performing FRS

Only one fifth of the participants indicated that they would feel comfortable in identifying someone as being 'at risk of falling'. Similarly, only 37% of Patterson and Honaker's (2014) participants felt comfortable identifying someone as being 'at risk of falling'. In line with the KAB framework, participants comfort in FRS was directly influenced by their aforementioned perceived lack of knowledge in FRS. Expressed discomfort in conducting FRSs amongst audiologists may be due to poor fall risk training and experience (Bassett, 2018), hence highlighting the importance of improving audiologists' FRS knowledge. Audiologists' improved knowledge may then positively influence their views on whether they could confidently contribute to fall prevention in SA.

5.4.3 Motivation: Interest to learn and perceived importance of FRS

Patterson and Honaker (2014) advocated for the inclusion of FRS in the audiology test battery for older adults, highlighting the potential of falls to significantly reduce an individuals' QoL. Current study findings as well as Patterson and Honaker (2014)'s research showed that almost all the audiologists agreed that FRS was important in addressing the needs of the aging

population and believed that all elderly adults could benefit from FRS. More specifically they agreed that it could potentially reduce the incidence of falls and subsequently minimise the negative impact of falls on the QoL of patients. A large study which involved several steering committees and worldwide MDT expert groups strongly agreed that all primary healthcare workers should learn more about and be involved in FRS because of the evidence behind managing modifiable risk factors to prevent falls (Montero-Odasso, Van der Velde, Martin, Petrovic, Pin Tan, et al., 2022). It was suspected that participants' awareness of the impact their participation in fall prevention (through FRS) could have, yielded an overall positive motivation towards wanting to learn more about how to support older adults who are at risk of falling (almost 100% indicated they would like further training). Understanding that the benefits of FRS were already well-perceived amongst participants was a promising indicator that once audiologists felt adequately equipped, implementation of FRS and the importance hereof could be easily rationalised (Roelens et al., 2006). With falls ranking as one of the most devastating and life-altering occurrences facing older adults (Honaker, 2021), it was promising to see that participants were aware of the importance of FRS and were motivated to learn more about how they could reduce the impact of falls on an older adult's life.

5.4.4 Outcome expectancy: anticipated changes to clinical practice and participant's views on FRS as an expansion of the audiology profession

The majority of the participants held the view that FRS had the potential to change how clinical practice is currently approached and further believed that these changes could contribute to the growth and development of the audiology profession. Interview participants discussed that incorporating FRS may allow those who are not currently practicing in fall risk to embrace more of their scope of practice in balance. These results are in line with Danhauer et al. (2011), stating that fall risk discussions offer an opportunity for audiologists to easily

introduce both the hearing and balance mechanisms into appointments. Recently, other authors have also highlighted that the incorporation of FRS encourages audiologists to embrace their occasionally neglected but very important prevention responsibilities (Rogers, 2021; Zaia, 2020). FRS could become a potential additional service offered, which would assist in diversifying and expanding the profession's remuneration streams beyond product sales, particularly in light of the potential threat posed by over-the-counter hearing aids to the traditional hearing aids sales model. This shift towards a service-based model has been advocated for by some as a necessary step for the long-term sustainability of the audiology profession (Taylor, 2016a, 2016b). This was a significant finding because with the changing climate occurring in audiology internationally, there have been discussions about possible avenues audiologists can pursue to provide a broader service-offering, with FRS being one of the avenues (McLean, 2022).

In line with a more service-reliant income model, interview participants also pointed out that incorporating FRS may aid in approaching clinical practice from a more biopsychosocial and interventional approach. With the biopsychosocial approach placing more focus on prevention, participation and QoL as opposed to diagnosis and disability (Sharma, 2016), this also encourages more individualised, goal-directed service provision. In terms of future-proofing the profession, literature has predicted that a service-reliant income model will be important, as future customers will be placing higher value on services and experience over physical goods (McLean, 2022). Furthermore, trend predictions suggest that the future patients of audiology services will view the prevention of hearing and balance deficits as important for their overall well-being (McLean, 2022; Taylor & Tysoe, 2013).

During the interviews, participants suggested that including FRS services may attract patients who perhaps would not have previously sought audiology services, resulting in an increase in patient volume. Furthermore, with FRSs focusing on early identification and prevention, providing it as a service may bring in patients who might have otherwise delayed seeking care from audiologists. These points highlight what is formally known as interventional audiology approach. Interventional audiology pertains to a preventive and proactive approach to audiology that targets the identification and management of hearing and balance issues at an early stage, thereby mitigating the likelihood of further deterioration or the onset of other health concerns(Taylor, 2016a, 2016b).

Parker (2014) encourages audiologists to identify both services which allow for more interventional audiology services and MDT collaboration. (Parker, 2014). Interview participants in this study discussed that adding FRS services to their clinic may encourage more MDT collaboration. When prevention is the goal, more patients may be referred for audiological services, at a younger age than what they may have personally sought out audiological services. Literature has suggested that incorporating FRS could aid in stimulating reciprocal MDT referrals, which will improve both holistic patient management and the number of older adults being referred for audiological services (Baxter et al., 2017a).

No other research has investigated how audiologists perceived that the knowledge of fall risk would firstly change clinical practice and secondly, offer opportunities for expansion of the profession of audiology. The findings of this study however suggest that SA audiologists may be open to the implementation of FRS clinically because there is perceived benefit to both the audiologist and the patient (De Clercq et al., 2021).

5.4.5 Perceived challenges: Views on the challenges to implementing FRS clinically

The survey identified the most perceived challenges to the implementation of FRS. Participants listed limited training and knowledge (in both balance and vestibular overall and in FRS); insufficient time and resources; lack of MDT collaboration as the top three perceived barriers. Within the interview data, participants also raised a few additional challenges (which were not provided as options within the survey). Although these challenges were raised by only one or two participants, they were still important to consider. These included: resistance to learning, resistance to change in practice and taking on additional responsibilities; conformity (audiologists will only start screening for fall risk if most of their colleagues are doing it as well) and lastly, it was reported that audiologists are resistant to embrace their full scope of practice, particularly responsibilities in the balance realm.

Limited training and knowledge in balance/vestibular assessments and in FRS was the most prevalently reported barrier to the implementation of FRS. Research has shown that even if a task is simple, people are less likely to implement something if they have not been trained because they lack the necessary familiarity and perceived knowledge and skills to be able to confidently conduct the screening (McKenzie et al., 2017). Without adequate training, audiologists may also not understand which fall risk tools to use, how to use them safely and accurately and when to use them. Additionally, audiologists may be unsure of the best practices or the potential risks associated with FRS.

Although an interest to learn more about FRS was indicated, two interview participants mentioned that audiologists may be resistant to learning, change and taking on additional responsibilities. Both interview participants who mentioned these challenges worked within the public sector. It is possible that there may be more resistance to learning about and initiating

FRS in the public sector because audiologists may already be feeling overwhelmed by the existing workload with the patient to audiologist ratio being unequitable (Pillay et al., 2020). As a result, audiologists may be hesitant to take on additional responsibilities that they perceive to require additional effort, time, and resources. More research is however required to identify if this is indeed a challenge facing FRS implementation in SA.

Participants also perceived that limited time and resources would make the implementation of FRS challenging. Bassett (2018) and as well as Patterson and Honaker, (2014) found that audiologists felt over-worked and reported that they did not have the time or equipment to presently implement FRS. Criter and Honaker (2017) agreed that due to time and resources, many of the suggested protocols in healthcare literature may not be feasible for a mainstream hearing clinic. Authors have however argued that FRS can take close to no additional clinical time and many of the FRS tools are freely available (Bassett, 2018; Criter & Honaker, 2017; Hatton, 2016). Authors have proposed that FRS can be done in a few minutes by being more aware of a patient's gait and balance and incorporating a few simple questions and tools into the test battery (Baxter et al., 2017a; Danhauer et al., 2011; Verge, 2021). For example, a simple performance-based measures such as the TUG test has been shown to have a sensitivity of 83.3% and a specificity of 61.1% and takes less than a minute to conduct (Criter & Honaker, 2016c).

Referrals to other members of the MDT are integral after FRS assessments, as the results often indicate multi-system sensory decline or health concerns that require further evaluation and management. This study, however, revealed that participants perceived that collaboration with other MDT members may be difficult. This concern has been identified and discussed in several other studies as well (Bassett & Honaker, 2016; Baxter et al., 2017; Criter

et al., 2013; Lindsey, 2015; Patterson & Honaker, 2014). Coordinating the schedules of MDT members to create an effective interdisciplinary clinic can be difficult (Lindsey, 2015). It has been documented in physiotherapy literature that MDT collaboration for fall risk may be difficult is SA due to inefficient data capturing systems, lack of evidence regarding fall management, unclear role descriptions and inefficient referral systems (Charumbira et al., 2021). Interviews data suggests that an additional challenge affecting MDT collaboration may be that some MDT members may not specifically have an interest in fall prevention or know the role audiologists play in fall prevention. Bassett and Honaker (2016) also discussed that the development of appropriate infrastructure to effectively assess, refer, and track patients who are at risk of falling is an area requiring discussion and action within the audiology profession. Other literature has urged that audiologists become proactive in becoming stronger MDT members by building an understanding of each team member's role and reaching out to physiotherapists, occupational therapists, as well as physicians to collaborate (Baxter et al., 2017a; Criter et al., 2013). This revealed that collaborative discussions amongst MDT members are integral to define, establish, document, and educate MDT members of all their respective scope of practice and roles in FRS.

Although establishing an MDT member's various roles and scope of practice would be necessary, this study raised that it is also important to consider that some audiologists may not embrace their full scope of practice and responsibilities, particularly related to balance and vestibular audiology. This was evident in literature where many audiologists are not providing balance services clinically (Seedat et al., 2018). The reason for this appears to be due to lack of confidence and perceived knowledge in this area and the belief that expensive equipment is needed to provide vestibular services (Khoza-Shangase et al., 2020; Seedat et al., 2018). Thus, non-vestibular audiologists may associate FRS with vestibular and balance services and reject

implementation hereof, if the importance of FRS with older adults in the hearing clinic is not emphasised.

Another interview participant highlighted that they believed that FRS will only begin to take traction once audiologists observe that many of their colleagues are implementing FRS. This phenomenon has been described by the American Psychological Association as "the adjustment of one's opinions, judgments, or actions so that they become more consistent with the opinions, judgments, or actions of other people"(APA, 2023). Generally, the initiation of conformity and adherence in healthcare necessitates profession-specific research guidelines, denoting and summarising evidence-based practice (Boisvert et al., 2017). Governing bodies and researchers still have long strides to take before sufficient research is available to compile audiology-specific FRS guidelines suitable for the SA context, which may encourage audiologists to play a role in FRS.

5.5 Objective E: Audiologists Reported Practice of FRS

5.5.1 FRS: reported implementation and clinical experience

Previous research has indicated that the assessment and management of patients with balance problems may be more challenging within the public healthcare sector due to limited availability of resources and workforce demand (Seedat et al., 2018). Based on expectations of similar results, it was anticipated that individuals working in the public sector in this study may also perceive greater challenges, leading to a less audiologists conducting FRS assessments. No statistical significance was however suggested when comparing the number of audiologists in public versus private practice in conducting FRSs. This may be due to FRS being a relatively newer, less familiar focus in the audiology profession (Rogers, 2021) and so overall, implementation levels were low in both the public and private sector.

Some of the above discussed perceived challenges reported by participants could explain why FRS was the least likely action that would be taken if a participant noticed that an older adult had an unsteady gait (4-11%). In the USA, the number of audiologists screening for fall risk was also low, with only 13.1% screening for fall risk (Patterson & Honaker, 2014). In more recent research conducted by Bassett (2018) in the USA, more audiologists (38%) reported implementing FRS. The larger number of audiologists conducting FRSs however could be explained by Bassett's (2018) smaller sample size and in 2018, audiologists were financially incentivised to conduct a FRS as part of Medicare's PQRS, albeit with it being incentivised, the number of audiologists conducting screenings were still low.

The survey results revealed that all participants who indicated that they would screen for fall risk were also providing balance and vestibular services. It was further revealed by interview participants that currently *only* patients who have been referred for a balance and vestibular evaluation are getting screened for fall risk. In other words, vestibular audiologists only view fall risk as part of balance and vestibular difficulties. By only conducting FRSs with obviously dizzy patients, audiologists are failing to use fall-risk screening as a preventative measure and are neglecting to screen the bulk of the 'at risk' older patients they come in contact within the hearing clinic weekly. This is particularly concerning because the Centre of Disease Control (CDC) recommends that all older adults be screened yearly once they are 65 years and older (CDC, 2019a). The purpose of FRS should be to identify risks early on, to implement a management plan to prevent a fall, not to wait for them to be in an imbalance crisis (necessitating a referral for vestibular diagnostics).

5.5.2 FRS tools participants would reportedly use

Literature has revealed that FRS protocols can range from including simple measures that take close to no additional clinical time to more complex and time-consuming protocols,

where the screening may include some vestibular diagnostic assessments (Hatton, 2016). This section of the discussion starts by discussing the simplest, least time-consuming screening tools and then progresses to discussing more in-depth and time-consuming assessment measures, in the following order: Flyers and posters; self-reported measures; observation of gait; case-history questions; tests of vestibular function; performance-based measures and 'other' measures.

Literature has suggested that making simple adaptations to audiologists' clinics can facilitate older adults' fall risk awareness, even before the consultation begins (Baxter et al., 2017a; Honaker, 2021). One such adaptation includes having posters or flyers in the waiting room (Verge, 2021). This study however revealed that 97% of audiologists have no fall risk informational resources in their waiting area. Baxter et al. (2017) also reported that 89% of Canadian audiologists did not have informational resources on fall risk available for their patients. This may be because audiologists may not have viewed having posters or flyers in the waiting room as a technique which could be used to initiate FRS. It is however also important to consider that printed resources are often provided to audiologists' equipment and hearing aid suppliers, whose focus may be more on product sales than fall prevention. FRS brochures may need to be printed by the audiologists themselves, which has cost implications.

Another simple way audiologists could incorporate FRS into their protocol is to add self-reported measures (questionnaires) that can be sent to all patients over the age of 65 before their consultations or be filled out in the waiting room (Baxter et al., 2017a; Lindsey, 2015). The two self-reported measures participants most indicated they would use as part of their protocol was the Dizziness Handicap inventory (DHI) (40%, n=16) and the Hearing Handicap Inventory for the Elderly (HHIE) (20%, n=8). Although the original purpose of the DHI and the HHIE were not to screen for fall risk, research has shown that high scores on these measures may be sensitive in identifying which patient's may be more at risk than others (Criter &

Honaker, 2017). The DHI and HHIE were likely popular selections because they are reportedly two of the most used self-reported measures internationally in audiology and are often recommended tools to use within best practice guidelines (BSA, 2016; Kumar et al., 2021; Mutlu & Serbetcioglu, 2013).

Another tool that can be used for fall risks screening and requires no additional time and resources is simply being more observant of abnormal gait patterns (Weisenfeld, 2019). This study revealed that half of the participants would use this as a 'tool' to screen for fall risk. Besides looking out for obvious gait and balance abnormalities, research has also shown that older adults with hearing loss are more likely to decrease their walking speed and step length when carrying out a dual task (e.g.: walking and carrying out a verbal task) (Wollesen et al., 2018). Wollesen et al. (2018)'s finding suggested that all audiologists should be proactively aware and alert to changes in older adults' gait and balance within consultations.

Case history taking can also be a valuable tool used to identify possible intrinsic and extrinsic fall risk factors. It was interesting to observe that 'case history' was the most selected tool used by those conducting FRSs, but far less participants reported feeling sufficiently knowledgeable in the fall risk factors. This raised the concern that case history taking is potentially not being used to its fullest potential in assisting audiologists to identify a patient's individual intrinsic and extrinsic fall risk factors and that further training would be required. Literature has also encouraged audiologists to ask about history and fear of falling in case history as a tool for FRS(Rogers, 2021; Verge, 2021). Promisingly, one third of participants conducting FRSs in this study indicated that they ask their patients about history of falling. This correlated with Bassett (2018) and as well as Patterson and Honaker (2014)'s study, which also revealed that one third of USA and Canadian Audiologists were asking older adults about history of falls at their initial evaluations. Research has shown that asking about history

of falls is a vital part of a FRS protocol because those who have fallen, have a greater chance of falling again in the next year (Public Health Agency of Canada, 2014).

Fear of falling has also been found to increase the risk of falling in older adults. A longitudinal study involving 640 participants revealed that 42% of those who initially reported a fear of falling had endured at least one fall after 24 months (Lavedán et al., 2018). Despite the established connection between fear of falling and increased fall risk, there is limited inquiry about fear of falling by audiologists, both in this study and in Patterson and Honaker's (2014) study. The infrequent use of simple questions to assess fall risk factors during case history may be attributed to the participants' lack of awareness of what questions to ask and how valuable case history can be when screening for fall risk. Research has demonstrated that incorporating a brief assessment of history and fear of falling can serve as a rapid and effective initial screening to identify individuals in need of further fall risk screening (Sarmiento & Lee, 2017)

Since all participants conducting FRSs also provide vestibular services exclusively to referred patients, it is logical that many participants would incorporate vestibular assessments into their FRS protocols. Such tests include: BPPV assessment, VNG/ENG, VEMPs, caloric and VHIT. Patterson and Honaker (2014) also found that audiologists (particularly those practicing in vestibular audiology) primarily used diagnostic vestibular tools. Although diagnostic vestibular assessments are appropriate in identifying if vestibulopathy is one of the patient's risk factors, some of the tests are time consuming and expensive, and are thus more appropriate for diagnostic evaluations when a screening had raised concerns about the vestibular system. Patterson and Honaker, (2014) reported that some vestibular audiologists may be solely relying on diagnostic vestibular assessments to identify a diagnosis/cause for a fall. The problem with this is that often with older adults, no strong signs of vestibular impairment are evident. Instead, older adults often have many minor problems across multiple

systems, which interact to create imbalance and subsequent fall risk (Nasher, 2000). Therefore, if vestibular audiologists are screening for fall risk, several appear to be using tools that are not sensitive to identifying multifactorial fall-risk factors.

With the understanding that fall risk can be multifactorial in nature, it also becomes important to screen for 'other' fall risk factors (not just for vestibular deficits). The survey results however indicated that less than 13% of participants indicated that they would screen 'other' areas, such as vision, environmental hazards assessment, cognition, proprioception, blood pressure and reaction time. Patterson and Honaker's (2014) study yielded similar findings, with less than 7% of audiologists indicating that they include 'other' measures. Overall, screening for holistic risk factors when identifying if a patient is at risk of falling is essential for providing comprehensive care, reducing the risk of falls, and improving patient outcomes.

The impact that multifactorial risk factors have on a patient's overall functional balance abilities can be screened with the use of performance-based measures. The survey revealed that not many participants were using performance-based tools to screen for gait and functional balance abnormalities either (with Gait assessment, mCTSIB, TUG and DGI being used by less than one third of those conducting FRSs). International studies again revealed comparable findings with only 12.6% and 23% of USA and Canadian audiologists using performance-based measures respectively (Baxter et al., 2017a; Patterson & Honaker, 2014a).

Jedlicka, (2020), explained that uncommon use of 'other' and performance-based tools was likely due to limited undergraduate teachings, exposure, and experience with these tools, which was also echoed in the statements made by interview participants in this study. One of the other important points raised in the interviews was that participants were hesitant to conduct 'other' and performance-based measures because they weren't sure if it was within their scope

of practice. It has been argued in literature that screening tests observing balance abilities are indeed within the audiologist's scope of practice (Bassett & Honaker, 2016a; McCaslin, 2013). Hatton (2016) also argued that if time permits and it is in the best interest of the patient, audiologists should be able to conduct basic 'other' screening measures looking beyond the vestibular and auditory system to help guide an effective individualised intervention plan for a patient (Hatton, 2016). Participants'' uncertainty regarding which tests were within the audiologist's scope of practice emphasized the necessity to define the scope of practice for audiologists and other MDT members in FRS.

Overall, with vestibular audiologists being statistically more likely to screen for fall risk, the selected FRS tools appeared to focus on identifying sensory deficits of the vestibular system, rather than a patient's holistic, multifactorial fall risk profile. The challenge with screening for fall risk in the same way you would screen for a vestibular disorder is that older adults can have normal peripheral vestibular function on assessment and yet still be a high fall risk. Chang et al. (2020) assessed in hospital patients who were considered a high fall risk according to the Morse Fall Scale and found that only 34.48% (10/27) of the high-risk group presented with peripheral vestibular dysfunction. The holistic screening of patients from a biopsychosocial perspective becomes imperative when assessing fall risk (de Clercq et al., 2022).

Several FRS programs have been developed in nursing and primary healthcare literature, which may help guide audiologists in the interim, as there is currently a lack of specific FRS protocols for audiologists. Such programs include, for example, the Falls Risk Assessment Tool (FRAT) (Nandy et al., 2004), the Morse Fall Scale (Cruz et al., 2015) and the St Thomas's risk assessment tool in falling elderly inpatients (STRATIFY) (Oliver et al., 1997). It is however important to bear in mind that, these tools were developed primarily for

use within primary care facilities and nursing homes and thus may not be entirely suitable for the audiology context. The STEADI protocol developed by the CDC (Sarmiento & Lee, 2017) was developed as a protocol all HCPs working with older adults could use. Whilst this may be a promising FRS protocol for use within the audiology setting, further research is still needed.

5.5.3 MDT Collaboration when Screening for Fall Risk

With FRS ideally considering multifactorial risk-factors, practice in fall risk requires referrals to and collaboration with MDT members (Bassett & Honaker, 2016a). Although participants (84%) agreed that MDT collaboration was important, 38% believed that in SA, MDT collaboration for fall risk patients would be challenging (as discussed in section 5.4.5). Interview participants elaborated that they were not sure of who to refer to and that MDT members may not be familiar with the audiologist's role in balance. This again highlighted lack of knowledge and for future training to incorporate the role of each MDT member. One participant also highlighted that particularly within the public sector, there were inadequate structures to facilitate effective management of fall risk patients, they will just "fall through the cracks" when referred. Literature has identified several barriers when patients are needing to attend several appointments within public healthcare. Some of these barriers include: long waiting lists, limited finances, time, transport and living far away from healthcare institutions (Tawa et al., 2020). MDT collaboration is necessary to define and document each profession's scope and role in managing older adults at risk of a falling. Furthermore, collaboration may aid in developing more effective referral networks necessary for holistic management of older adults at risk of falling.

Literature has revealed that on occasion, it is assumed that an older adult's GP is screening for fall risk. However, research has shown that only 20% of patients in the USA reported discussing falls with their HCPs (Criter & Honaker, 2016b). Although GPs may be referring older adults to audiologists for obvious hearing difficulties, they may not be aware of

the audiologists' value in also screening older adults for fall risk. Particularly because this research revealed that only 11 % of SA audiologists have discussed how older adults with hearing loss may also be at risk of falling with the GPs in their area.

This suggested that a good start to building up appropriate referral networks for fall risk may be by firstly providing audiologists with sufficient training in FRS and then encouraging audiologists to also collaborate and discuss fall risks and how audiologists can assist in screening for and minimising this risk with their GPs (Jedlicka, 2020). Currently audiologists are primarily referring patients to physiotherapists (73%), ENTs (45%) and GPs (44%) when they suspect a patient may be at risk of falling. Literature has revealed that these are often members of the MDT team managing fall risk (Honaker, 2006; Tiedemann, 2021). The finding that participants were referring fall risk patients was positive, particularly because MDT collaboration with fall risk patients is important to provide comprehensive and coordinated care, leading to improved patient outcomes and a reduced risk of falls.

CHAPTER 6: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

Falls in older adults (>65 years) is a major global health concern (United Nations, 2020). Approximately 30% of elderly individuals experience falls each year, leading to either fatal outcomes or life-changing injuries that can greatly impact their QoL and independence (CDC, 2019b). With the growth of the older adult population, the gravity of falls is becoming more evident, prompting worldwide movements to rally healthcare professionals together to screen older adults for fall risk (CDC, 2019a). Audiologists are not exempt from this movement. Due to audiologists being able to easily screen for fall risk of older adults and the understanding that falls have detrimental, life-altering effects on a person's physical, financial and mental wellbeing, the important role an audiologist plays in screening for fall risk and initiating prevention measures is undeniable (Honaker, 2021). In accordance with this, it could be argued that if audiologists do not embrace their role in FRS and seek out additional training and resources to equip themselves to provide fall risk services, it may be a direct breach of their ethical oath to uphold beneficence. Baxter et al. (2017, p1) argued that "Fall prevention is within the scope of audiology. Ignoring the problem or waiting until a patient is in a mobility crisis is not best practice".

This chapter contains a summary of the research conclusions on what audiologists perceived knowledge, views and reported practice in FRS were, following analysis of the survey and interview data. Moreover, it includes a discussion on the clinical implications of the research, as well as an examination of its limitations and strengths. Finally, this chapter concludes by providing recommendations for future research endeavors.

6.2 Summary of the Main Findings

Audiologists face challenges in embracing their role in FRS due to insufficient training and knowledge. Less than half of the participants in this study had received FRS training, and even among those who had received training, perceived knowledge levels remained low. Despite this, participants recognized the importance of their role in FRS and the need to reduce falls and improve the quality of life for older adults. Most participants expressed motivation to acquire more FRS knowledge and believed it could expand audiology services. Few participants however actually conducted FRSs, indicating a disconnect between their positive views towards FRS and their current actions. Interestingly, the small group of participants who did conduct FRSs were all vestibular audiologists. Consequently, findings suggested that while some FRS tools were appropriate for assessing vestibular patients, they lacked sensitivity in identifying those at risk of falling due to multifactorial risk factors.

6.3 Conclusions

This study is the first to add to the knowledge base, providing insight into SA audiologists perceived knowledge, views and practice in FRS. By comprehensively understanding the impact of perceived knowledge and views on FRS practice, this study established a solid groundwork for future advancements in fall risk screening within the field of audiology in South Africa. The findings of this study underpinned enhancing training is crucial for successfully implementing FRS in SA audiology as it improves perceived knowledge and confidence in FRS.

The current challenge with the implementation of good training programs in FRS, is the lack of audiology-specific resources available for educators to refer to. This study emphasized the pressing need for further audiology research in the realm of FRS. This is

particularly important because, scope of practice and professional guideline documentation requires updating, to include further guidance for audiologists on evidence-based FRS practice (as identified by the systematic review conducted as part of this research) (van Rie et al., 2022). In the absence of adequate research to inform the scope of an audiologist's role, advancements in professional best-practice guidelines and tertiary training may be hindered, potentially limiting the growth of the field's curriculum (Turton et al., 2020).

Although perceived knowledge levels in FRS appear to be low presently, this did not diminish participants' recognition of the importance of FRS within audiology and the role audiologists play in preventing falls among older adults. The findings on audiologists' views of FRS added to the knowledge base in audiology by emphasizing the potential benefits of incorporating FRS into audiological clinical practice. The findings guide future clinical practice by highlighting the importance of preventative services, the potential for audiologists to play a crucial role in falls prevention among older adults, and the need to adapt to service-reliant income models. The findings further suggested that once audiologists' perceived barriers to the implementation of FRS have been addressed (such as inadequate knowledge, time constraints and the need for specialized equipment and vestibular knowledge), the adoption of FRS within clinical practice may be more broadly accepted. Additionally, the findings indicated that the implementation of FRS may also offer an opportunity for the enhancement of interventional audiology practice, improve patient outcomes, and contribute to the overall well-being of older adults in contact with audiologists.

Although participants appeared to view fall risk screening positively and were regularly providing services to older adults, less than one-tenth of the participants reported conducting FRS. FRS in South Africa appears to primarily be conducted with older adults referred for vestibular evaluations, presenting a missed opportunity to identify fall risk in all older adults consulting with audiologists. This underscored the necessity of raising awareness among audiologists regarding the significance of all audiologists conducting FRS for all older adults.

The study further highlighted the limited utilization of fall risk screening tools that are sensitive to identifying fall risk. This information added to the knowledge base by identifying gaps in awareness, exposure, practical experience, and knowledge regarding the application of FRS tools in audiology. Findings highlight the need for standardized and researched FRS protocols specific to the audiology context. Currently, there is a lack of strong evidence and recommendations for FRS protocols that are sensitive, specific, and feasible within the audiology clinic (Ciorba, 2015; Criter et al., 2013; Criter & Honaker, 2016c; Lindsey, 2015). This research further informed the need for further research and guideline development in the field of audiology-specific FRS protocols. Until a strong evidence base for FRS in audiology is available, this research also stressed the need for professional bodies to create FRS recommendations based on the existing literature from related disciplines (such as nursing, primary healthcare and physiotherapy).

In order for FRS to be initiated in more audiology clinics in SA however, MDT collaboration needs to be strengthened. Given the high prevalence of falls in the elderly and with the risk factors being so multifaceted, preventing falls is larger than any one profession (Baxter et al., 2017). Patients at risk of falling may require several referrals, thus for an at-risk patient to be effectively and holistically managed, good referral networks are needed. This

research suggested that MDT collaboration is not only necessary for the effective prevention and management of falls, but also for establishing respective MDT member roles and communicating the importance of the audiologist's role within the multidisciplinary team. This is essential for future-proofing the profession of audiology because additional MDT collaboration provides audiologists with the opportunity to broaden their client base through referrals from other MDT members for additional preventative services- such as FRS. The findings inform academic institutions offering audiology programmes that further research is needed to identify context-specific solutions on how to best screen and manage older adults at risk of falling in South Africa amongst MDT members. Overall, findings emphasized that MDT members have a lot of talking to do to educate, discuss, problem solve and expand on the roles of each professional within the fall risk team, before South Africa is effectively managing older adults at risk of falling.

In conclusion, it is within all healthcare professional's duty to screen for conditions that the population they are serving may be vulnerable to acquiring "so that an early treatment or intervention can be offered and thereby reduce the incidence and/or mortality of the health problem or condition within the population" (WHO, 2020, pIV). FRS should be a primary concern for all audiologists involved in the care of older adults. The AGS and BGS have advised that annual fall risk screening should be conducted for all individuals aged 65 years and above (AGS & BGS, 2011). On this basis, it has been insisted that audiologists urge older adults to screen their balance annually to prevent falls, in the same way that they have adopted encouraging early annual hearing evaluations to prevent cognitive decline(Honaker, 2021).

6.4 Critical evaluation of the study

The strengths and limitations of the study in terms of design, methods and findings are specified in **Table 6.1**.

Table 6.1

Strengths of the study in terms of methods and findings

Discussion area	Strengths of this study	Limitations of this study
Mixed-methods approach	• The qualitative provided further descriptive information which assisted in interpreting the qualitative findings. • The research was more likely to reflect the participants' views and relied less on the researcher's interpretation, subsequently minimising bias. • Survey results would therefore more likely be a more credible and generalisable representation of audiologists' views, perceived knowledge and reported practice (Flick, 2018)	• Due to time limitations, data saturation was not established within the interview data, affecting the generalizability of the findings from the interview data.
Selection criteria and sample size	• The selection criteria were relatively broad, which meant that most audiologists would have been able to participate. This permitted audiologists with varying experience in FRS and biographical information to participate, which made the research more representative and generalisable. • The minimum sample size for the study was 91 participants (Confidence level of 95% and a margin error of 10). In this study a sample size of 106(Confidence level of 95% and a margin error of 9) was achieved.	• Although a larger sample size was obtained than the minimum required for the surveys, only a 9% margin error was obtained, where as a margin error of 5% or less would have been ideal. • A significantly smaller sample size for the interview phase was obtained compared to the survey.
Data collection tools and methods	• The adaptation of the survey ensured that the survey was relevant to the latest audiology research in FRS, the South African context and the research objectives. • A pilot study of the survey and interview protocols ensured that the methodology, sampling instrument and analysis were adequate before using the research tools in the main study.	• Occasionally interviews were affected by technological difficulties and audio buffering, which made conducting the interview challenging at times. • Real knowledge was not tested and participant's perceived knowledge was not correlated with their university curriculum.

Table 6.1 continued

Discussion area	Strengths of this study	Limitations of this study
Data collection tools and methods	• Online/ virtual tools allowed for: 1. All audiologists across provinces and contexts to participate in this study. 2. Completion of the survey/ interview participation within their own time without needing to worry about other factors, such as travel time. • The interview power-point: Providing a visual presentation of the questions asked can sometimes assist the participant in staying on topic while they respond, thus keeping the data as relevant to the objectives as possible(Glegg, 2019).	
Data analysis	• Different data sources (systematic review, surveys and interviews) were used at the interpretation stage to analyse and interpret the data, which can minimise the influences of individual variations on the results and assist in reducing researcher bias (Korstjens & Moser, 2017). • Inter Rater Reliability (IRR): Two other investigators reviewed the codebook and coded the interview data. The IRR calculation provided for a reliable measure for determining the consistency of the qualitative research results. Furthermore, it helped to identify potential sources of bias and potential areas of disagreement between raters, uncovering any potential sources of error and improving the accuracy of the results(McDonald et al., 2019).	Reduction of Richness: coding interview with a deductive approach often involves categorizing and coding responses into predefined categories or numerical values. This process can lead to a loss of richness and depth in the data, as it may overlook nuanced or contextual information that cannot be easily quantified (Seidman, 2019a).
Study findings	• Due to obtaining a sufficient sample size, survey results were generalisable.	• *Only barriers were explored:* In this study only the barriers to the implementation of FRS were explored. In future research facilitators should also be explored. • It was identified that there was potential confusion between FRS and vestibular screening when the survey was being completed. Future researchers are advised to establish a clear distinction between fall risk screening (FRS) and vestibular screening at the outset of participant surveys. • Participants were not asked to specify where they found learning opportunities in FRS.

6.5 Implications of the study

6.4.1 Implications for education and theory

- By investigating the influence of perceived knowledge and views on FRS practice, this study established a strong foundation for future progress in the field of audiology in South Africa with regards to fall risk screening
- This study contributed valuable insights to the existing body of literature exploring audiology practice from a preventive and biopsychosocial perspective. This is a necessary addition to the literature which emphasizes the importance of adopting a person-centred, service-oriented approach for audiologists to thrive in the future.
- This study shed light on SA audiologists perceived barriers influencing the implementation of fall risk screening in audiology. These findings will inform the development of targeted interventions and problem-solving which may be necessary to promote the national adoption of FRS in audiology practice.
- This study highlighted the opportunity for improvement in the perceived knowledge levels of audiologists regarding FRS. It shed light on the importance of enhancing FRS training within curriculum planning and CPD events for audiologists. Based on the findings, the following recommendations are proposed for consideration when designing training programs in the area of FRS (**Table 6.2**):

Table 6.2

Factors to consider when planning the incorporation of FRS into audiology curriculum or CPD events

1	-	Training should include what the audiologist's scope of practice and role in FRS is within the MDT team.
2	-	Training should ensure that audiologists are exposed to and practically trained on appropriate FRS tools and protocols that effectively identify fall risk.

Table 6.2 continued

3	-	Careful consideration is required on how FRS is implemented into the undergraduate audiology curriculum as this may influence audiologists views on the importance of FRS for *all* older adults seeking audiological care (not just those referred for vestibular testing). - Fall risk screening should be introduced into the undergraduate curriculum early on and emphasised as important to conduct with all older adults over the age of sixty-five. Introducing FRSs at the same time hearing screenings are introduced would provide students with several opportunities to practice screening for fall risk and be reminded of the importance of fall prevention for all older adults throughout their undergraduate years, across diverse clinical practical sites (Jedlicka, 2020).
4	-	This study underscored that FRS should not only be emphasised within academic and clinical vestibular curriculum, but rather be emphasised as an important consideration for all older adults consulting with audiologists.
5	-	Within curriculum or training programs, this study highlighted that it would also be important to differentiate between the differences between FRS and vestibular screening with older adults and when it would be important to conduct one or both screening evaluations.
6	-	The findings highlighted that FRS should be taught and implemented utilising a biopsychosocial model approach with the ICF. This would shift the focus away from assessing to diagnose a balance pathology to assessing to help a patient prevent, rehabilitate, and reintegrate into daily activities and participation (Bassett, 2018; de Clercq et al., 2022). It is recommended that the ICF framework and code set be taught and be used as a guide in teaching audiologists on how to identify fall risk factors and prompt them as to which additional FRS tools may be useful in identifying functional deficits.
8	-	Training in the area of FRS should aim to address misconceptions and demystify certain perceived barriers surrounding FRS.
9	-	Training for audiologists in the private sector should include how audiologists would bill for a fall risk screening evaluation.

6.4.2 Implications for practice

- The findings underscored the significance of conducting promotional campaigns to enhance awareness of FRS within the audiology field and to highlight the potential positive impact it could yield.
- While the HPCSA acknowledges prevention as a fundamental duty of audiology practice, it tends to receive comparatively less attention in practice. This study highlighted that amidst the presence of over-the-counter hearing aids and audiology franchises that pose potential challenges to independent audiology, the field of

preventative audiology emerges as a promising avenue for practice expansion through the diversification of service offerings.

- While awaiting further research to inform policy and practice in FRS, it is advisable to utilize established generic outpatient healthcare FRS guidelines and protocols, such as the CDC's STEADI program (Sarmiento & Lee, 2017). Additionally, adopting a biopsychosocial model approach to FRS, incorporating the ICF framework and codeset, can assist in identifying individualized fall risk profiles and implementing appropriate intervention plans for fall prevention(Honaker, 2021).
- This study revealed the importance of future collaborative efforts among MDT members in clarifying their respective roles in FRS and enhancing referral networks to ensure effective management of fall risk following screening.
- In South Africa, prominent medical aid schemes have introduced incentives for fall risk screening, urging their members to undergo annual screenings conducted by biokinetics (Discovery Health, 2023). Given the high prevalence of falls among older adults, this research strongly supports and advocates for the active participation of medical aid schemes in incentivizing fall risk screenings for as many older adults as possible. Recognizing that audiologists maintain regular contact with a portion of the population particularly susceptible to falls, this research proposes the inclusion of audiologists as an endorsed profession (by the medical aid scheme) for members seeking FRS. It is recommended that professional audiology bodies in SA investigate the possibility of this once the audiology scope of practice documentation has been revised. By extending the availability of FRS to audiologists, medical aid schemes can play a larger, crucial role in preventing falls and safeguarding the well-being of their members in this at-risk population.

6.4.3 Implications for policy

This study provides evidence emphasizing the need for additional research to support the development of professional scope of practice and guideline documents for audiologists in South Africa. It highlights the importance of explicitly defining FRS as part of the audiologist's scope of practice within professional documentation. Moreover, the study identifies a pressing need to document the audiologist's role in FRS within the MDT and to establish recommended tools and protocols specific to the audiology context.

Based on the findings, it is recommended that professional bodies consider the formation of a task team to conduct research and to update the scope of practice documentation, specifically addressing FRS as a key responsibility of audiologists in preventative practice. Additionally, the task team should develop guidelines outlining best practices for audiologists in conducting FRS within the hearing and vestibular clinic settings and in collaboration with the MDT.

6.6 Recommendations for future research

Before FRS ‘best practice’ guidelines can be compiled for audiologists, further research is needed. This study highlighted several areas requiring further research, namely:

- To establish the opportunities available to audiologists within undergraduate curriculums to learn about how to conduct FRSs, at South African universities.
- To determine the efficacy of FRS training programs. This could be done by correlating actual knowledge and following up with participants a year later to identify if clinical implementation of FRS is evident.
- To identify which combinations of FRS tools (protocols) yield the most accurate results within the audiology clinic context.

- Research exploring the barriers and facilitators to MDT collaboration for FRS and referrals for appropriate management post screening would be valuable.
- FRS is the starting point in the fall prevention process. Further research is however also needed in identifying the efficacy of fall prevention management programs within the South African context.
- Future research looking at audiologists' practice in FRS should include virtual fall risk assessment options, such as the FRAT-up.
- Research investigating the sensitivity and specificity of the ICF code set in identifying fall risk in the audiology clinic setting would be valuable.
- Reconducting this research with a larger interview sample size using inductive thematic analysis,

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APPENDICES

APPENDIX 1
Survey of Audiologists Best Practice for Assessing Risk of Fall (Patterson & Honaker, 2014)

Survey of Audiologists' Best Practice for Assessing Risk of Falling

Background Information

1. Date of completion of highest degree:
____Before 1970
____Between 1971 and 1980
____Between 1981 and 1990
____Between 1991 and 2000
____Between 2001 and 2011

2. Highest degree earned:
____B.A., B.S.
____M.A., M.S.
____Ed.D.
____Au.D.
____Ph.D.
____Other

3. Geographic location:
____Rural and/or small town
____Suburban
____City

4. Describe your clinical environment
____Hospital setting
____University setting

APPENDIX 1 Continued…

8. Approximate total number of hours of RoF training/education____

9. Please indicate your experience with RoF Assessment:
___Currently implementing RoF assessment
___Previously implemented RoF assessment
___Planning to implement RoF in the future
___No experience with RoF
___Other_____

10. Approximate number of years of experience with RoF assessment:_____

11. Please indicate resources used when solely assessing your patients of falling risk:
___Fall history question(s) on intake questionnaire (e.g., Have you fallen?)
___Performance-based gait assessment tools (e.g., Gait Speed, Timed Up & Go, Berg Balance Scale, Dynamic Gait Index, Functional Gait Assessment, and Functional Reach)
___Fear of Falling/Balance Confidence Questionnaire (e.g., Activities-specific Balance Confidence Scale and Modified Falls Efficacy Scale)
___Computerized dynamic posturography
___Vestibular function testing (i.e., ENG/VNG, VEMP, and rotational chair)
___Geriatric Depression Scale or equivalent behavioral assessment scale
___Cognitive Function Scale (e.g., Mini-Mental State Examination)
___Reaction time assessment
___Review of medication history
___Orthostatic hypotension evaluation
___Proprioception and vibration senses screening

APPENDIX 1 Continued…

Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about RoF assessment. Please indicate only one response for each statement.

SA = ***Strongly Agree*** SD = ***Strongly Disagree***
MA = ***Mildly Agree*** MD = ***Mildly Disagree***
U = ***Uncertain***

1. RoF assessment is part of the audiologist's scope of practice.	SA	MA	U	MD	SD
2. Learning new ways to administer risk of falling would be helpful to me.	SA	MA	U	MD	SD
3. Audiologists have opportunities to learn about RoF assessment.	SA	MA	U	MD	SD
4. Audiologists are knowledgeable about RoF assessment.	SA	MA	U	MD	SD
5. All older adults can benefit from RoF assessment.	SA	MA	U	MD	SD
6. Audiologists are sufficiently trained to provide RoF assessment.	SA	MA	U	MD	SD
7. RoF assessment should be applied to all patients served in the audiology clinic.	SA	MA	U	MD	SD
8. Multidisciplinary screening is important to RoF assessment.	SA	MA	U	MD	SD
9. RoF assessment is necessary to determine candidacy for a rehabilitation program (e.g., physical therapy).	SA	MA	U	MD	SD
10. Changing my practice to better support risk of falling would take a lot of time.	SA	MA	U	MD	SD
11. RoF assessment is important, but uncontrollable	SA	MA	U	MD	SD

APPENDIX 1 Continued…

23. RoF assessment is important in addressing the needs of our aging population.	SA	MA	U	MD	SD
24. RoF assessment is restricted to specific areas of audiological practice, such as vestibular and balance disorders.	SA	MA	U	MD	SD
25. Audiologists have an important role in RoF assessment.	SA	MA	U	MD	SD
26. I typically ask about history of falls at the initial audiology appointment.	SA	MA	U	MD	SD
27. Implementing a RoF assessment program may add to my job stress and/or lead to burn out.	SA	MA	U	MD	SD
28. Across the U.S., large numbers of audiologists are having discussions about RoF assessment and fall prevention.	SA	MA	U	MD	SD
29. A RoF assessment program can be challenging to implement because:					
a. Training is needed.	SA	MA	U	MD	SD
b. Funds are needed to support assessment and/or intervention.	SA	MA	U	MD	SD
c. Additional personnel may be needed.	SA	MA	U	MD	SD
d. Workload may be too demanding	SA	MA	U	MD	SD
e. Administrative leadership is needed.	SA	MA	U	MD	SD

APPENDIX 2

"Professional Guidelines and Reported Practice of Audiologists Performing Fall Risk Assessment with the Elderly: A Systematic Review" by van Rie, Kanji and Naudé (2021)



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ASHA American Speech-Language-Hearing Association

AJA

Review Article

Professional Guidelines and Reported Practice of Audiologists Performing Fall Risk Assessment With Older Adults: A Systematic Review

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ARTICLE INFO

Article History:
Received July 16, 2021
Revision received September 26, 2021

ABSTRACT

Purpose: This systematic review aimed to explore the recommended fall risk assessment practices in audiology, identify audiologists' reported practices in fall risk assessment, and recognize the barriers and facilitators affecting fall risk

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assessment and management of older adults with balance disorders was shown to be an efficacious way to deal with fears about falling and improving quality of life in Honaker's (2006) PhD thesis. Within the Future Directions statement, Honaker (2006) initiated the perspective that medical professionals need to shift their focus to encourage older adults to be aware of their fall risk factors. Later, Honaker (2015) further discussed in an ASHA *Leader Live* article that audiologists need to start thinking about their role in early fall risk identification and prevention with older adults to improve patient-centered outcomes.

It is estimated that 75% of adults older than 65 years have a disabling hearing loss in the United States (National Institute on Deafness and Other Communication Disorders, 2016). As a result, many audiologists may primarily provide services to older adults, especially as the population is living longer and the degree of a person's hearing loss and its effects on functioning continue to progress with advancing age (Dupuis et al., 2019). Research has revealed that older patients with hearing loss are more at risk of falling (Criter & Honaker, 2016a; Viljanen et al., 2009). It has been suggested within a clinical trial review and a systematic review that this is because hearing loss and vestibulopathy are intrinsic fall risk factors (Chiarella et al., 2020; Jiam et al., 2016). However, it is also important to consider that older individuals seeking out audiological services appear to present with poorer overall health and, thus, may also present with several additional fall risk factors (Criter & Honaker, 2016a). Criter and Honaker's (2016a) research revealed that audiology patients reported an average of 2.12 chronic conditions and non-audiology patients reported an average of 1.56 conditions. Among these chronic conditions were compounding fall risk factors, such as polypharmacy, diabetes, depression, and decreased cognition (Zalewski, 2015). Audiologists are thus working with a population who are highly vulnerable to falls.

Audiologists are placed in a paramount position to identify older individuals who are at risk of falling so that reduction of falls through individualized intervention can commence. With the audiologist's regular contact with older individuals and their graduate training of the vestibular and balance system, their importance in the early identification of fall risk is undeniable. The question, however, remains as to whether audiologists are currently contributing to the early identification of fall risk with their older patients (individuals over the age of 65 years). The aim of this systematic review was to identify the recommended and reported practice of audiologists performing fall risk assessments with their older patients.

The following three objectives were defined:

A. To establish what the recommended practice for audiologists is in the realm of fall risk assessment according to professional scope of practice and guideline documents.
B. To identify current fall risk assessment practices of audiologists as mentioned in the literature.
C. To distinguish what factors encouraged or prevented audiologists from conducting fall risk assessments, to aid in understanding the barriers and facilitators affecting fall risk assessment in audiology.

Objective A was completed by exploring information on fall risk assessment in scope of practice and guideline documents established by international, professional audiology associations and available on their respective websites. Objectives B and C were met through the use of a systematic review. In order to ensure research rigor and trustworthiness, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2015) checklist was followed. A summary of the process from the search to the final selection of studies for extraction and synthesis, including how many articles were included or excluded at each stage, is presented in Figure 1.

Method

Search Strategy and Selection Criteria

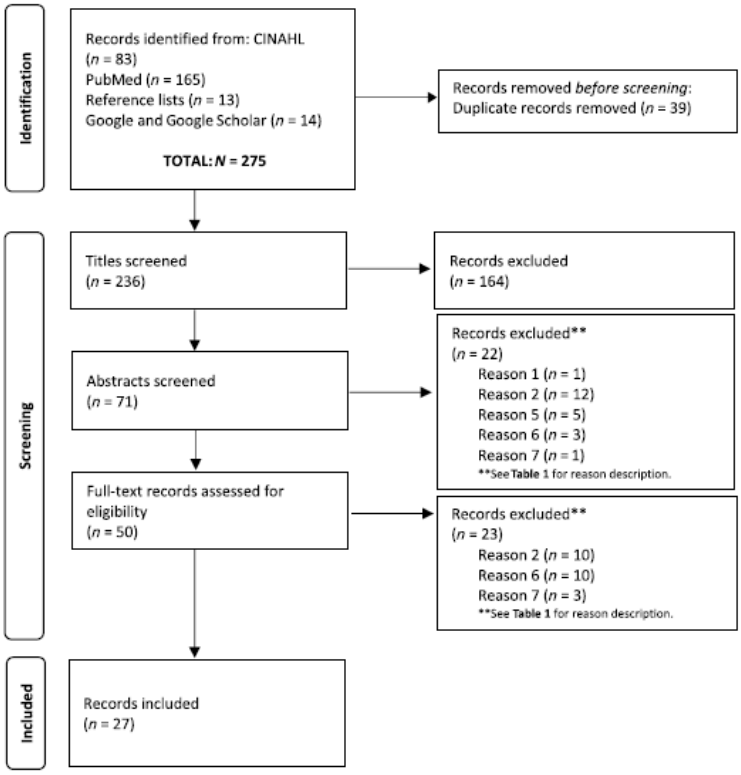
Audiology professional association documents were identified using four phases. First, the professional associations were identified within South Africa, the United States, Canada, the United Kingdom, India, and Australia. Second, all official documentation available on their websites was identified. Third, all document titles pertaining to scope of practice, general audiology guidelines, balance/vestibular practice, or practice with older adults were downloaded for a full-text review. Last, to ensure that no documents had been missed, the researcher conducted several searches on each website using the key words "falls," "fall risk," "assessment," "balance," and "elderly." Documents were excluded if it was identified after a full-text review that they did not make mention of fall risk or fall risk assessment.

The search strategy used to identify articles to be included in the systematic review proceeded as follows: First, the search terms were defined using the PICO (Population, Intervention, Comparison, Outcomes) guidelines; however, this yielded more than 21,000 search responses, most of which were irrelevant to the scope of this review article. The search terms were simplified to Medical Subject Headings terms, namely, "accidental falls" AND "audiology," and the search was conducted using PubMed and CINAHL databases. Gray literature discussing fall risk assessment in audiology found by conducting Google and Google Scholar searches was also included. Non-English articles and articles older than 2005 were excluded

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Figure 1. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram details the search and selection process applied during the review process.



from the search. Furthermore, only full-text articles were included.

Article Assessment and Selection

All records identified using the systematic review process (see Figure 1) with relevant titles were exported to Mendeley (online reference manager software), where all three authors independently screened each report at an abstract level using the inclusion and exclusion criteria (see Table 1). Where a conflicting decision was made as to whether an article should be included or excluded at the abstract level, the article was moved to the full-text review level. At the full-text review level, the articles accepted for inclusion by all three authors reached 83% agreement. Any discrepancies related to the inclusion of articles were resolved through a discussion between the two authors with a conflicting view. If consensus could not be reached, the remaining author reviewed arguments from both sides and decided on whether to include the article or not.

Ultimately, 27 articles were included in this review article (see Figure 1). In the end, the inclusion of these articles was made with 100% agreement between authors. Table 3 summarizes the articles included in this review article.

Systematic Review: Eligibility Criteria

The inclusion and exclusion criteria used when selecting records can be viewed in Table 1. Reports were not excluded based on its peer review status, study design, participants, or outcome measures. This was because it was identified that answers to the research questions were not easily found within peer-reviewed literature but tend to be found in non–peer-reviewed editorials as well as informative, opinion, and descriptive articles instead. To obtain a wide understanding of the research objectives, the inclusion/exclusion criteria were very open. It is therefore important

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Table 1. Article inclusion and exclusion criteria.

Reason no.	Inclusion criteria	Exclusion criteria	Rationale
1	Articles written in 2005 or later	Articles written before 2005	The first document identified in this review article on an audiology professional association website that mentioned fall risk was published in 2006 (ASHA, 2006).
2	Included information on fall risk measures being used or possible barriers and facilitators to conducting fall risk assessments in audiology	Did not include information on fall risk measures being used or possible barriers and facilitators to conducting fall risk assessments in audiology	To ensure data were being recorded systematically and with stringent focus (Cherry & Dickson, 2017)
3	Free access via the university portal	Articles required payment, or no access was available due to membership requirements.	Due to cost and time involved in purchasing the material (Edinger & Cohen, 2013)
4	Article available in English	Article only available in a foreign language	Due to cost and time involved in translating the material (Edinger & Cohen, 2013)
5	Full text available	Full text not available	To ensure that data were being captured responsibly and accurately, with an understanding of the research context and objectives (Edinger & Cohen, 2013)
6	Fall risk assessment protocols discussed were conducted within the audiology context.	Fall risk protocols discussed were conducted by medical professionals other than audiologists.	The purpose of this review article was to identify assessment practices of audiologists (Meline, 2006).
7	The article had to be discussing fall risk assessment, where fall risk was the main concern.	Articles discussing balance assessment protocols with patients who have vestibular disorders were excluded.	The purpose of this review article was to identify assessment practices of audiologists where the main concern was fall risk of older adults and not fall risk as a secondary concern due to vestibular pathology (Meline, 2006).
8	The article had to focus on fall risk assessment with older patients.	The article had to focus on fall risk assessment with a population other than older adults.	The purpose of this review article was to identify assessment practices of audiologists where the main concern was fall risk of older adults (Meline, 2006).

for the reader to understand that the subsequent conclusions are based on mostly anecdotal and opinion articles with scant peer-reviewed, original data.

Data Collection and Extraction

Two data extraction sheets were compiled to ensure consistent and reliable data extraction from the literature reviewed. The first sheet captured pertinent data found in the scope of practice and guideline documents. This assisted in fulfilling Objective A. The second sheet extracted relevant information from the records included in the systematic review, whereby data pertaining to Objective B were separated from data pertaining to Objective C.

Risk of Individual Bias and Bias Across Studies

The focus of this review article was not to assess validity or appraise the strength of evidence available on fall risk assessment practice protocols utilized in audiology. Rather, the purpose was to identify and describe reported practice in the realm of fall risk assessment in audiology as well as to underpin possible facilitators and barriers in fall risk assessment in audiology, to guide future research in this area. Therefore, no formal assessments of quality or risk of bias of the articles were deemed necessary to perform.

Data Analysis

All data referring to fall risk within the reviewed scope of practice and guideline documents were summarized (see Table 2) for discussion. Data from the 27 articles identified through the systematic review were summarized and analyzed using a qualitative, inductive approach. Fall risk practice discussed in the audiology literature was documented, and the measures mentioned as well as the number of times they were mentioned were tabulated (see Table 4).

Results

The results are discussed in line with the three objectives of this review article.

Recommended Practice for Audiologists in the Realm of Fall Risk Assessment

Sixteen scope of practice and guideline documents were reviewed. Twelve of the 16 documents reviewed did not

APPENDIX 2 Continued

Table 2. Summary of scope of practice and guideline documents that provided information on fall risk within audiology.

Country	Organization	Year	Document name	Mention of older adults being at risk of falling	Specific mention of the audiologist's role in fall risk assessment of older adults	Guidelines on how to conduct fall risk assessment	Fall risk information
USA	ASHA	2006	Preferred Practice Patterns for the Profession of Audiology	x	x	✓	• "Falls risk assessment may include, but not be limited to, the above assessment procedures (vestibular assessments) in addition to assessment measures of gait, blood pressure, mentation, depression, vision, and reaction time." (p. 34) • "Results of the balance system assessment are interpreted, and the evaluation may assist in making recommendations for vestibular and balance rehabilitation therapy, reduction in falls risk, and possible referral for medical evaluation." (p. 33)
USA	AAA	2014	Position Statement on the Audiologist's Role in the Diagnosis and Treatment of Vestibular Disorders	✓	x	x	• "In the elderly person, balance-related falls are associated with significant morbidity, mortality, and expense to the health-care system." (p. 1)
Australia	Audiology Australia	2013	Audiology Australia Professional Practice Standards—Part A Clinical Operations	✓	✓	x	• "Allied health professionals have an important role to play to prevent clients and patients from falling and experiencing harm from falls." (p. 63) • "An audiology practice needs to consider the risk of falls with respect to its client base. There may be a greater degree of risk of falls associated with clients who are elderly and clients who may have a balance disorder." (p. 63) • "In particular, clinics that have a significant client base of elderly people or offer vestibular assessment should consider a falls prevention and management policy." (p. 63) • Audiologists need to understand the role they play and should 1. promote independence for people at risk of falls; 2. examine fall prevention in the context of a person's circumstances, goals, and interests; 3. understand fall prevention and how to contribute to fall prevention as a part of routine care; 4. use surveillance and observation approaches, which are particularly useful for people who have a high fall risk and who may be temporarily or permanently cognitively impaired; 5. consider an active role in assessment and/or assessing a person's risk of falling and act on the results; 6. be aware of local practice in fall prevention in facilities such as hospitals and aged care facilities;

(*table continues*)

APPENDIX 2 Continued

Table 2. *(Continued).*

Country	Organization	Year	Document name	Mention of older adults being at risk of falling	Specific mention of the audiologist's role in fall risk assessment of older adults	Guidelines on how to conduct fall risk assessment	Fall risk information
							7. consider arranging an appropriate referral for people deemed to be at risk of falls in the community setting (e.g., a referral to an occupational therapist); 8. encourage clients to have regular vision review; 9. ensure that people who have fallen or are at a high risk of falling have additional injury prevention strategies in place; and 10. consider the role of an audiologist in a multifactorial, multidisciplinary fall prevention program. (pp. 63 and 64)
							• Audiologists are encouraged to refer to the Australian Commission on Safety and Quality in Health Care for fall prevention guidelines.
USA	ASHA	2020	MIPS Quality Measures for Audiologists Scope of Practice: Guidance on QPP Final Rule and MIPS Applies to Audiology, Family Medicine, Internal Medicine, Nephrology, Orthopedic Surgery, Otolaryngology, Physical Therapy/ Occupational Therapy, Podiatry	✓	✓	✓	**Measure #154: Fall Risk Assessment** To be conducted with patients who are 65 years and older, reported a minimum of once per calendar year. To accurately report on Measure #154 (Fall Risk Assessment), audiologists were required to document: • **Risk assessment:** Composed of a balance/gait scale (e.g., Get Up & Go, Berg Balance Scale, Tinetti) and one or more of the following: postural blood pressure, vision, home fall hazards, and documentation on whether medications are a contributing factor or not to falls within the past 12 months. **Measure #318: Falls Assessment for Future Fall Risk** • Applicable for patients aged 65 years and older. • Assessment of whether an individual has experienced a fall or problems with gait or balance. A specific assessment tool is not required for this measure; however, potential assessment tools include the Morse Fall Scale and the Timed Up & Go/Get Up & Go test. All older persons who are under the care of a heath professional (or their caregivers) should be asked at least once a year about falls. • Older persons who present for medical attention because of a fall, report recurrent falls in the past year, or demonstrate abnormalities of gait and/or balance should have a fall evaluation performed. This evaluation should be performed by a clinician with appropriate skills and experience, which may necessitate referral to a specialist (e.g., geriatrician).

Note. ASHA = American Speech-Language-Hearing Association; AAA = American Academy of Audiology; MIPS = Merit-Based Incentive Payment System; QPP = Quality Payment Program.

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make mention of fall risk. Interestingly, this included all the scope of practice documents reviewed across the six countries. Within the scope of practice documents, the audiologist's role in balance and vestibular testing was clear, but no specific mention was made of fall risk assessments on older individuals.

Only four out of the 16 documents made mention of fall risk in the older adult population. Three of these documents were from the United States, and one was from Australia. The fall risk statements found within these documents are detailed in Table 2.

Only one document specified the roles of the audiologist (Audiology Australia, 2016), and two documents briefly discussed possible assessment areas and measures (American Speech-Language-Hearing Association [ASHA], 2006, 2020). In summary, the documents in Table 2 suggested that audiologists should "consider an active role in assessment and/or assessing a person's risk of falling and act on the results" (Audiology Australia, 2016, p. 63). The following fall risk measures were mentioned within audiology guideline documents: fall history questions, risk assessment, postural blood pressure, vision assessment, home fall hazards assessment, depression, mentation, reaction time, and a review of medications taken (ASHA, 2006, 2020). In addition, the following functional measures of gait and balance were listed: Get Up & Go/Timed Up & Go (TUG), Berg Balance Scale, Tinetti, and Morse Fall Scale (ASHA, 2006, 2020).

Audiologist's Reported Practice

The articles that were included in this review article were separated into three categories and documented in Table 3. Within Table 3, Category 1 consisted of articles that directly researched what audiologists' reported practice was in fall risk assessment. Category 2 included articles where the main goal was not necessarily to identify audiologists' fall risk assessment practices but, nonetheless, provided valuable insights into the chosen fall risk assessment measures included in research methodology. Category 3 included articles that were not research based (editorials, commentaries, opinion and descriptive articles) but provided valuable insights into what authors in the field of audiology recommended or discussed with regard to fall risk in the realm of audiology. Table 3 also reveals that the majority of articles exploring fall risk in the realm of audiology have originated from the United States. Contribution is also observed from Canada, Turkey, and Italy, but to a much smaller extent.

A large variety of fall risk assessment measures were mentioned within the audiology literature. Twenty-five of the 27 articles included made reference to specific fall risk assessment measures. The number of times each measure was mentioned within a screening or diagnostic assessment context can be viewed in Table 4.

In this review article, when an article made mention of measures that gave the clinician an objective, quantitative idea of a specific system's function (such as the vestibular system), this was considered a diagnostic test battery. A screening test battery was defined as a battery of tests mentioned that required subjective interpretation and where the goal of the assessment was to identify possible fall risk factors. Overall, nine articles mentioned fall risk measures within a diagnostic test battery, and 16 articles mentioned fall risk measures within a screening test battery (n = 25).

Overall, results revealed that the six most reported fall risk screening assessment measures in the audiology literature were case history (11/16), the TUG test (Podsiadlo & Richardson, 1991; 10/16), the Activities-Specific Balance Confidence Scale (ABC Scale; Powell & Myers, 1995; 8/16), the Dizziness Handicap Inventory (DHI; Jacobson & Newman, 1990; 6/16), the modified Clinical Test of Sensory Integration and Balance (Shumway-Cook & Horak, 1986; 5/16), and medication review (5/16). Likewise, the six most frequently reported fall risk diagnostic assessment measures in the audiology literature were computerized dynamic posturography (CDP; 9/9), videonystagmography/electronystagmography (VNG/ENG; 8/9), rotatory chair testing (8/9), the TUG test (7/9), the Mini-Mental State Examination (MMSE; Folstein et al., 1975; 7/9), and the Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986; 6/9).

Although fall risk assessment measures are evident in the audiology literature, insights from the articles in Category 1 (see Table 3) revealed that fall risk assessments are not being conducted by numerous audiologists as part of standard practice. Bassett's (2018) unpublished dissertation reported that nearly half of the audiologists (45.5%, n = 25/55) who responded to a survey in the United States did not conduct fall risk screening on older patients. Similarly, another study reported that 62.1% (n = 147/238) of audiologists surveyed indicated no experience with fall risk assessments (Patterson & Honaker, 2014). Additionally, in Canada, 76.9% of audiologists stated that they do not use fall risk screening tools (Baxter et al., 2017).

Patterson and Honaker (2014) further reported that of the audiologists who were conducting fall risk assessments, all of them were also practicing vestibular audiology. The most common measures reportedly used as part of a fall risk assessment were tests of vestibular function (37.4%). Very few reported the use of functional balance measures in their fall risk assessment protocols (only 12.6%). Furthermore, additional screening measures, such as fear of falling, cognition, depression, hypertension, proprioception and vibration senses, vision screening, and home hazards screening, were conducted by less than 7% (n = 238) of vestibular audiologists (Patterson & Honaker, 2014).

Findings also revealed that in recent years, in the United States, Medicare has initiated an incentive program encouraging audiologists to conduct fall risk screening

APPENDIX 2 Continued

Table 3. Summary of articles included in the systematic review (n = 27).

Article category	No.	Study citation	Study title	Country	Study design & publication type	Objective B screening/diagnostic fall risk test battery mentioned	Objective C fall risk assessment barriers/ facilitators mentioned
1. Research articles that explored audiologists' current fall risk screening practices	1	Bassett (2018)	Evaluating Fall Risk Assessment Protocols in the Field of Audiology	USA	PhD	Screening	✓
	2	Baxter et al. (2017)	Striking the Right Balance: Current Fall Prevention Strategies in Audiology Practice: A Review of the 2017 CAA Fall Prevention Survey Results	Canada	Descriptive study	Screening	✓
	3	Callahan et al. (2013)	Academic Training of Audiology Graduate Students in Vestibular Evaluation and Balance Assessment Procedures	USA	Descriptive study	Tools not discussed	✓
	4	Patterson & Honaker (2014)	Survey of Audiologists' Views on Risk of Falling Assessment in the Clinic	USA	Descriptive study	Diagnostic	✓
2. Research articles where audiologists discussed fall risk screening or utilized fall risk screening tools in their methodology	5	Alvord et al. (2008)	A Preliminary Study of the Effectiveness of an Otolaryngology-Based Multidisciplinary Falls Prevention Clinic	USA	Observational study	Diagnostic	✓
	6	Baydan et al. (2019)	The Interaction Between Mild Cognitive Impairment With Vestibulo-ocular Reflex, Dynamic Visual Acuity and Postural Balance in Older Adults	Turkey	Experimental study	Screening	x
	7	Ciorba (2015)	Dizziness and the Risk of Falling in the Elderly: A Literature Review	Italy	Literature review	Screening	✓
	8	Criter & Gustavson (2020)	Subjective Hearing Difficulty and Fall Risk	USA	Correlational study	Screening	x
	9	Criter & Honaker (2013)	Falls in the Audiology Clinic: A Pilot Study	USA	Descriptive, correlational, and retrospective study	Screening	x
	10	Criter & Honaker (2016b)	Identifying Balance Measures Most Likely to Identify Recent Falls	USA	Retrospective review	Screening	✓
	11	Criter & Honaker (2016a)	Audiology Patient Fall Statistics and Risk Factors Compared to Non-Audiology Patients	USA	Case–control study	Screening	✓
	12	Criter & Honaker (2017)	Fall Risk Screening Protocol for Older Hearing Clinic Patients	USA	Cross-sectional study	Screening	✓
	13	Honaker (2006)	A Team Approach Risk of Falling Assessment and Remediation Program for Community Dwelling Older Adults With a Fear of Falling and Balance Disorders	USA	PhD	Diagnostic	x

(table continues)

APPENDIX 2 Continued

Table 3. *(Continued).*

Article category	No.	Study citation	Study title	Country	Study design & publication type	Objective B screening/diagnostic fall risk test battery mentioned	Objective C fall risk assessment barriers/ facilitators mentioned
	14	Honaker & Shepard (2011)	Use of the Dynamic Visual Acuity Test as a Screener for Community-Dwelling Older Adults Who Fall	USA	Experimental study	Screening	x
	15	Jacobson et al. (2008)	Significant Vestibular System Impairment Is Common in a Cohort of Elderly Patients Referred for Assessment of Falls Risk	USA	Retrospective review	Diagnostic	✓
	16	Krager (2018)	Assessment of Vestibular Function in Elderly Patients	USA	Literature review	Diagnostic	x
3. Editorials as well as informative, opinion, and descriptive articles where fall risk screening was discussed	17	Bassett & Honaker (2016)	Audiologist's Role Within the Changing Climate of Fall Prevention: Are We Ready?	USA	*Perspectives of the ASHA Special Interest Groups* article	Screening	✓
	18	Chiarella et al. (2020)	Disequilibrium and Risk of Falling in the Elderly Is a Priority for Health Services	Italy	Review of clinical trials	Screening	✓
	19	Criter et al. (2013)	Audiologists' Role in Assessing Risk of Falls	USA	*Perspectives of the ASHA Special Interest Groups* article	Diagnostic	✓
	20	Danhauer et al. (2011)	An Open Letter to Dennis: We Can Do More to Educate Our Patients About Falls	USA	*Audiology Today* article	Screening	✓
	21	Handelsman (2011)	Falls Among Older Adults: A Public Health Concern	USA	*ASHAWire* article	Screening	x
	22	Hatton (2016)	Prevent Falling Patients From Falling Off the Radar: Resources for Building Your Falls Risk Protocol	USA	*ASHAWire* article	Diagnostic	✓
	23	Honaker et al. (2013)	Life in Balance	USA	*The ASHA Leader* article	Screening	✓
	24	Jedlicka (2020)	20Q: Why All Audiologists Should Be Administering Balance Screenings	USA	AudiologyOnline interview	Screening	✓
	25	Lindsey (2015)	Audiologists Integral Piece of the Puzzle in Fall Prevention	USA	Cover Story article in *The Hearing Journal*	Diagnostic	✓
	26	McCaslin (2013)	Falls in the Elderly and the Role of the Audiologist	USA	Editorial	None	✓
	27	Smith & Porter (2013)	Fall Risk Assessment and Intervention	USA	*Perspectives of the ASHA Special Interest Groups* article	Diagnostic	✓

Note. CAA = Canadian Academy of Audiology; ASHA = American Speech-Language-Hearing Association.

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Table 4. Fall risk assessment measures reported in audiology practice and research.

Instrument type	Fall risk assessment measure	Diagnostic test battery (n = 9) Goal: diagnosis	Screening test battery (n = 16) Goal: identify fall risk	Total no. of mentions (n = 25)
Fall risk factor screening	Case history (e.g., history of falls or fear of falling, imbalance symptoms)	6	11	17
	Medication review	5	5	10
	Risk factors checklist (comorbidities)	2	4	6
	STEADI questionnaire	1	2	3
	Use of ambulatory device	0	2	2
	Morse Fall Scale	/	1	1
	Questions about inactivity	1	/	
	St. Thomas's Risk Assessment Tool (STRATIFY)	1	1	2
	Family member interviews about falls	/	1	1
Self-report questionnaires	Activities-Specific Balance Confidence Scale	3	8	11
	Geriatric Depression Scale	6	2	8
	Dizziness Handicap Inventory	6	2	8
	Hospital Anxiety and Depression Scale	1	2	3
	Beck Anxiety Inventory	3	/	3
	Falls Efficacy Scale	2	/	3
	Falls Efficacy Scale – International			
	Hearing Handicap Inventory for the Elderly	/	3	3
	Instrumental Activities of Daily Living	/	1	1
	Vertigo Symptom Scale – Short Form	/	1	1
	The Disability Scale	/	1	1
	Vertigo Handicap Questionnaire	/	1	1
	UCLA Dizziness Questionnaire	/	1	1
	Vestibular Disorders Activities of Daily Living Scale	/	1	1
	Center for Epidemiologic Studies Depression Scale	1	/	1
Functional measures of gait and balance	Timed Up & Go	7	10	17
	Computerized dynamic posturography - Motor Control Test - Sensory Organization Performance Task	9	2	11
	Dynamic Gait Index	3	4	7
	Modified Clinical Test of Sensory Integration and Balance – bedside/computerized	1	5	6
	Berg Balance Scale	2	4	6
	Tinetti balance assessment tool	2	3	5
	Gait	2	2	4
	Romberg test	2	2	4
	30 Second Sit To Stand Test	2	1	3
	Fukuda Stepping Test	2	1	3
	Functional Reach Test	2	1	3
	5 Times Sit to Stand Test	/	3	3
	STEADI tools	2	1	3
	Functional Gait Assessment	2	/	2
	Single-leg stance test	1	1	2
	Gans Sensory Organization Performance Task	/	2	2
	Dual-task measures	/	1	1
	CDC 4-Stage Balance Test	1	/	1
	Romberg	1	/	1
Bedside vestibular assessments	Oculomotor assessment	1	1	2
	Vestibular–ocular reflex assessment	1	1	2
	Videonystagmography/electronystagmography	8	2	10

(table continues)

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Table 4. *(Continued).*

Instrument type	Fall risk assessment measure	Diagnostic test battery (*n* = 9) Goal: diagnosis	Screening test battery (*n* = 16) Goal: identify fall risk	Total no. of mentions (*n* = 25)
Vestibular clinic diagnostic procedures	Rotatory chair testing	8	/	8
	Dynamic visual acuity	2	4	6
	Vestibular evoked myogenic potentials	5	/	5
	Benign paroxysmal positional vertigo assessment	5	/	5
	Video head impulse test	4	/	4
	Caloric	4	1	4
	Gaze stabilization testing	2	/	2
	Sinusoidal harmonic testing	1	/	1
	Dynamic visual acuity perception time test	1	/	1
	Vertebrobasilar artery insufficiency protocol	1	/	1
	VOR suppression	1	/	1
Additional measures	Mini-Mental State Examination	7	2	9
	Vision assessment	5	1	6
	Postural blood pressure	4	1	5
	Home fall hazards/environmental assessment	3	2	5
	Sensation, proprioception, somesthesia Vibration	5	/	5
	Reaction time	4	/	4
	Fall prevention handouts	/	1	1
	Katz Activities of Daily Living	/	1	1
	Cardiovascular function	1	/	1
	Montreal Cognitive Assessment	/	1	1
	Lower extremity strength and sensation	1	/	1
	Foot anomalies	1	/	1
	Motor control test, sensory organization test, and big toe up or down test	1	/	1
	Lawton and Brody's Instrumental Activities of Daily Living Scale	/	1	1

Note. STEADI = Stopping Elderly Accidents, Deaths & Injuries; / = tool not mentioned; UCLA = University of California, Los Angeles; CDC = Centers for Disease Control and Prevention; VOR = vestibulo-ocular reflex.

measures with their older patients (ASHA, 2020). The assessment measures reportedly used by the U.S. audiologists who are implementing Medicare's fall risk screening guidelines appeared to correlate with some of the most mentioned screening measures found in this review article, namely, the TUG test, case history such as fall history or "fear of falling" questions, the DHI, and medication review (Bassett, 2018).

Fall Risk Assessment Barriers and Facilitators Within the Audiology Clinic

Several possible barriers and facilitators were described; most factors were mentioned several times within the reviewed literature, which affirmed the reliability of the identified barriers and facilitators summarized in Figure 2.

Fall Risk Assessment Barriers

Scope of practice beliefs. One barrier that was suggested was the consensus between audiologists as to whether fall risk assessment was within the scope of the audiologist, with findings from both a U.S. and a Canadian study indicating the belief that fall risk assessment and prevention should not be within the scope of the audiologist (Baxter et al., 2017; Honaker, 2015).

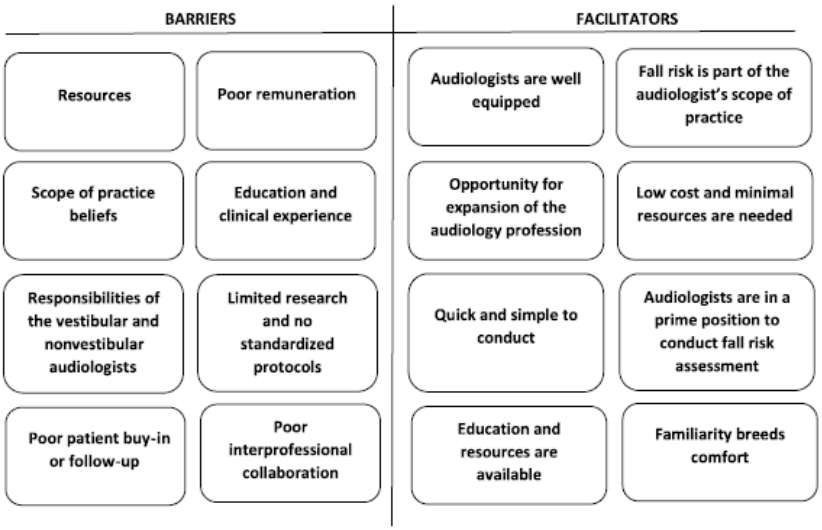
Education and clinical experience. The uncertainty of some audiologists with regard to their role in fall risk assessment may stem from limited education and clinical experience in the area of fall risk assessment. Eight of the 27 articles discussed that formal training and education on fall risk assessment is lacking (Bassett, 2018; Bassett & Honaker, 2016; Baxter et al., 2017; Criter & Honaker, 2017; Criter et al., 2013; Jedlicka, 2020; Patterson & Honaker, 2014).

One study from the United States identified that very few audiology doctoral programs incorporated fall risk assessment training into the vestibular and balance coursework, with only 40% of the students reporting hands-on experience with fall risk assessments (Callahan et al., 2013). This finding corresponds with findings in a later dissertation which revealed that only 19% of audiologists felt their university coursework prepared them to conduct fall risk assessment measures (Bassett, 2018). Similarly, 90.6% of Canadian audiologists felt ill-equipped in fall risk measures after their studies (Baxter et al., 2017).

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Figure 2. A summary of the fall risk assessment barriers and facilitators identified in the audiology literature for fall risk screening in the audiology clinic.



Several authors have expressed the sentiment that there is a need for further training in fall risk practice through improved graduate coursework or continuing education credits (Bassett & Honaker, 2016; Callahan et al., 2013; Criter & Honaker, 2017), with the suggestion that it should perhaps be introduced at the same time hearing assessment is being taught and practiced (Jedlicka, 2020).

Limited research and no standardized protocols. Standardizing fall risk coursework, however, may prove to be a challenge. Authors have discussed that further research is needed to identify the most sensitive, specific, quick, and practical fall risk assessment protocols within the audiology practice setting (Ciorba et al., 2017; Criter & Honaker, 2016b; Criter et al., 2013; Lindsey, 2015). One of the studies explored several combinations of fall risk assessment tools (Bassett, 2018) and revealed that varying assessment protocols had high specificity but lacked sensitivity, which may result in over-referral to other medical professionals.

Resources. In addition to standardization concerns, audiologists have also expressed concerns regarding not having the appropriate resources required for fall risk assessment practice. The four resources highlighted in the articles included time (6/27 articles), equipment (6/27 articles), additional personnel needed (1/27 articles), and limited space (1/27 articles).

Poor remuneration. Another practical barrier specified is the lack of remuneration and reimbursement received for fall risk measures (Bassett, 2018; Patterson & Honaker, 2014). Within an opinion article, Jedlicka (2020) confirmed that audiologists are not reimbursed for completing fall risk assessments. The only measures that are reimbursed are objective vestibular assessments. Thus, it may not be feasible for audiologists to be spending a lot of time conducting fall risk measures. For this reason, in the viewpoint of Lindsey (2015), fall risk assessment protocols need to be quick and easy to administer.

Responsibilities of the vestibular and nonvestibular audiologists. Three articles highlighted that fall risk assessment measures may be assumed to be the responsibility of the audiologists practicing vestibular audiology and that hearing clinic audiologists may feel exempt from fall risk assessment of patients (Bassett & Honaker, 2016; Baxter et al., 2017; Patterson & Honaker, 2014). Patterson and Honaker's (2014) study was the only study with original data to support this claim—79% of audiologists believed that fall risk assessment was more prominent in the vestibular and balance clinic.

Poor patient buy-in and follow-up. Fall risk assessment and prevention requires close monitoring and follow-up with patients (Lindsey, 2015). An article in the *Audiology Today* magazine suggested that another barrier in conducting fall risk assessment measures may be that audiologists feel it is difficult to determine if a patient has followed their recommendations (Danhauer et al., 2011). It has also been speculated that some audiology clinics may feel that they do not have the appropriate infrastructure to be able to adequately evaluate, recommend, and track patient outcomes (Bassett & Honaker, 2016).

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Poor interprofessional collaboration. Tracking of patients may prove to be difficult because a network of medical professionals may be involved in managing one patient. Referrals to MDT members are important as the risk factors that are identified may not be the risk factors the audiologist can provide intervention for (Criter et al., 2013). In an interview with Lindsey (2015), McCaslin shared that he believed that another barrier to conducting fall risk assessments may be that audiologists do not know how or when the appropriate time is to refer to other professionals and may not feel they have the time to collaborate around these issues (Lindsey, 2015). Patterson and Honaker (2014) revealed that 76.1% of American audiologists who are not conducting fall risk assessments are also not referring their older patients to another specialist for further evaluation. This finding was also evident in a study of Canadian audiologists, where responses revealed that the majority of audiologists did not refer to a physical or an occupational therapist if their patient had a history of falls (Baxter et al., 2017). Baxter et al. (2017) specified a need for audiologists to become stronger members within interprofessional health care teams.

Fall Risk Assessment Facilitators

Fall risk assessment is within the audiologist's scope of practice. Fall risk assessment is considered to be part of the audiologist's scope of practice. Eight articles described that fall risk assessment is indeed part of the audiologist's scope of practice (Bassett, 2018; Bassett & Honaker, 2016; Baxter et al., 2017; Criter & Honaker, 2017; Jedlicka, 2020; Lindsey, 2015; McCaslin, 2013; Smith & Porter, 2013). Additionally, fall risk assessment is mentioned in several audiology professional associations' documentation (American Academy of Audiology [AAA], 2014; ASHA, 2006, 2020; Audiology Australia, 2016).

Opportunity for expansion of the audiology profession. Within an editorial, it was expressed that fall risk assessment may present as an avenue of expansion for the profession of audiology (McCaslin, 2013). Both Jedlicka (2020) and McCaslin (2013) are of the opinion that an assessment of the entire balance system and associated risk factors can easily be incorporated into vestibular clinics.

Audiologists are in a prime position to conduct fall risk assessments. This opportunity of expansion for audiology is also readily accessible as audiologists are in a prime position to be conducting assessments with older patients (Baxter et al., 2017; Lindsey, 2015). Audiology patients have been shown to be more at risk of falling than those who are not at risk of falling (Criter & Honaker, 2016a). Moreover, audiologists are balance specialists; with their main patient base considered as being at risk of falling, they are perfectly positioned to identify fall risks and play their part in minimizing the consequences of falls on the older population who consults with them (Baxter et al., 2017). The identification and triaging of at-risk patients identified in the audiology clinic may contribute significantly to fall prevention (Lindsey, 2015). However, no evidence that supported this claim could be found.

Simple, low-cost, and minimal resources are needed. Careful use of a range of simple, informal, and freely available measures can give the clinician a good idea of the patient's susceptibility to falling (Criter & Honaker, 2017), with minimal time, resources, or equipment needed (Baxter et al., 2017; Chiarella et al., 2020; Criter & Honaker, 2016b; Criter et al., 2013; Danhauer et al., 2011; Jedlicka, 2020; Lindsey, 2015). Fall risk assessment can be as simple as asking questions about a patient's fall history or asking them to fill out self-reported measures at home or before their appointments (Baxter et al., 2017; Danhauer et al., 2011). Furthermore, the TUG test, if done in isolation, has a sensitivity of 83.3% and a specificity of 61.1% (Criter & Honaker, 2016b). The TUG test takes less than a minute to conduct, and only a chair and a timer are needed.

Familiarity with fall risk measures. An additional facilitation factor that was identified was familiarity with assessments. Fall risk assessment measures conducted in the audiology clinic are often dependent on the audiologist's knowledge and experience with fall risk tools. It has been inferred in the literature that the more familiar audiologists are with certain measures, the more likely they are to implement them in clinical practice (Bassett, 2018).

There is opportunity to learn. Last, the opportunity to become familiar with fall risk assessment measures is available to students and practicing audiologists. Jedlicka (2020) discussed that AAA and ASHA have resources available to help guide audiologists in fall risk practice. Additionally, audiologists reportedly have the opportunity to learn through continued education through seminars or peer-reviewed journals (Criter et al., 2013).

Discussion

Overall, information on fall risk assessment and the role of the audiologist within scope of practice and guideline documents from audiology international, professional associations was scant. None of the reviewed scope of practice documents mentioned fall risk assessments as being part of the audiologist's scope of practice. However, although fall risk is not explicitly stated, it still falls within the scope of the audiologist (Bassett, 2018; Bassett & Honaker, 2016; Baxter et al., 2017; Criter & Honaker, 2017; Jedlicka, 2020; Lindsey, 2015; McCaslin, 2013; Smith & Porter, 2013). This is because an audiologist's primary responsibility is to prevent, investigate, and manage auditory dysfunction, dizziness, and balance dysfunction (Criter & Honaker, 2013). Age-related decline in both the auditory and vestibular systems may very well be contributing factors to imbalance symptoms (Jacobson, 2009; Krager,

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2018). Regardless of the cause, should a patient be at risk of developing auditory or balance dysfunction or report the presence of auditory or balance symptoms, the audiologist is trained to initiate further investigation and prevention.

Furthermore, of the audiology professional association documents that did discuss fall risk, the information provided was insufficient to guide audiologists in creating a comprehensive fall risk assessment protocol. The lack of overt and comprehensive discussion of the audiologist's role in fall risk screening may be due to the limited research on fall risk assessment within audiology, subsequently resulting in a scarcity of standards and guidelines available. Resultantly, many audiologists are unaware of their role in fall risk assessment of older individuals (Baxter et al., 2017; Patterson & Honaker, 2014). Until there is sufficient research to guide best practice and define the audiologist's scope of practice in fall risk, confusion may persist among audiologists as to whether fall risk assessment does indeed fall within the scope of the audiologist.

It is possible that medical centers and audiology clinics are currently conducting fall risk assessment protocols; however, if this is the case, few are published or found via a Google search. The articles incorporated into this review article thus represented the available audiology literature that mentioned fall risk screening. Thus, the fall risk assessment measures collated in this review article represent tools likely most familiar to audiologists and not necessarily tools that are regularly incorporated clinically. On review of the fall risk screening measures mentioned in the audiology literature, it was revealed that the TUG test was the most mentioned functional balance measure used and that the DHI and the ABC Scale were the most mentioned questionnaires. Another study also revealed that these measures are also commonly used in fall risk screening protocols within audiology clinics (Bassett, 2018). The regular incorporation of the TUG test, the DHI, and the ABC Scale could be due to audiologists' familiarity with this test, as it has been suggested that familiarity with assessment procedures is predictive of clinical usage (Bassett, 2018). Additionally, within the context of audiology, with limited time and reimbursement available, quick screening measures are better than no screening at all and have been identified as effective (Criter et al., 2013). The TUG test only takes a few seconds and has been suggested as the best measure to identify individuals with a recent history of falls (Criter & Honaker, 2016b). Similarly, Criter and Gustavson (2020) also identified that a higher Hearing Handicap Inventory for the Elderly (HHIE) score correlated with a higher number of falls experienced by audiology patients. When the TUG test, HHIE, and DHI are used together, their predictive power of fall risk is said to increase, with 92% sensitivity and 100% specificity (Criter & Honaker, 2017). The implementation of quick fall risk screening measures may lead to regular conversations with patients about fall risk factors, which may also encourage self-referrals to appropriate professionals and, in turn, contribute toward the prevention of falls (Criter & Honaker, 2016b). The literature thus revealed that conducting simple screening measures does not require extensive additional training, resources, time, or in-depth knowledge of the balance system. Hence, fall risk screening is not a service that should be limited to the vestibular audiologist's capabilities.

A quick and simple fall risk screening protocol being incorporated into all annual appointments with adults over the age of 65 years would allow audiologists to triage patients who may require a more in-depth fall risk screening assessment. This review article, however, revealed that a comprehensive fall risk screening is not commonly conducted by audiologists. Additional measures such as cognitive decline, depression, proprioception, and reaction time were not commonly mentioned within audiology screening protocols. Perhaps audiologists feel that they are not trained to screen these areas or that these areas do not fall within their scope of practice as they do not directly involve the auditory or vestibular system. Findings also revealed that screening measures for vestibular function were mentioned only once within audiology fall risk screening protocols (Honaker & Shepard, 2011). This may be because dizziness and imbalance are well-recognized problems among older people and because audiologists may not attribute these complaints to the vestibular system unless vertigo is described (van de Berg et al., 2015). However, in older adults, bilateral vestibulopathy has been shown to largely contribute to falls (Chiarella et al., 2020). These patients may complain of general unsteadiness rather than vertigo (Moon et al., 2017). Screening for vestibular weakness and signs of benign paroxysmal positional vertigo should be conducted often by audiologists with older adults (Jacobson et al., 2008). Subsequent referrals for diagnostic testing and early rehabilitation may prevent a fall from occurring (Furman et al., 2010).

It appears that the vestibular system is more commonly assessed within diagnostic protocols. The most mentioned measures for assessment of the vestibular system were vestibular function (VNG/ENG and rotatory chair testing), functional balance (CDP and the TUG test), and risk factors (the GDS and the MMSE). It was interesting to note that additional fall risk screening measures of depression and cognition were used within diagnostic protocols more commonly than within screening protocols. Perhaps this is due to more time being set aside for diagnostic testing. Concern, however, arises with these risk factors only being assessed at a diagnostic level. This is because the need for a diagnostic assessment would generally imply that imbalance consequences have already occurred; that is, the patient has fallen, and the cause hereof needs to be identified. Rather, incorporating additional risk measures into fall risk screening programs

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may assist in early identification and appropriate triaging to MDT members before the patient falls. With the high morbidity and mortality rates of falls globally, there is a great need for health care professionals to screen for fall risk before diagnostic measures are suggested so that preventative measures can be instilled.

Due to traditional vestibular and balance graduate training, the implementation of fall risk screening protocols within audiology may prove to be challenging. In Jedlicka's (2020) and McCaslin's (2013) opinion, many graduate programs primarily focus on the diagnostic assessment of the peripheral and central vestibular systems, and minimal emphasis is given to the assessment of whole-body fall risk factors and functional balance of older audiology patients. Callahan et al. (2013) further examined audiology doctoral programs in the United States and identified that professors and instructors rarely reported fall risk assessment as being a component that was focused on in clinical practice. Reliance on clear guidelines is evident before a paradigm shift can occur in the focus of the audiologist's role in balance assessments of older adults. The shift from a vestibular diagnosis–driven focus to a whole-body function and risk aversion focus is essential if all audiologists are to contribute to fall prevention through fall risk screening of older adults. Being too diagnosis driven may be problematic for programs where risk identification and prevention needs to be emphasized.

Once all risks have been identified, an effective MDT collaboration is key to the prevention of falls. The literature, however, revealed that poor partnerships with MDT members exist in the realm of fall risk screening within audiology. Without having the appropriate partnership with team members, fall risk assessment programs are fruitless as the appropriate MDT intervention cannot commence. It was suggested by Baxter et al. (2017) that poor collaboration may be due to the audiologist's limited understanding of how and when to refer to other health care professionals for further evaluation and intervention. Similarly, in Smith and Porter's (2013) opinion, MDT members may not recognize the role of the audiologist within the fall risk team. The success of an MDT-driven program requires an awareness of each other's roles and how it adds value to the assessment and management of a patient (Criter et al., 2013). Ideally, all members of the fall risk assessment team should be aware of the audiologist's expertise in and insights into one of the largest contributing factors to falls: dizziness and imbalance (Zalewski, 2015).

Audiologists are trained in understanding the balance and hearing system comprehensively. With their regular exposure to older individuals with hearing loss and balance complaints, Hatton (2016) suggested that audiologists are in an optimal position to be conducting fall risk screenings with their older patients.

Furthermore, with the evolution and paradigm shift of audiology from a health care service delivery model to a patient-centered care approach (Boisvert et al., 2017), fall risk screening may present an ideal opportunity for the expansion of the profession. Moreover, fall risk screening of individuals 65 years and older allows for the implementation of interventional audiology. This is described by Taylor (2016) as the delivery of services to patients at an earlier stage of their impairment. As the profession of audiology advances, reliance on hearing aid sales to sustain practice costs may become insufficient (Taylor, 2016). Audiologists will need to position themselves as trusted health care advisors and service providers who seek to minimize impairment and maximize daily function (Taylor, 2016). Furthermore, the audiologist's function in fall risk screening and prevention could prove to be highly valuable in decreasing health costs because of fall morbidities.

It is important to note that there were several limitations to this study. Reports were not excluded based on its peer review status, study design, participants, or outcome measures. This was because it was identified that answers to the research questions were not easily found within peer-reviewed literature but tend to be found in non–peer-reviewed editorials as well as informative, opinion, and descriptive articles instead. To obtain a wide understanding of the research objectives, the inclusion/exclusion criteria were very open. It is therefore important for the reader to understand that the subsequent conclusions are based on mostly anecdotal and opinion articles with scant peer-reviewed, original data. Only four articles directly reported audiologists' fall risk screening clinical practice. This review article thus represents the "most mentioned" fall risk measures in the audiology literature and not the "most used" measures. It should also be distinguished that audiologists may be implementing fall risk screening clinically; however, research reports of this are limited. Another limitation of this study is that the gray literature search only included articles or documents that could be found online. Thus, it is uncertain whether medical centers or academic institutions have standard audiology fall risk screening protocols in their clinical handbooks. Although the data obtained were limited, this systematic review played an important part of a larger study whereby the information was used to adapt a survey.

Conclusions

Fall risk assessment is within the audiologist's scope of practice. The reviewed literature revealed that a vast array of fall risk assessment measures and protocols have been mentioned, discussed, and clinically implemented in the audiology literature. However, the sources available are primarily not peer-reviewed and do not obtain original data. Foreseeably, with minimal evidence-based guidance available, research looking at audiologists' clinical implementation of fall risk assessment revealed that many are not conducting

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fall risk assessments and that some are even unaware that it falls within the audiologist's scope of practice.

The main challenges presented appear to be due to limited guidance within audiology scope of practice and guideline documents as well as inadequate training and knowledge of audiologists on fall risk factors and measures. There is subsequently a great need for research to be conducted so that scope of practice and guideline documents can include clear and detailed fall risk screening guidelines for audiologists. This may also aid in the development of standardized graduate and postgraduate fall risk training programs.

Although limited conclusions can be drawn from what fall risk tools and protocols audiologists are implementing clinically, it was identified that several fall risk measures are familiar to audiologists. Research has suggested that including a few of these familiar fall risk screening tools may be an effective protocol to early identification of falls in older adults (Criter & Honaker, 2017). Nonetheless, substantial further research is still required before audiologists are able to incorporate evidence-based fall risk screening protocols that are sensitive, specific, and feasible within the audiology clinic setting.

With anticipated future progression in the available evidence-based literature, adopting the audiologist's role as part of the fall risk MDT will provide an opportunity for growth as a profession and to move toward the implementation of interventional audiology. With audiologists interacting with numerous older and at-risk individuals weekly, they have an inherent responsibility to contribute to decreasing the mortality and morbidity of falls in the older population. However, this review article suggests that in order to overcome many of the barriers to the implementation of fall risk screening clinically, fall risk needs to be incorporated into audiology practice guidelines and standardized within graduate curricula.

Author Contributions

Kayla J. van Rie: Conceptualization (Lead), Data curation (Lead), Formal analysis (Lead), Investigation (Lead), Methodology (Lead), Project administration (Lead), Validation (Lead), Visualization (Lead), Writing – original draft (Lead), Writing – review & editing (Lead). **Amisha Kanji:** Methodology (Supporting), Supervision (Lead), Writing – review & editing (Supporting). **Alida Naudé:** Methodology (Supporting), Supervision (Lead), Writing – review & editing (Supporting).

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APPENDIX 2 Continued

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APPENDIX 3

Permission obtained to use and adapt the "Survey of Audiologists Best Practice For Assessing Risk of Fall" From Patterson and Honaker's Study (2014)

Kayla van Rie <kjvrie@gmail.com>
to jnpatterson7

Feb 16, 2020, 5:49 AM (6 days ago)

Hi Dr Patterson,

I am a masters student at the University of the Witwatersrand in South Africa.

I would firstly like to thank you for your contribution to research in the area of balance. I have found your research so interesting and it has played a large role in how I adapt my clinical protocol for best practice!

I have decided to start my own academic journey by beginning my Masters Degree this year. As part of my dissertation, I would like to replicate your study entitled: "Survey of audiologists' views on risk of falling assessment in the clinic." From what I have subjectively identified, very few audiologists in SA are conducting fall-risk screening. I would like to reuse your questionnaire to assess if the results you recorded carries over to the South African Population of Audiologists.

I would also love to possibly collaborate after this research has been conducted to write a comparison article.

Your consideration hereof would be greatly appreciated. I look forward to hearing from you.

Kind regards
Kayla van Rie
Clinical and Training Audiologist
Linkedin profile: www.linkedin.com/in/kayla-jade-van-rie-b84035157

Jessie Patterson
to me

Feb 19, 2020, 12:54 AM (3 days ago)

Kayla,

I apologize for the delay in my response to your email. Yes, you have my permission to use the questionnaire I used in my publication.

Please let me know if there is anything you need from me.

Best,
Jessie

Sent from my iPhone

> On Feb 15, 2020, at 9:50 PM, Kayla van Rie <kjvrie@gmail.com> wrote:
>
> ...
>
> [Message clipped] View entire message

APPENDIX 4

ADAPTED PILOT STUDY SURVEY:

"Survey of SASA Audiologist' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults"

SECTION 1 of 9: INFORMED CONSENT AND CONTACT DETAILS	
I have read and understood the participant information sheet and I consent to voluntarily participate in this study	☐ Yes, I agree to participate. ☐ No, I do not agree to participate ☐ If the select no, the survey terminates
Full name	
Email address	
Cellphone number	

SECTION 2 of 9: BIOLOGICAL QUESTIONS	
A. Are you registered with the HPCSA	☐ Yes, as an audiologist ☐ Yes, as an audiologist and speech therapist ☐ No
B. Do you have clinical audiological assessment experience with older adults (>65 years old)?	☐ Yes ☐ A limited amount (< 6 months experience) ☐ No
C. What is your first, second and third (if applicable) language?	
D. Do you have prior clinical or academic knowledge in the area of fall-risk screening? (Note: for the purposes of this study, it is not necessary to have prior knowledge)	☐ Yes ☐ A limited amount ☐ No
E. What sector do you work in? (multiple may be selected)	☐ Public clinical practice ☐ Private clinical practice ☐ Academic institution ☐ Corporate audiology

Feedback form

A survey feedback form was provided to you in a Microsoft Word document (attached in the email requesting participation). Please download this document and scan over the questions before commencing. It is recommended that the feedback form be completed while answering the survey, to document your thoughts, comments and recommendations.

SECTION 3 of 9- BACKGROUND INFORMATION	
Participants need to have answered yes to both to continue with questionnaire	
1. When did you complete your undergraduate degree?	☐ 1970 or before ☐ Between 1971 and 1980 ☐ Between 1981 and 1990 ☐ Between 1991 and 2000 ☐ Between 2001 and 2011 ☐ Between 2012 and 2021
2. Where did you obtain your undergraduate degree in audiology?	☐ University of the Witwatersrand ☐ University of Cape Town ☐ University of Pretoria ☐ Sefako Makgatho Health Sciences University (Previous Medunsa) ☐ University of KwaZulu-Natal ☐ I obtained my degree internationally

APPENDIX 4 continued…

3. Highest degree earned:	☐ B.A (SP & H)/ BSC (AUD) ☐ M.A., MSc. ☐ Au.D. ☐ Ph.D. ☐ Other:
4. Which province/s do you practice in?	☐ Gauteng ☐ Free State ☐ Limpopo ☐ Mpumalanga ☐ Northern Cape ☐ Eastern Cape ☐ Western Cape ☐ North West ☐ KwaZulu-Natal
5. What is your geographic location?	Geographic location ☐ Rural area ☐ Suburban area (built-up residential area) ☐ Urban area (within a main city/town)
6. What environment/s do you work in?	☐ Hospital setting ☐ Clinic setting ☐ Private practice ☐ School setting ☐ ENT/ outpatient facility ☐ University (lecturer / researcher / clinical supervisor) ☐ Corporate audiology ☐ Occupational audiology ☐ Other
7. Please select the services you regularly provide to the older adult population:	☐ Diagnostic audiological assessment ☐ Diagnostic vestibular assessment ☐ Hearing screening ☐ Vestibular screening ☐ Hearing aid fittings ☐ Aural rehabilitation ☐ Vestibular rehabilitation ☐ Cochlea implant services

SECTION 4 of 9- VEIWS OF FALL RISK SCREENING WITHIN AUDIOLOGY
Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about risk fall screening in older adults **(65 years old or older)**. Please indicate only one response for each statement..

APPENDIX 4 continued…

SA= Strongly Agree A= Agree U=uncertain D=disagree SD=strongly disagree					
	SA	A	U	D	SD
8. It is important to evaluate older adults' balance if they complain about having poor balance/had a fall?					
9. Fall risk screening (to identify fall risk factors) is part of the audiologist's scope of practice.					
10. Fall risk screening is an opportunity for expansion of our profession.					
11. Clear guidelines exist for the role of the audiologist in fall risk screenings nationally					
12. Clear guidelines exist for the role of the audiologist in fall risk screenings nationally					
13. Audiologists play an important role in screening the older adults to identify if they are at risk of falling					
14. Audiologists are sufficiently trained to conduct fall risk screenings in undergraduate curricula					
15. Fall risk screening services should be more prevalent in the vestibular disorder clinical setting compared to "general" audiology clinical setting.					
16. Fall risk screening should only be done by audiologists practicing in vestibular and balance audiology.					
17. Fall risk screenings should be conducted with all older adults served in the audiology clinic					
18. Changing my practice to include fall risk screening in consultations would take a lot of time					
19. Fall risk screening is important, but uncontrollable variables (e.g., time, reimbursement etc) may prevent involvement in this service.					
20. Learning new ways to administer fall risk screening would be helpful to me.					
21. I am interested in learning more about how to support older adults who are at risk of falling.					
22. I had the opportunity to learn about fall risk screening in my undergraduate studies course work.					
23. I have had the opportunity to learn about fall risk screening in postgraduate courses or through self-study					
24. I feel confident identifying someone as being "at risk of falling".					
25. Implementing a fall risk screening program may add to my job stress and workload					
26. Across the world, large numbers of audiologists are having discussions about fall risk screening and fall prevention.					
27. Audiologists playing a part in fall prevention through screening their older adult patients may have a significant impact on their patients' future quality of life.					

28. A fall risk screening program can be challenging to implement because (select the options you agree with):
    - ☐ It does not fall within the audiologist's scope of practice
    - ☐ Additional resources would be needed, which could be costly
    - ☐ There is minimal remuneration for fall risk screening
    - ☐ Additional training is needed.
    - ☐ There is limited time with each patient- the workload may be too demanding
    - ☐ There is not enough research defining a sensitive screening protocol which audiologists can use routinely
    - ☐ Collaboration and planning with other professionals is necessary
    - ☐ I don't know who to refer to if I identify risk factors out of the audiologist's scope of practice
    - ☐ I have not connected with medical professionals who could treat the patient with me as part of a multidisciplinary team approach
    - ☐ I am not comfortable with balance or vestibular testing, and therefore feel like I won't be comfortable with fall-risk screening.

29. Do you believe there are other reasons not mentioned above that would make the implementation of a fall-risk screening program challenging? If so, please list them below.

APPENDIX 4 continued…

SECTION 5 of 9- PERCEIVED KNOWLEDGE OF FALL-RISK					
30. Please indicate any professional preparation that focused on fall-risk screening (Multiple answers may be selected)	☐ Under-graduate coursework ☐ In-service training provided by employer ☐ Post graduate workshop training ☐ Conference presentations ☐ None at this time ☐ Other (please specify)				
31. Approximate total number of hours of fall risk training/education you have received (undergraduate and postgraduate)					
32. Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about fall risk screening. Please indicate only one response for each statement. SA= Strongly Agree A= Agree U=uncertain D=disagree SD=strongly disagree					
	SA	A	U	D	SD
A. Audiologists are knowledgeable about fall risk screening.					
B. I feel I have sufficient knowledge of all the factors that may put a patient at risk of falling					
C. I feel I have sufficient knowledge to perform fall risk screenings					
D. I feel I have sufficient knowledge to counsel patients to reduce their risk of falling					
E. Fall risk screenings are important in addressing the needs of our aging population.					
F. I have heard/ read that patients with hearing loss are more at risk of falling					
G. Multidisciplinary screening is important when conducting fall risk screening					
H. All older adults (>65) adults can benefit from fall risk screening.					
I. Fall risk screening services are preventative in that they can decrease the number of individuals who may experience a falling event					
J. A fall risk screening connects audiology and physiotherapy services.					
K. Negative consequences due to falls may be prevented if fall risk screening was implemented in all audiology clinics.					
L. Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the **vestibular** clinic.					
M. Knowledge of fall risk screening will change how we assess and identify “at risk” patients seen in the **hearing** clinic.					
N. I feel I have sufficient knowledge on the International Classification of Function, Disability and Health Framework (ICF) to use it as a model for fall risk screening.					
33. When screening for fall risk, I believe it would be important to consider the following: Personal factors (case history, falls history, medical conditions etc)					
Biological factors (balance system structures and function)					
Psychological and cognitive factors					
Social factors (participation and activity)					
Environmental factors (living conditions)					

APPENDIX 4 continued…

SECTION OF 6 of 9- REPORTED PRACTICE OF FALL RISK SCREENING	
34. If you notice that your patient has an unsteady gait, what do you generally do? (multiple options may be selected)	☐ Nothing, I trust that their general practitioner has discussed fall risk and prevention with them ☐ Often nothing, unsteady gait is to be expected with age ☐ Discuss fall risk factors and prevention with them ☐ I conduct a fall risk screening assessment and make the appropriate recommendations ☐ I refer them to a physiotherapist ☐ Other
35. Do you have informational resources for patients on fall risk in your waiting room?	☐ Yes ☐ Usually yes, but not currently due to COVID-19 ☐ No
36. Have you ever spoken to a general practitioner about the fall risk of older adults with hearing loss?	☐ Yes ☐ No
37. If you do not conduct fall risk screenings with your older adult patients, do you know of an audiologist or physiotherapist who you could refer to?	☐ Yes ☐ No ☐ No need -I screen my patients for fall risk and make the appropriate recommendations
38. When you suspect a patient is at-risk of falling which professionals do you commonly refer to and collaborate with? (multiple answers may be selected)	☐ Physiotherapist ☐ General physician ☐ Otolaryngologist/Ear nose and throat specialist ☐ Occupational therapist ☐ Pharmacist ☐ Neurologist ☐ Cardiologist ☐ Optometry/ophthalmology ☐ Geriatrician ☐ Psychologist ☐ Exercise instructors ☐ None at this time
39. Do you typically ask about history of falls at the initial audiology appointment.	☐ Always ☐ Often ☐ Rarely ☐ Never
40. Do you typically ask about fear of falling at the initial audiology appointment	☐ Always ☐ Often ☐ Rarely ☐ Never
41. Please indicate your clinical experience with fall risk screening:	☐ I have never heard of or thought about conducting fall risk screening as an audiologist. ☐ Currently implementing fall risk screenings ☐ I have previously implemented a fall risk screening. ☐ I am planning on implementing fall risk screenings in the future. ☐ I have no experience with fall risk and do not think I will implement fall risk screening with my patients. ☐ I have heard of fall risk screening but have no experience and am not confident to conduct fall risk screening without further training. ☐ Other_____

APPENDIX 4 continued…

42. Do you conduct informal or formal FRSs on patients 65 years old or older?	☐ Always (Proceed to next section) ☐ Never (Submit survey and terminate) ☐ Often (Proceed to next section) ☐ Rarely (Proceed to next section)
SECTION 7 of 9- REPORTED PRACTICE OF FRS (2nd part)	
43. Approximate the number of years of experience with FRSs: _____	
44. Approximate time allocated for FRS (If no time is generally allocated please insert '0')	

SECTION 8 of 9- REPORTED PRACTICE OF FRS (3rd part)
Assessment tools used for FRS

45. Please select the fall-risk-factor measures you use for FRS.

- ☐ I do not use any of the fall risk factor measures listed below
- ☐ International classification of functioning and disability (ICF) checklist
- ☐ Observation of patient's gait and steadiness
- ☐ History of falls or fear of falling
- ☐ Case history
- ☐ Medication review
- ☐ Risk factor checklist
- ☐ STEADI Questionnaire
- ☐ Presence of dizziness/imbalance
- ☐ Use of ambulatory device
- ☐ Morse fall scale
- ☐ Questions about inactivity
- ☐ St. Thomas Risk Assessment (STRATIFY)
- ☐ Family member interviews about falls
- ☐ Other

46. Please select the performance-based screening tools you use for FRS.

- ☐ I do not use performance-based screening tools
- ☐ Timed Up and Go (TUG)
- ☐ Computerised dynamic posturography (CDP)
- ☐ Dynamic Gait Index (DGI)
- ☐ Modified Clinical test of Sensory Integration on Balance (mCTSIB)
- ☐ Berg Balance Scale (BBS)
- ☐ Tinnetti Balance Assessment Tool (TBAT)
- ☐ Gait
- ☐ s second sit-to-stand
- ☐ Fukuda stepping test
- ☐ Functional Reach Test (FRT)
- ☐ Functional Gait Assessment (FGA)
- ☐ Other_____

47. Please select the self -reported measure you use for FRS tools you use.

- ☐ I do not use self-reported measures
- ☐ Activities Specific Balance Confidence Scale (ABC Scale)
- ☐ Geriatric depression scale (GDS)
- ☐ Dizziness Handicap inventory (DHI)
- ☐ Hospital Anxiety and Depression Scale (HADS)
- ☐ Beck Anxiety Inventory
- ☐ Falls Efficacy Scale (FES)
- ☐ Falls Efficacy Scale-International (FES-I)
- ☐ Hearing Handicap Inventory for the Elderly (HHIE)
- ☐ Other_____

APPENDIX 4 continued…

48. Please select the tests of vestibular functioning you include in FRS.

- I do not use tests of vestibular function
- VNG/ENG
- Rotatory chair
- Dynamic Visual Acuity (DVA)
- Vestibular evoked myogenic potentials
- Benign Paroxysmal Positional Vertigo (BPPV) assessment
- Video Head Impulse Test (vHIT).
- Caloric
- Gaze Stabilization Testing (GST)
- Other_____

49. Please select any 'other' measures you use for FRS.

- I do not use 'other' measures
- Mini-Mental State Examination/ Montreal Cognitive Assessment
- Postural blood pressure
- Vision screening
- Home fall Hazards/ environmental assessment
- Sensation, proprioception, somesthesis
- Vibration
- Reaction time
- Other_____

50. Optional: What are your additional comments regarding FRS services for older adults in the audiology clinic?	

Kindly complete the survey feedback document and email it to kaylavanrie@gmail.com . Thank you for your valuable contribution to this study! Please proceed to the next section for information on the interview (Part 2).

APPENDIX 5
Email to the Pilot Participants

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

Hi _____,

Thank you for agreeing to take part in my Pilot Study for my research entitled:

"South African Audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults"

There are 2 parts to this study:

PART 1: SURVEY

The survey should take no longer than 15-25 minutes and will involve answering mostly scaled/multiple choice questions. Hereafter, I would like to request that you complete a **feedback form *(please find the form attached)***. Please download this document and read over it before completing the survey and fill it out during or after completing the survey. Please make note of any technical difficulties you experienced along the way and record the amount of time it takes you to complete the survey.

PART 2: INTERVIEW

Detailed Information about the interview will be provided at the end of the electronic survey, along with an opportunity to suggest dates and times you have available to participate in the one-on-one interview. The interview should take no longer than 30-45 minutes.

I would like to kindly request that you complete the survey within ***2 weeks*** of receiving this email and that suitable interview dates are provided at your earliest convenience.

When you are ready to complete the electronic survey (Part 1), please click on the link below

Remember to start your timer when you begin and have the attached feedback form handy)

https://docs.google.com/forms/d/e/1FAIpQLSfgw0hukcbBPl3VqfJxzlPPto7XhVZhjNu-FFP717Px1kFs_w/viewform?usp=sf_link

Kind regards
Kayla van Rie
Audiology Masters student
WITS University

APPENDIX 6

Pilot Study Participant Information Sheet and Informed Consent

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

Good day,

My name is Kayla van Rie and I am a Master's student in Audiology at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating "South African Audiologists' Perceived Knowledge Views and Reported Practice in the Realm of Fall Risk Screening of Older Adults", under the supervision of Prof Amisha Kanji and Dr Alida Naudé. The aim of this research project is to gauge South African audiologists' perceptions and current screening practice of fall-risk with their older adult patients.

As part of this project, I would like to invite you to take part in the pilot study for this research. There are two parts to this pilot study. Part one involves completing a survey and filling out a feedback form. Part 2 involves participating in an online semi-structured interview via Zoom.

PART 1: SURVEY

The survey will take no longer than 15-25 minutes and will involve answering mostly scaled questions. Hereafter I would like to request that you complete a feedback form (attached in the email).Please download the feedback form, read over it before completing the survey and fill it out during or after completing the survey. Please make note of any technical difficulties you experience along the way and record the amount of time it takes you to complete the survey.

PART 2: INTERVIEW

The interview should take no longer than 30-45 minutes. With your permission, I would also like to video record the interview over Zoom. The information you share with me will be held securely and not be disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report (More interview details will be provided at the end of this google form).

There will be no personal costs to you if you participate in this project. You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time.
By selecting "yes, I agree to participate" below, you are consenting to participate in the survey portion (Part 1) of this Pilot study. A separate informed consent letter will be provided at the end of this google form for the interview (Part 2).

If you have any questions about this research, feel free to contact me on the details listed below. This study will be written up as a dissertation which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you. The data collected from this research project will be encrypted and stored in a password protected folder and will be kept for 5 years.

Sincerely,

Researcher
Name: Kayla van Rie
Email: kaylavanrie@gmail.com
Contact number: 0810461626

Research Supervisor
Name: Prof Amisha Kanji
Email: Amisha.kanji@wits.ac.za
Contact number: 011 717 4551

APPENDIX 6 continued…

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

INFORMED CONSENT

I have read all the information given relating to the research project and declare that I understand it. I have been given the opportunity to contact and discuss relevant aspects of the project with the researcher or their supervisor. I hereby declare that I agree to voluntarily participate in this survey.

I have read and understood the participant information sheet and I consent to voluntarily participate in this study

- ☐ Yes, I agree to participate
- ☐ No, I do not wish to participate in this study

APPENDIX 7

Pilot Study Participant Information Letter and Informed Consent for the *Interviews*

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

Good day,

My name is Kayla van Rie. I am an Audiology Masters student at the University of the Witwatersrand, Johannesburg. As part of my post graduate degree, I am conducting research entitled: "South African Audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults".

As part of this project, I would like to invite you to take part in an interview via Zoom (online video call) to pilot the interview process and questions. The interview should take no longer than 30-45 minutes. With your permission, I would also like to video record the interview over Zoom. The information you share with me will solely be used for the purposes for this research. The information will further be protected within an encrypted folder- which only the researcher and supervisors of this study will have access to. Furthermore, I will be using a pseudonym (false name) to represent your participation in my final research report.

There will be no personal costs to you if you participate in this project, you will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to.

Ethical approval for this study has been obtained from the WITS non-medical ethics committee and the department of Human and Community Development. Should you wish to participate, please ensure you provide informed consent below and provide a date and time for the interview that would suit you.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you. The data collected from this research project will be encrypted and stored in a password protected folder and will be kept for 5 years.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Sincerely,

Researcher
Name: Kayla van Rie
Email: kaylavanrie@gmail.com
Contact number: 0810461626

Research Supervisor
Name: Prof Amisha Kanji
Email: Amisha.kanji@wits.ac.za
Contact number: 011 717 4551

APPENDIX 7 Continued…

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

INFORMED CONSENT

I have read all the information given relating to the research project and declare that I understand it. I have been given the opportunity to contact and discuss relevant aspects of the project with the researcher or their supervisor. I hereby declare that I agree to voluntarily participate in this research project.

I have read and understood the participant information sheet and I consent to voluntarily participate in this study

- ☐ Yes, I agree to participate
- ☐ No, I do not wish to participate in this study

AVAILABILITY

If you have agreed to participate, please provide 3 dates and times where you are available for 30-45 minutes to participate in an interview.

_____

APPENDIX 8

Pilot Study Survey: Feedback Response Form

Please answer the following questions on completion of the survey

1. Technical aspects of the survey

1.1 Did the link to the survey open the survey without any technical challenges? Please mention any technical challenges when opening the link.

☐Yes ☐No

_____

_____

1.2 Were you able to complete all the questions in the survey? Please mention any questions you were unable to complete due to technical challenges.

☐Yes ☐No

_____

_____

1.3 Did you experience any technical difficulties while completing the survey? If yes, Please mention them below:

☐Yes ☐No

_____

_____

2. Layout and visual representation of the survey

2.1 Was the layout and flow of the survey intuitive? If no, Please mention any aspect that could be changed or enhanced in the survey's layout.

☐Yes ☐No

_____

_____

2.2 Did the layout of the survey result in any confusion at any point? Please elaborate.

☐Yes ☐No

_____

_____

3. Survey items

3.1 Were the instructions given to complete the survey clear? Please provide suggestions for clarification.

☐Yes ☐No

_____

_____

3.2 Did you find that the questions were relevant to the research title? If not, please elaborate.

☐Yes ☐No

_____

_____

APPENDIX 8 Continued…

3.3 Was any of the language, terminology or phrasing used unclear? If so, please elaborate.

☐Yes ☐No

3.4 In any of the questions asked, did you feel like an additional response option would be helpful to answer the question more accurately? If yes, please indicate which question you are referring to, and which response option you would recommend adding.

☐Yes ☐No

4. General aspects

4.1 How long did it take you to complete the survey?

4.2 In your opinion, is the suggested time of 20 – 25 minutes to complete the survey appropriate or should more or less time be suggested to complete the survey?

5. Further suggestions or comments

5.1 Did you feel like the survey covered all necessary aspects of audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults?

☐Yes ☐No

If your answer was no, what else do you suggest should be included in the survey?

Do you have any additional comments or further suggestions to enhance the survey?

APPENDIX 9

Pilot Study: Aims, Recommendations and Changes Made to the Survey

To the	Participant comments	Changes made based off the participant's comments
Technical aspects		
To determine if the google forms link to the survey provided the intended access in an easy and reliable manner	None	NA
To determine if any technical difficulties were experienced whilst completing the survey.	None	NA
The layout and visual representation of the survey		
To determine if the layout of the survey and flow of the items were intuitive and easy to follow.	"Above question 8: the instructions are much smaller than the question text. I missed the instructions because of this and needed to go back to check what I needed to do."	The instructions text was made larger
	"It sometimes felt like the questions were repetitive. One had to re-read to find the subtle differences in questions posed, especially with regards to clinician experience with fall risk."	- Where questions had subtle differences, the differences were highlighted by typing the differences in capital letters. Q11 Clear guidelines exist for the role of the audiologist in fall risk screenings NATIONALLY - Q12: Clear guidelines exist for the role of the audiologist in fall risk screenings INTERNATIONALLY - Q28: Do you typically ask about HISTORY OF FALLS at the initial audiology appointment with older adults? - Q29: Do you typically ask about FEAR OF FALLING in the initial audiology appointment with older adults? - Q32: M. Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the VESTIBULAR clinic

APPENDIX 9

Pilot Study: Aims, Recommendations and Changes Made to the Survey

To the	Participant comments	Changes made based off the participant's comments
		- Q32: N. Knowledge of fall risk screening will change how we assess and identify "at-risk" patients in the HEARING clinic
	Survey items	
To determine if the instructions for the survey were clear.	"Q28 could be clearer – I read it as what do I think, in general, is the issue with not implementing fall risk screenings/what could be possible reasons. Maybe edit to '…challenging for me to implement in my practice…' or something to clarify if you want the participant's own reasons for not doing it. Same with Q29.	Q28: A fall risk screening program can be challenging to implement because (select all the options you agree with): ***CHANGED TO:*** Q28: A fall risk screening program may be challenging to implement into my consultations with older adults because (select all the options you agree with): Q29. Do you believe there are other reasons not mentioned above that would make the implementation of a fall-risk screening program challenging? If so, please list them below. ***CHANGED TO:*** Q29. Do you believe there are other reasons not mentioned above that would make the implementation of a fall-risk screening program into your consultations challenging? If so, please list them below.
	Q43 – "time allocated for fall screening – do you mean per patient? In general? I was unsure with this one and the following time for counseling question. I don't actually allocate specific time, I just do what is indicated/needed…. Or do you want to know, if a 'general' audiology patient is booked, how much time do I book per patient and then how much of that do I think I will use on fall screening? Same with counseling?"	Q43. Approximate time allocated for fall risk screening of patients (If no time is generally allocated please insert '0') ***CHANGED TO:*** Q43. Approximate how much time you generally need to conduct a fall risk screening with your patients. - 0-15 minutes - 15-30 minutes - 30 minutes- 1 hour - >1 hour Q50. Approximate time allocated for fall risk counselling (If no time is generally allocated, please insert '0') ***CHANGED TO:*** Q50. Approximate how much time you generally need to counsel older adults on their fall risk. - 0 minutes (I do not generally council on fall risk) - 0-5 minutes

APPENDIX 9

Pilot Study: Aims, Recommendations and Changes Made to the Survey

To the	Participant comments	Changes made based off the participant's comments
		- 5-10minutes - 10-15 minutes - >15minutes ***Rationale for changes*** Options added to obtain more accurate responses.
To determine if the language, terminology, and phrasing of the questions were clear.	"Perhaps giving a good definition of what fall risk is, at the start of the survey may be helpful as some practitioners may be screening for it without even knowing that they are doing so"	Definition added before the first question: - Falls: A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level. - Fall risk: The likelihood that a patient may fall based on personal, physical, physiological, medical and environmental factors.
To determine if the participant felt that an additional response option would be helpful to ensure the question was answered more accurately.	"What is your first, second and third language? Is there perhaps a way that you can indicate "first language" and then the participant chooses from a list -second language: and the participant chooses from a list; Third language: and participant chooses from a list. This way you know which language is the first, second and third language."	"What is your first, second and third language? ***CHANGED TO:*** What is your first language? □ English □ Zulu □ Afrikaans □ Xhosa □ Venda □ Tswana □ Sesotho, □ Sepedi □ Tsonga □ Swati □ SASL □ Other What is your second language? □ English □ Zulu □ Afrikaans □ Xhosa □ Venda □ Tswana □ Sesotho, □ Sepedi □ Tsonga □ Swati □ SASL □ Other □ None What is your third language? □ English □ Zulu □ Afrikaans □ Xhosa □ Venda □ Tswana □ Sesotho, □ Sepedi □ Tsonga □ Swati □ SASL □ Other □ None ***Rationale for changes*** Options to improve the certainty of participants' first, second and third language. This question was however removed in the main study because it did not influence the interpretation of the participants responses.

APPENDIX 9

Pilot Study: Aims, Recommendations and Changes Made to the Survey

To the	Participant comments	Changes made based off the participant's comments
	"Do you have experience in assessing older adults? Perhaps change to: What is your years' experience assessing older adult patients? And then give options: 0-5 years, 5-10 years, 10-15 years, 16-20 years, more than 20 years. This will give more quantifiable data."	No changes made. As the questionnaire asks what year the audiologist qualified and if they have adult patients in their caseload. This gave the researcher sufficient biographic information to work with.
	"Question 30: I am not sure what is meant by this question…. Another answer option should be workshops. Workshops for me do not form part of post graduate studies"	Q30 Please indicate any professional preparation that focused on fall-risk screening (multiple answers may be selected) ☐ Under graduate coursework ☐ Post graduate coursework ☐ In-service training provided by employer ☐ Conference/workshop/course presentations ☐ Online course/webinar ☐ None at this time ***CHANGED TO:*** Q30 Please indicate any professional preparation that focused on fall-risk screening (multiple answers may be selected) ☐ Under graduate coursework ☐ Post graduate coursework ☐ In-service training provided by employer ☐ Conference/workshop/course presentations ☐ Online course/webinar ☐ None at this time ***Rationale for changes*** To separate postgraduate coursework and workshops as they are considered to be separate forms of learning.

APPENDIX 9

Pilot Study: Aims, Recommendations and Changes Made to the Survey

To the	Participant comments	Changes made based off the participant's comments
	"Question 32: M and N are the same"	Addressed in the 'layout and visual representation of the survey' section. These two questions were not the same In order to clearly differentiate between them, the differences, were typed in capital letters.
	Question 43: "Approximate time in relation to what? Perhaps say per month?? Or weekly? Question 50: Approximate time in relation to what? Perhaps say per month?"	Changes made to Q43 and Q50 within the 'survey items' section addresses this comment as well.

APPENDIX 9

Pilot Study: Aims, Recommendations and Changes Made to the Survey

To the	Participant comments	Changes made based off the participant's comments
To determine how long the survey takes to complete	Participant 1: 20 minutes Participant 2: 12 minutes Participant 3: 25 minutes Participant 4: 15 minutes Participant 5: 17 minutes Participant 6: 20 minutes	No changes made to the expected time given to the participants.
To determine if more or less time is needed than that suggested in the informed consent	6/6 participants reported that 20-25 minutes is sufficient to complete the survey.	None
Face validity: To determine if participants felt the questions were all relevant to the research title.	6/6 Participants reported that they perceived the survey as adequately covering all necessary aspects of audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults	None
Content validity: To ascertain that the content of the questions asked were perceived to be relevant to the research title by the participant.	6/6 Participants reported that the questions were relevant to the research title.	None
		Further suggestions
To gather additional suggestions and comments from objective, experienced audiologists about ways in which the survey could be improved.	"Perhaps at the end, to provide a few lines on what fall-risk is and the scope of practice for audiology. This is as people who have limited experience in this area may feel as if they are answering "no" to everything, without being given the opportunity to improve their knowledge"	- A note was placed at the end of the survey to guide participants as to where they would be able to access the writeup of the results of the study once completed. - Additional reading resources were not provided after the survey, as this may have influenced the way in which questions were answered in the interviews, and not represent a true reflection of the audiologist's original views and perceived knowledge on fall risk screening.

APPENDIX 10:Survey
The interview template script

SECTION 5 of 11 VIEWS OF FALL RISK SCREENING WITHIN AUDIOLOGY						**Interview questions**		
Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about risk fall screening in older adults (65 years old or older). Please indicate only one response for each statement. 1= Strongly Agree 2= Agree 3=uncertain 4=disagree 5=strongly disagree						**Agree (1/2) Interview question**	**Uncertain (3) Interview question**	**Disagree (4/5) Interview question**
Survey Question	**Response options**					**Agree (1/2) Interview question**	**Uncertain (3) Interview question**	**Disagree (4/5) Interview question**
8. For me as an audiologist, I believe that it is important that audiologists conduct a fall risk screening when an older adult report experiencing imbalance	1	2	3	4	5	I was glad to see you recognized the importance of fall risk screening. In your opinion, why is it important for an audiologist to conduct a fall risk screening on an older adult if they report imbalance?	/	I noted that you felt it was not important for an audiologist to conduct a fall risk screening on an older adult if they report imbalance- would you mid offering further insight on this?
9. Fall risk screening (to identify fall risk factors) is part of the audiologist's scope of practice.	1	2	3	4	5	What contributes to making you feel that fall risk screening is within the scope of the audiologist?	What contributes to making you feel uncertain as to whether fall risk screening is within the scope of the audiologist?	What contributes to making you feel that fall risk screening is not within the scope of the audiologist?
10. Fall risk screening is an opportunity for expansion of our profession.	1	2	3	4	5	In what way do you believe fall risk screening offers opportunity for the expansion of the audiology profession?	/	Why do you believe fall risk screening does not offer opportunity for the expansion of the audiology profession?
13. Audiologists play an important role in screening the older adults to identify if they are at risk of falling.	1	2	3	4	5	In the survey, you mentioned that audiologists play an important role in identifying fall risk. What do you believe our role to be specifically?	Can you identify what factors may make you feel uncertain as to whether audiologists play an important role in fall risk screening of older adults? *(May be similar to Q9's answer)*	In the survey, you mentioned that audiologists do not play an important role in identifying fall risk. What are your thoughts behind this response?

APPENDIX 10 continued…

Survey Question	Response options					Agree (1/2) Interview question	Uncertain (3) Interview question	Disagree (4/5) Interview question
14. Audiologists are sufficiently trained to conduct fall risk screenings in undergraduate curricula.	1	2	3	4	5	In the survey, you mentioned that undergraduate audiologists are sufficiently trained in fall risk screening. Could you elaborate a bit more on this? *(Question 22 is similar- do not repeat)*	In the survey, you mentioned that you are not sure if undergraduate audiologists are sufficiently trained in fall risk screening. Did you receive any training in fall risk screening as an undergraduate? *(Question 22 is similar- do not repeat)*	In the survey, you mentioned that undergraduate audiologists are not sufficiently trained in fall risk screening. Why do you think this is the case? *(Question 22 is similar- do not repeat)*
15. Fall risk screening services should be more prevalent in the vestibular disorder clinical setting compared to the "general" audiology clinical setting.	1	2	3	4	5	For what reasons do you think that fall risk screening services should be more prevalent in the vestibular disorder clinical setting compared to the "general" audiology clinical setting	For what reasons do you feel uncertain as to whether fall risk screening services should be more prevalent in the vestibular disorder clinical setting compared to the "general" audiology clinical setting	For what reasons do you think that fall risk screening services should NOT be more prevalent in the vestibular disorder clinical setting compared to the "general" audiology clinical setting.
16. Fall risk screening should only be done by an audiologist practicing in vestibular audiology.	1	2	3	4	5	*If answer above was 1 or 2 do not ask this question (redundant)* For what reasons do you think that fall risk screening should only be done by an audiologist practicing in vestibular audiology.	*If answer above was 3 do not ask this question (redundant)* For what reasons do you feel uncertain as to whether fall risk screening should only be done by audiologists practicing in vestibular audiology.	*If answer above was 4/5 do not ask this question (redundant)* For what reasons do you think that fall risk screening should not only be done by audiologists practicing in vestibular audiology.

APPENDIX 10 continued…

Survey Question	Response options					Agree (1/2)	Uncertain (3)	Disagree (4/5)

						Interview question	**Interview question**	**Interview question**
17. Fall risk screenings should be conducted with all older adults served in the audiology clinic.	1	2	3	4	5	For what reasons do you feel fall risk screenings should be conducted with all older adult patients served in the audiology clinic	/	For what reasons do you feel fall risk screenings should not be conducted with all older adult patients served in the audiology clinic
18. Fall risk screening in consultations takes a lot of time.	1	2	3	4	5	In the survey, you mentioned that fall risk screening would take a lot of time. How much time do you think fall risk screening would take?	/	In the survey, you mentioned that including fall risk screening does not take up lot of time. How much time do you believe you would need?
22. I had the opportunity to learn about fall risk screening in my undergraduate studies course work	1	2	3	4	5	In the survey, you mentioned that audiologists have opportunities to learn about fall risk screening in their undergraduate studies course work. Can you elaborate on these opportunities? (Question 14 is similar- do not repeat)		In the survey, you mentioned that audiologists do not have opportunities to learn about fall risk screening in their undergraduate studies. What factors do you think play a role in its exclusion from the curriculum? *(Question 14 is similar- do not repeat)*
23. Audiologists have opportunities to learn about fall risk screening in post graduate courses or through self-study.	1	2	3	4	5	Are you aware of any specific post graduate courses or resources which give audiologists the opportunity to learn more about fall risk screening?	/	/
24. I feel comfotable identifying someone as being "at risk of falling".	1	2	3	4	5	What factors have contributed to you feeling confident in identifying someone as being "at risk of falling"?	What factors have contributed to you feeling uncertain about your confidence in identifying someone as being "at risk of falling"?	What would you need to feel more confident in identifying someone as being "at risk of falling"8?

APPENDIX 10 continued…

Survey Question	Response options					Agree (1/2) Interview question	Uncertain (3) Interview question	Disagree (4/5) Interview question
25. Implementing a fall risk screening program may add to my job stress and workload.	1	2	3	4	5	For what reasons do you feel that implementing a fall risk screening program would add to your job stress and workload?	/	For what reasons do you feel that implementing a fall risk screening program would not add to your job stress and workload?
28. A fall risk screening program may be challenging to implement into my consultations with the older adult because (select all the options you agree with): ☐ I don't believe it would be challenging ☐ It does not fall within the audiologist's scope of practice ☐ Additional resources would be needed, which could be costly ☐ There is minimal remuneration for fall risk screening ☐ Additional training is needed. ☐ There is limited time with each patient- the workload may be too demanding ☐ There is not enough research defining a sensitive screening protocol which audiologists can use routinely ☐ Collaboration and planning with other professionals are necessary ☐ I don't know who to refer to if I identify risk factors out of the audiologist's scope of practice ☐ I have not connected with medical professionals who could treat the patient with me as part of a multidisciplinary team approach ☐ I am not comfortable with balance or vestibular testing, and therefore feel like I won't be comfortable with fall-risk screening.						Elaboration on options selected will be asked.		

SECTION 6 of 11
PERCEIVED KNOWLEDGE OF FALL-RISK

Survey Question	Response options	Interview question
30. Please indicate any professional preparation that focused on fall-risk screening: (Multiple answers may be selected)	☐ Undergraduate coursework ☐ Post graduate coursework ☐ In-service training provided by employer ☐ Conference/workshop/course presentations ☐ Online course/webinar ☐ None at this time	I noted that you have_____Could you please elaborate on what this preparation entailed?

APPENDIX 10 continued…

	□ Other							
32. Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about fall risk screening with older adult . 1= Strongly Agree 2= Agree 3=uncertain 4=disagree 5=strongly disagree						Agree (1/2)	Uncertain (3)	disagree (4/5)
B. I feel I have sufficient knowledge of all the factors that may put a patient at risk of falling	1	2	3	4	5	In your survey, you mentioned that you feel you have sufficient knowledge of all the factors…. What factors do you generally consider when screening the older adults for fall risk?	/	What factors do you believe contribute to audiologists not being knowledgeable in fall risk screening?
H. All older adults (>65) adults can benefit from fall risk screening	1	2	3	4	5	What do you believe the benefit will be for older adults if their audiologists were to screen for fall risk? ***Similar to Q8***	/	For what reasons do you feel that not all older adults will benefit from their audiologist conducting a fall risk screening?

APPENDIX 10 continued…

Survey Question	Response options					Agree (1/2) Interview question	Uncertain (3) Interview question	Disagree (4/5) Interview question
L. Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the VESTIBULAR clinic.	1	2	3	4	5	How will the knowledge of fall risk screening change how we assess and identify "at risk" patients in the VESTIBULAR clinic?	/	/
M. Knowledge of fall risk screening will change how we assess and identify "at-risk" patients in the HEARING clinic	1	2	3	4	5	How will knowledge of fall risk screening change how we assess and identify "at-risk" patients in the HEARING clinic?	/	/
N. I feel I have sufficient knowledge on the International Classification of Function, Disability and Health (ICF) to use it as a model for fall risk screening.	1	2	3	4	5	How do you/would you incorporate the ICF into your fall risk screening?	How do you think acquiring more knowledge on fall risk screening using the ICF model would affect your views and implementation of fall risk screening?	Are you at all familiar with the ICF? How do you think acquiring more knowledge on fall risk screening using the ICF model would affect your views and implementation of fall risk screening?
33. When screening for fall risk, I believe it would be important to consider the following: - Personal factors (case history, falls history, medical conditions etc) - Biological factors (balance system structures and function) - Psychological and cognitive factors - Social factors (participation and activity) - Environmental factors (living conditions)	1	2	3	4	5	Can you please elaborate on why you feel _____factors are important to consider when screening patients for fall risk as an audiologist.	Can you please elaborate on why you feel uncertain as to why _____factors are important to consider when screening patients for fall risk as an audiologist.	Can you please elaborate on why you feel _____factors are not important to consider when screening patients for fall risk as an audiologist.

APPENDIX 10 continued…

SECTION OF 7 of 11 REPORTED PRACTICE OF FALL RISK SCREENING		
Survey Question	**Response options**	**Interview questions**
41. Please indicate your clinical experience with fall risk screening:	☐ I have never heard of or thought about conducting fall risk screening as an audiologist ☐ Currently implementing fall risk screenings ☐ I have previously implemented a fall risk screening ☐ I am planning on implementing fall risk screenings in the future ☐ I have no experience with fall risk and do not think I will implement fall risk screening with my patients ☐ I have heard of fall risk screening but have no experience and am not confident to conduct fall risk screening without further training ☐ Other_____	What factors have prompted you to want to start implementing fall risk screening in the future? What factors contribute to you not wanting to implement fall risk screening with patients in the future?

SECTION 9 of 11 REPORTED PRACTICE OF FALL RISK SCREENING (3rd part) Assessment tools used for fall risk screening	
Question and response options	**Interview questions**
If you are presently involved in fall risk screening of older adults, please select which below tools you often incorporate in your screening protocol, if any. 45. Please select the any fall-risk-factor measures you use for fall risk screening. ☐ I do not use any of the 'fall-risk factor measures' listed below ☐ The International Classification of Functioning, Disability and Health (ICF) code set/ core set for fall risk	• How do you decide what to include/exclude in your fall risk screening protocol? • What are your reasons for including/ not including…?

APPENDIX 10 continued…

□ Observation of patient's gait and steadiness □ History of falls or fear of falling □ Case history □ Medication review □ Risk factor checklist □ STEADI Questionnaire □ Presence of dizziness/imbalance □ Use of ambulatory device □ Morse fall scale □ Questions about inactivity □ St. Thomas Risk Assessment (STRATIFY) □ Family member interviews about falls □ Other_____ 46. Please select the performance-based screening tools you use for fall risk screening. □ I do not use performance-based screening tools □ Timed Up and Go (TUG) □ Computerized dynamic posturography (CDP) □ Dynamic Gait Index (DGI) □ Modified Clinical test of Sensory Integration on Balance (mCTSIB) □ Berg Balance Scale (BBS) □ Tinnetti Balance Assessment Tool (TBAT) □ Gait □ 30 second sit-to-stand □ Fukuda stepping test □ Functional Reach Test (FRT) □ Functional Gait Assessment (FGA) □ Other_____ 47. Please select the self -reported measure you use for fall risk screening tools you use. □ I do not use 'self -reported measures' □ Activities Specific Balance Confidence Scale (ABC Scale) □ Geriatric depression scale (GDS)	

APPENDIX 10 continued…

- Dizziness Handicap inventory (DHI)
- Hospital Anxiety and Depression Scale (HADS)
- Beck Anxiety Inventory
- Falls Efficacy Scale (FES)
- Falls Efficacy Scale-International (FES-I)
- Hearing Handicap Inventory for the Elderly (HHIE)
- Other_____

48. Please select the tests of vestibular functioning you include in fall risk screening.

- I do not use tests of vestibular function
- VNG/ENG
- Rotatory chair
- Dynamic Visual Acuity (DVA)
- Vestibular evoked myogenic potentials
- Benign Paroxysmal Positional Vertigo (BPPV) assessment
- Video Head Impulse Test (vHIT).
- Caloric
- Gaze Stabilization Testing (GST)
- Other_____

49. Please select any 'other' measures you use for fall risk screening.

- I do not use 'other measures'
- Mini-Mental State Examination/ Montreal Cognitive Assessment
- Postural blood pressure
- Vision screening
- Home fall Hazards/ environmental assessment
- Sensation, proprioception, somesthesia
- Vibration
- Reaction time

Other_____

APPENDIX 11
Final Adapted Survey: Main Study

"Survey of South African Audiologist' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults"

SECTION 1 of 9: INFORMED CONSENT AND CONTACT DETAILS	
I have read and understood the participant information sheet and I consent to voluntarily participate in this study	☐ Yes, I agree to participate. ☐ No, I do not agree to participate If the select no, the survey terminates

SECTION 2 of 11: PRE-SURVEY DEFINITIONS
Falls: A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level. **Fall risk:** The likelihood that a patient may fall based on personal, physical, physiological, medical and environmental factors. **Older adult population:** Any persons 65 years old or older.

SECTION 3 of 11: BIOLOGICAL QUESTIONS	
A. Are you registered with the HPCSA	☐ Yes, as an audiologist ☐ Yes, as an audiologist and speech therapist ☐ No
B. Do you have clinical audiological assessment experience with older adult (>65 years old)?	☐ Yes ☐ A limited amount (< 6 months experience) ☐ No
C. Do you have prior clinical or academic knowledge in the area of fall-risk screening? (note: for the purposes of this study, it is not necessary to have prior knowledge)	☐ Yes ☐ A limited amount ☐ No
D. What sector do you work in? (multiple may be selected)	☐ Private clinical practice ☐ Public clinical practice ☐ Both public and private clinical practice

SECTION 3 of 9- BACKGROUND INFORMATION	
Participants need to have answered yes to both to continue with questionnaire	
1. When did you complete your undergraduate degree?	☐ 1970 or before ☐ Between 1971 and 1980 ☐ Between 1981 and 1990 ☐ Between 1991 and 2000 ☐ Between 2001 and 2011 ☐ Between 2012 and 2021

Appendix 11 Cont…

2. Where did you obtain your undergraduate degree in audiology?	□ University of the Witwatersrand □ University of Cape Town □ University of Pretoria □ Sefako Makgatho Health Sciences University (Previous Medunsa) □ University of KwaZulu-Natal □ I obtained my degree internationally
3. Highest degree earned:	□ B.A (SP & H)/ BSC (AUD) □ M.A., MSc. □ Au.D. □ Ph.D. □ Other:
4. Which province/s do you practice in? (multiple may be selected if necessary)	□ Gauteng □ Free State □ Limpopo □ Mpumalanga □ Northern Cape □ Eastern Cape □ Western Cape □ North West □ KwaZulu-Natal
5. What geographic location do you work in?	□ Rural area □ Suburban area (built-up residential area) □ Urban area (within a main city/town)
6. What environment/s do you work in? (multiple may be selected)	□ Hospital setting □ Clinic setting □ Private practice □ School setting □ ENT/ outpatient facility □ University (lecturer / researcher / clinical supervisor) □ Corporate audiology □ Occupational audiology □ Other
7. Please select the services you regularly provide to the older adult population:	□ Diagnostic audiological assessments □ Diagnostic vestibular assessment □ Hearing screening □ Vestibular screening □ Hearing aid fittings □ Audiological rehabilitation □ Vestibular rehabilitation □ Cochlea implant services

Appendix 11 Cont…

SECTION 5 of 11					
VEIWS OF FALL RISK SCREENING WITHIN AUDIOLOGY Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about risk fall screening in older adults **(65 years old or older)**. Please indicate only one response for each statement.					
1= Strongly Agree 2= Agree 3=uncertain 4=disagree 5=strongly disagree					
8. For me as an audiologist, I believe that it is important that audiologists conduct a fall risk screening when an older adult reports experiencing poor balance/have had a fall.					
9. Fall risk screening (to identify fall risk factors) is part of the audiologist's scope of practice					
10. Fall risk screening is an opportunity for expansion of our profession.					
11. Clear guidelines exist for the role of the audiologist in fall risk screenings NATIONALLLY					
12. Clear guidelines exist for the role of the audiologist in fall risk screenings INTERNATIONALLY					
13. Audiologists play an important role in screening the older adults to identify if they are at risk of falling					
14. Audiologists are sufficiently trained to conduct fall risk screenings in undergraduate curricula					
15. Fall risk screening services should be more prevalent in the vestibular disorder clinical setting compared to the "general" audiology clinical setting					
16. Fall risk screening should ONLY be done by an audiologists practicing in vestibular and balance audiology					
17. Fall risk screenings should be conducted with all older adults served in the audiology clinic					
18. Fall risk screening in consultations takes a lot of time					
19. Fall risk screening is important, but uncontrollable variables (e.g., time, reimbursement etc.) may prevent inclusion of fall risk screening into consultations with older adults					
20. Learning new ways to administer fall risk screening would be helpful to me					
21. I am interested in learning more about how to support older adult patients who are at risk of falling					
22. I had the opportunity to learn about fall risk screening in my undergraduate studies course work					
23. I have had the opportunity to learn about fall risk screening in postgraduate courses or through self-study					
24. I feel comfortable identifying someone with fall-risk					
25. Implementing a fall risk screening program may adds to/may add to my job stress and workload					

Appendix 11 Cont…

26. Across the world, large numbers of audiologists are having discussions about fall risk screening and fall prevention					
27. Audiologists playing a part in fall prevention through screening older adults may have a significant impact on their patients' future quality of life					

28. 28. A fall risk screening program can be challenging to implement because (select all the options you agree with):

- I don't believe it would be challenging
- It does not fall within the audiologist's scope of practice
- Additional resources would be needed, which could be costly
- There is minimal remuneration for fall risk screening
- Additional training is needed.
- There is limited time with each patient- the workload may be too demanding
- There is not enough research defining a sensitive screening protocol which audiologists can use routinely
- Collaboration and planning with other professionals is necessary
- I don't know who to refer to if I identify risk factors out of the audiologist's scope of practice
- I have not connected with medical professionals who could treat the patient with me as part of a multidisciplinary team approach
- I am not comfortable with balance or vestibular testing, and therefore feel like I won't be comfortable with fall-risk screening .

29. Do you believe there are other reasons not mentioned above that would make the implementation of a fall-risk screening program challenging? If so, please list them below.

SECTION 6 of 11	
PERCEIVED KNOWLEDGE OF FALL-RISK	
30. Please indicate any professional preparation that focused on fall-risk screening: (multiple answers may be selected)	__ Under-graduate coursework __ Postgraduate coursework __ In-service training provided by employer __ Conference/workshop/course presentations __ Online course/webinar __None at this time __ Other (please specify)
31. Approximate total number of hours of fall risk training/education you have received (undergraduate and postgraduate)	

Appendix 11 Cont…

32. Please indicate the strength of your agreement or disagreement with each statement that follows as a generalization about fall risk screening. Please indicate only one response for each statement. 1= Strongly Agree 2= Agree 3=uncertain 4=disagree 5=strongly disagree					
A. Audiologists are knowledgeable about fall risk screening.					
B. I feel I have sufficient knowledge of all the factors that may put a patient at risk of falling					
C. I feel I have sufficient knowledge to perform fall risk screenings					
D. I feel I have sufficient knowledge to counsel patients to reduce their risk of falling					
E. Fall risk screenings are important in addressing the needs of our aging population.					
F. I have heard/ read that patient with hearing loss are more at risk of falling					
G. Multidisciplinary screening is important when conducting fall risk screening					
H. All older adults (>65) can benefit from fall risk screening.					
I. Fall risk screening services are preventative in that they can decrease the number of individuals who may experience a falling event					
J. A fall risk screening connects audiology and physiotherapy services.					
K. Negative consequences due to falls may be prevented if a fall risk screening was implemented in all audiology clinics.					
L. Knowledge of fall risk screening will change how we assess and identify "at risk" patients in the VESTIBULAR clinic					
M. Knowledge of fall risk screening will change how we assess and identify "at-risk" patients in the HEARING clinic					
N. I feel I have sufficient knowledge on the International Classification of Function, Disability and Health (ICF) to use it as a model for fall risk screening.					
33. When screening for fall risk, I believe it would be important to consider the following: Personal factors (case history, falls history, medical conditions etc)					
Biological factors (balance system structures and function)					
Psychological and cognitive factors					
Social factors (participation and activity)					
Environmental factors (living conditions)					

Appendix 11 Cont…

SECTION OF 7 of 11	
REPORTED PRACTICE OF FALL RISK SCREENING	
34. If you notice that your patient has an unsteady gait, what do you generally do? (multiple options may be selected)	☐ Nothing, I trust that their general practitioner has discussed fall risk and prevention with them ☐ Often nothing, unsteady gait is to be expected with age ☐ Discuss fall risk factors and prevention with them ☐ I conduct a fall risk screening assessment and make the appropriate recommendations ☐ I refer them to a physiotherapist ☐ I refer for vestibular testing ☐ Other
35. Do you have informational resources for patients on fall risk in your waiting room?	☐ Yes ☐ Usually yes, but not currently due to COVID-19 ☐ No
36. Have you ever spoken to a general practitioner about the fall risk of older adult with hearing loss?	☐ Yes ☐ No
37. If you do not conduct fall risk screenings with your older adult patients, do you know of an audiologist or physiotherapist who you could refer to?	☐ Yes ☐ No ☐ No need -I screen my patients for fall risk and make the appropriate recommendations
38. When you suspect a patient is at-risk of falling which professionals do you commonly refer to and collaborate with? (multiple answers may be selected)	☐ Physiotherapist ☐ General physician ☐ Otolaryngologist/Ear nose and throat specialist ☐ Occupational therapist ☐ Pharmacist ☐ Neurologist ☐ Cardiologist ☐ Optometry/ophthalmology ☐ Geriatrician ☐ Psychologist ☐ Exercise instructors ☐ None at this time
39. Do you typically ask about HISTORY OF FALLS at the initial audiology appointment with older adult patients?	☐ Always ☐ Never ☐ Often ☐ Rarely
40. Do you typically ask about FEAR OF FALLING in the initial audiology appointment with older adult patients?	☐ Always ☐ Never ☐ Often ☐ Rarely

41. Please indicate your clinical experience with fall risk screening:	☐ I have never heard of or thought about conducting fall risk screening as an audiologist ☐ Currently implementing fall risk screenings ☐ I have previously implemented a fall risk screening ☐ I am planning on implementing fall risk screenings in the future ☐ I have no experience with fall risk and do not think I will implement fall risk screening with my patients ☐ I have heard of fall risk screening but have no experience and am not confident to conduct fall risk screening without further training ☐ Other_____
42. Do you conduct informal or formal fall risk screenings on patients 65 years old or older?	☐ Always (Proceed to next section) ☐ Never (Submit survey and terminate) ☐ Often (Proceed to next section) ☐ Rarely (Proceed to next section)

SECTION 8 of 11	
REPORTED PRACTICE OF FALL RISK SCREENING (2nd part)	
43. Approximate the number of years of experience with fall risk screenings: _____	
44. Approximately, how much time do you generally take to conduct a fall risk screening with your patients?	

SECTION 9 of 11

REPORTED PRACTICE OF FALL RISK SCREENING (3rd part)
Assessment tools used for fall risk screening

If you are presently involved in fall risk screening of older adults, please select which below tools you often incorporate in your screening protocol, if any.

45. Please select the any fall-risk-factor measures you use for fall risk screening, if any.

☐ I do not use any of the 'fall-risk factor measures' listed below
☐ The International Classification of Functioning, Disability and Health (ICF) code set/ core set for fall risk
☐ Observation of patient's gait and steadiness
☐ History of falls or fear of falling
☐ Case history
☐ Medication review
☐ Risk factor checklist
☐ STEADI Questionnaire
☐ Presence of dizziness/imbalance

Appendix 11 Cont…

- Use of ambulatory device
- Morse fall scale
- Questions about inactivity
- St. Thomas Risk Assessment (STRATIFY)
- Family member interviews about falls
- None at this time
- Other_____

46. Please select the performance-based screening tools you use for fall risk screening, if any.
- I do not use performance-based screening tools
- Timed Up and Go (TUG)
- Computerised dynamic posturography (CDP)
- Dynamic Gait Index (DGI)
- Modified Clinical test of Sensory Integration on Balance (mCTSIB)
- Berg Balance Scale (BBS)
- Tinnetti Balance Assessment Tool (TBAT)
- Gait
- 30 second sit-to-stand
- Fukuda stepping test
- Functional Reach Test (FRT)
- Functional Gait Assessment (FGA)
- None at this time
- Other_____

47. Please select the self -reported measure you use for fall risk screening tools you use, if any.
- I do not use 'self -reported measures'
- Activities Specific Balance Confidence Scale (ABC Scale)
- Geriatric depression scale (GDS)
- Dizziness Handicap inventory (DHI)
- Hospital Anxiety and Depression Scale (HADS)
- Beck Anxiety Inventory
- Falls Efficacy Scale (FES)
- Falls Efficacy Scale-International (FES-I)
- Hearing Handicap Inventory for the Elderly (HHIE)
- None at this time
- Other_____

48. Please select the tests of vestibular functioning you include in fall risk screening, if any.
- I do not use tests of vestibular function
- VNG/ENG
- Rotatory chair
- Dynamic Visual Acuity (DVA)
- Vestibular evoked myogenic potentials
- Benign Paroxysmal Positional Vertigo (BPPV) assessment
- Video Head Impulse Test (vHIT).
- Caloric
- Gaze Stabilization Testing (GST)
- None at this time
- Other_____

Appendix 11 Cont…

49. Please select any 'other' measures you use for fall risk screening, if any. ☐ I do not use 'other measures' ☐ Mini-Mental State Examination/ Montreal Cognitive Assessment ☐ Postural blood pressure ☐ Vision screening ☐ Home fall Hazards/ environmental assessment ☐ Sensation, proprioception, somesthesia ☐ Vibration ☐ Reaction time ☐ None at this time Other_____	
50. Do you have any additional comments regarding fall risk screening services for older adults in the audiology clinic?	

SURVEY COMPLETE

I would like to invite you to participate in the short Zoom interview portion of this research project. Please indicate if you are willing to participate below:
☐ I would like to consider participating in the zoom interview after receiving further details about what this will entail. (continue to the next section)
☐ No, I would not like to participate in the interview portion of this research. (Submits form)

APPENDIX 12
Letters requesting permission for distribution of the research invitation

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

09/06/2020

SASLHA Past President

ursula.zsilavecz@gmail.com

Good day Mrs Ursula Zsilavecz,

RE: Request to distribute questionnaire and interview invitations (for research purposes) to SASLHA membership database

My name is Kayla van Rie. I am an Audiology Master's student at the University of the Witwatersrand, Johannesburg. My Master's degree is thesis-based. I am conducting research entitled: "South African Audiologists' Perceptions and Reported Practice in the Realm of Fall Risk Screening of Older Adults".

My research tools consist of an online questionnaire and interviews using Zoom Video Communication Technology. I kindly request for the distribution of my research questionnaire and interview invitation though the SASHLA membership electronic database.

The questionnaire should take approximately 15-25 minutes and the interview 30-45 minutes. Audiologists can participate either via the questionnaire, interview or both. The participating audiologists will be asked questions relating to their perceptions and practice in the Realm of Fall Risk Screening of Older Adults.

These findings will be valuable in adding to the professional body of knowledge in audiology in South Africa.

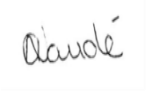
Your consideration will be highly appreciated.

Sincerely,

Kayla van Rie







Kayla van Rie Prof	Amisha Kanji	Dr Alida Naudé
(Master's student researcher)	(Supervisor)	(Supervisor)
671313@students.wits.ac.za	Amisha.kanji@wits.ac.za	alida@amtronix.co.za

APPENDIX 12 Cont…

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

09/06/2020

SAAA Administrative Officer

admin@audiologysa.co.za

Good day Mrs Cornelle Naudé,

RE: Request to distribute questionnaire and interview invitations (for research purposes) to SASLHA membership database

My name is Kayla van Rie. I am an Audiology Master's student at the University of the Witwatersrand, Johannesburg. My Master's degree is thesis-based. I am conducting research entitled: "South African Audiologists' Percieved knowledge, views and Reported Practice in the Realm of Fall Risk Screening of Older Adults".

My research tools consist of an online questionnaire and interviews using Zoom Video Communication Technology. I kindly request for the distribution of my research questionnaire and interview invitation though the SAAA membership electronic database.

The questionnaire should take approximately 15-25 minutes and the interview 30-45 minutes. Audiologists can participate either via the questionnaire, interview or both. The participating audiologists will be asked questions relating to their perceptions and practice in the Realm of Fall Risk Screening of Older Adults.

These findings will be valuable in adding to the professional body of knowledge in audiology in South Africa.

Your consideration will be highly appreciated.

Sincerely,

Kayla van Rie







Kayla van Rie (Master's student researcher) 671313@students.wits.ac.za

Prof Amisha Kanji (Supervisor) Amisha.kanji@wits.ac.za

Dr Alida Naudé (Supervisor) alida@amtronix.co.za

APPENDIX 12 continued…

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

13/12/2021

Dear Rasheena Dooki,

RE: Request to distribute survey and interview invitations (for research purposes) to the National Speech Therapy and Audiology Forum

My name is Kayla van Rie. I am an Audiology Master's student at the University of the Witwatersrand, Johannesburg. My Master's degree is thesis-based. I am conducting research entitled: "South African Audiologists' Percieved knowledge, views and Reported Practice in the Realm of Fall Risk Screening of Older Adults".

My research tools consist of an online survey and interviews with audiologists using Zoom Video Communication Technology. I kindly request for the distribution of my research survey and interview invitation be distributed via email and/or Whatsapp Groups to audiologists practicing in the public sector (through yourself, as the National Speech Therapy and Audiology chairperson and the respective provincial represenatives).

The survey should take approximately 15-25 minutes and the interview 30-45 minutes. Audiologists can participate in the survey alone or in both the survey and interview. The participating audiologists will be asked questions relating to their views, perceptions and practice in the Realm of Fall Risk Screening of Older Adults.

These findings will be valuable in adding to the professional body of knowledge in audiology in South Africa.

Your consideration will be highly appreciated.

Sincerely,

Kayla van Rie

Kayla van Rie	Prof Amisha Kanji	Dr Alida Naudé
(Master's student researcher)	(Supervisor)	(Supervisor)
671313@students.wits.ac.za	Amisha.kanji@wits.ac.za	alida@amtronix.co.za

APPENDIX 13
Letters granting permission for distribution of the research invitation

South African Association of Audiologists
CARING FOR YOUR HEARING.

6 July 2020

To whom it may concern

PERMISSION TO CONDUCT RESEARCH

I, Liepollo Ntlhakana, hereby give permission to Kayla van Rie to conduct her research through the South African Association of Audiologists (SAAA).

Name: Liepollo Ntlhakana (SAAA President)

+27 (0)82 727 5977 | admin@audiologysa.co.za | www.audiologysa.co.za

APPENDIX 13 Continued…

SASLHA
South African Speech-Language-Hearing Association

Local Tel : 0861 113 297
Address : P. O Box 1690 Umhlanga Rocks 4320
Email : admin@saslha.co.za
Web : www.saslha.co.za

13 June 2020

Researchers: Kayla van Rie (Audiology Master's Student)
Department of Speech Language Pathology and Audiology
University of the Witwatersrand

Dear Ms van Rie

Request permission to send research request to SASLHA members

Title: South African Audiologists' Perceptions and reported practice in the realm of Fall Risk Screening of Older Adults

Hereby I acknowledge receipt of your request to publish your questionnaire to SASLHA members. On behalf of SASLHA, I Ursula Zsilavecz (Past President) give Kayla van Rie permission to recruit participants through the South African Speech Language and Hearing Association (SASLHA) database. The research has been explained to me and I understand what my participation will involve. I am aware of the research process:

Please circle:

I agree that participants may be recruited from SASLHA	**YES**
I agree that SASLHA's registered Audiologists may partake in the research study	**YES**
I can contact any of the researchers at any time about the study	**YES**

Ursula Zsilavecz (Past President)
13 June 2020

APPENDIX 13 Continued…

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

20 December 2021

Dear Ms van Rie,

RE: Request to distribute survey and interview invitations (for research purposes) to the National Speech Therapy and Audiology Forum

Research Title: South African Audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults

Researcher: Kayla van Rie (Audiology Master's Student) Department of Speech Language Pathology and Audiology University of the Witwatersrand

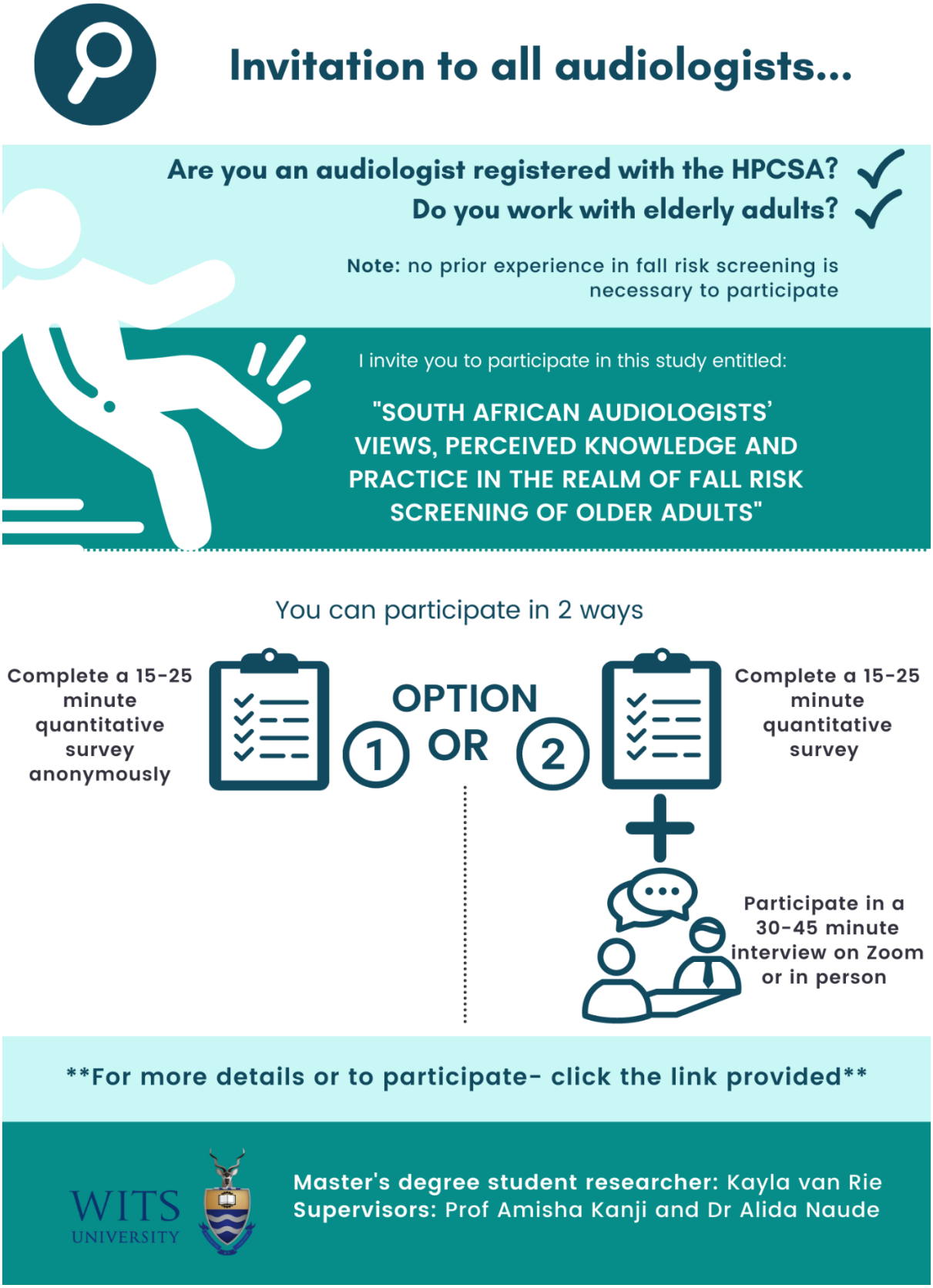
I hereby acknowledge receipt of your request to distribute your research invitation to the National Speech Therapy and Audiology Forum database.

Approval has been obtained from Mr Maluta Tshivhase of the National Disability and Rehabilitation Directorate to send out the survey to all provincial reps for distribution with the instruction that it is up to the individual professionals to decide on whether to participate in the research study or not.

Signature: Dooki Date: 20/12/2021

Rasheena Dooki
Chairperson: National Speech Therapy and Audiology Forum

APPENDIX 14:
Research invitation infographic



APPENDIX 15
Survey: Participant Information Sheet and Consent

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

Good day,

My name is Kayla van Rie and I am a Master's student in Audiology at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating "South African Audiologists' Perceived Knowledge, Views, and Reported Practice in the Realm of Fall Risk Screening of Older Adults", under the supervision of Prof Amisha Kanji and Dr Alida Naudé. The aim of this research project is to gauge South African audiologists' perceptions and current screening practice of fall-risk with their older adult patients.

As part of this project, I would like to invite you to take part in answering a survey. The survey will take no longer than 15-25 minutes and involves answering quantitative questions, mostly on a Likert scale. Your participation will be anonymous to the researcher if you choose to participate in the survey only. However, if you decide to also participate in the interviews, your identity and survey responses will become known to the research for further discussion. For the validity of this research, it is very important that you be as honest about your answers as possible.

There will be no personal costs to you if you participate in this project. You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to. Your answers will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else.

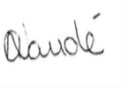
If you agree to participate, please click on the survey link provided. By clicking on the survey link, you will be providing consent to participate in the study.

If you have any questions about this research, feel free to contact me on the details listed below. This study will be written up as a dissertation which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you. The data collected from this research project will be encrypted and stored in a password protected folder and will be kept for 5 years.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Sincerely,





Kayla van Rie
(Master's student researcher)
671313@students.wits.ac.za

Prof Amisha Kanji
(Supervisor)
Amisha.kanji@wits.ac.za

Dr Alida Naudé
(Supervisor)
alida@amtronix.co.za

APPENDIX 16:
Interview: Participant Information Sheet and Consent

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

Good day,

My name is Kayla van Rie and I am a Master's student in Audiology at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating "South African Audiologists' Perceived Knowledge, Views and Reported Practice in the Realm of Fall Risk Screening of Older Adults", under the supervision of Prof Amisha Kanji and Dr Alida Naudé. The aim of this research project is to gauge South African audiologists' perceptions and current screening practice of fall-risk with their older adult patients.

As part of this project, I would like to invite you to take part in a single interview via Zoom (online video call). The interview should take no longer than 30-45 minutes and will entail answering questions about your views, perceived knowledge, and practice on fall risk (knowledge on fall risk *will not* be tested). With your permission, I would also like to video record the interview over Zoom. Interviews will be scheduled at a mutually convenient time. Only the researcher will know your identity. Your identity and the information you share will be held securely and not be disclosed to anyone else. Your participation and information shared will be confidential and remain anonymous. I will be using a pseudonym (false name) to represent your participation in my final dissertation.

There will be no personal costs to you if you participate in this project. You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to.

If you wish to take part in this interview you will need to complete the attached informed consent form.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a dissertation which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you. The data collected from this research project will be encrypted and stored in a password protected folder and will be kept for 5 years.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Sincerely,

Kayla van Rie





Kayla van Rie
(Master's student researcher)
671313@students.wits.ac.za

Prof Amisha Kanji
(Supervisor)
Amisha.kanji@wits.ac.za

Dr Alida Naudé
(Supervisor)
alida@amtronix.co.za

APPENDIX 16 Cont…

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
SPEECH PATHOLOGY AND AUDIOLOGY

Informed consent: I have read all the information given relating to the research project and declare that I understand it. I have been given the opportunity to contact and discuss relevant aspects of the project with the researcher or their supervisor. By adding my information below, I hereby declare that I agree to voluntarily participate in a zoom interview

I have read and understood the participant information sheet for the interview, and I consent to voluntarily participate interview portion of this research as well.	☐ Yes, I agree to participate in the Zoom interview ☐ No, I do not wish to participate in the Zoom interview
SECTION 11 of 11	
Participant information sheet Zoom Interview	
Full name	
Email address	
Contact number	
Do you work for the public or private sector	☐ Public ☐ Private
Please indicate three times and dates within the next month where you will be available to participate in a 30 -45 minute Zoom interview.	

APPENDIX 17
Research invitation: email template used

Good day,

My name is Kayla van Rie and I am a Master's student in Audiology at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating ***"South African Audiologists' Views, Perceived Knowledge and Reported Practice in the Realm of Fall Risk Screening of Older Adults,"*** under the supervision of Prof Amisha Kanji and Dr Alida Naudé.

As part of this project, I would like to invite you to take part my research study. There are two parts to this study. You are can either participate in part one only, OR in both part one and two.

PART ONE: ONLINE SURVEY

The survey will take no longer than 15-25 minutes and involves answering quantitative questions, mostly on a Likert scale. Your participation will be anonymous if you choose to participate in the survey only. However, if you decide to also participate in the interviews, your survey responses will become known to the researcher for further discussion within the interviews.

PART TWO: ZOOM INTERVIEW

The Zoom interview should take no longer than 30-45 minutes. The questions will be based on your answers provided in the survey. Knowledge of fall risk screening will not be tested, the questions will merely be seeking further elaboration or insight into your views, perceived knowledge and practice in fall risk screening.

By selecting on the link below, you will open up the detailed participant information letter for the survey part of this study (Part 1). Once you provide electronic consent, the survey will begin. A separate information and informed consent letter will be provided at the end of the electronic survey for the interviews (Part 2), where you will be provided the opportunity to indicate whether you would like to also participate in the interviews or not.

https://docs.google.com/forms/d/e/1FAIpQLSfWb-jNDxwpMRVo5jwb8MN5iZUljTVBXhSOUF4KEsyV6ArjRg/viewform?usp=sf_link

If you have any questions about this research, feel free to contact me on the details listed below.

Sincerely,

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APPENDIX 18
Results: Supporting quotations from the online interviews

4.5.1 AUDIOLOGIST'S PERCIEVED KNOWLEDGE OF FALL RISK SCREENING

4.5.1.1 and 4.5.1.2 Reported training and perceived knowledge in the area of fall risk screening.

Vestibular training is a relatively newer topic in the audiology field:
- ***"Look I graduated a long time ago. Long time ago. We did have a block of vestibular lectures, and with, basically, no practical aspect to it" (P1)***
- ***"Because back when the earth was cooling, vestibular just wasn't on the radar at all" (P2)***
- ***"It was quite a long time ago, but I remember the paucity of information in the vestibular and balance realm to start with" (P3).***

Limited opportunities were provided to gain experience in fall risk screening:
- ***"We each only got to see one patient practically in our final year…so we got lots of the theoretical training on it, but the practical side, I think we could have gotten a little bit more experience in that." (P7)***
- ***"… the undergraduate would then sort of decide the importance of it (fall-risk screening). So, if you think it wasn't such a risk for that specific patient, then it was okay. If you did think it was very important, then we did get to do it and practice on it... So, I think I was one of the fortunate ones who got a patient for whom it was necessary, but I mean not each and every undergraduate student might get the opportunity." (P7)***
- ***"When I had my vestib block that's when I did the fall risk assessment. And actually, to be honest, it wasn't done with every patient we saw. So, I think perhaps it could be incorporated more. We never actually had a thorough lecture on it per se. It was more like a tool that you could go read at home like prep for it." (P6)***

Time limitations:
- ***"Look at the time it was also your combined speech therapy and audiology degree I just don't think there was enough time" (P1)***
- ***"In final year, we were really pushed for time, so we got lots of the theoretical training on it, but the practical side, I think we could have gotten a little bit more experience in that." (P7)***
- ***"At the undergraduate level and doing all the vestibular testing takes quite some time, so we ran out of time necessary to do all of this stuff" (P4)***

Focus of undergraduate curriculum:
- ***"I don't remember being trained in fall risk specifically. Yeah, I remember getting the balance, you know the test battery, but not in fall risk per se"(P8)***
- ***"it [fall risk] wasn't a formal component of our audiology training"(P10).***
- ***"…the focus is hugely on hearing, and not nearly as much on balance or vestibular function." (P14)***
- ***"I do just wish they would, in undergraduate, they would focus more or equally the hearing and the balance side of it. Not put the one above the other and it should not be a speciality for certain people who are interested in it. If a patient comes in today, and they are at risk of falling every audiologist is supposed to be able to identify that." (P17)***
- ***"And I think there was huge focus on, like what the balance system is and what the vestibular system is and what vestibular assessments are, but not necessarily a focus on the patient, themselves, and like I said, the holistic view of the patient. I think there's more focus on body structure and function and not actually looking at the activity and participation at all. That's just from my undergraduate studies and what I thought. I don't think there was time spent on the other factors. Yeah. So, I think, like, like almost every other training I think focuses on more like the vestibular system and how to assess that and not much else." (P11)***
- ***"We tend to focus more a lot on the equipment. The VNG, the ENG, the VEMPS and don't actually start with the basics like fall risk" (P17)***
- ***"So it's mostly we prioritize the equipment based testing and then the bedside the obvious tests, and then, not really, the fall risk assessment." (P18)***

Limited knowledge of educators at universities:
- ***"It's just lack of lack of knowledge, it's not it's not forming part of our typical vestibular- I think the vestibular curriculum focuses on pathology and vestibular as opposed to the overall balance." (P1)***
- ***"I didn't feel like the staff were competent in vestibular to be able to teach on that." (P5)***
- ***"To be honest, I think that's because the people in charge, don't really know that it's our responsibility."* (P8)**
- ***"There's not always someone who knows vestibular as well as they should at the university, where they can teach evidence-based practice of firstly, vestibular and secondly fall risk…So there's not necessarily the evidence base at the university to be able to provide a very good vestibular training as well as fall risk training." (P4)***

Fall risk screening is not emphasised as being important:
- ***"…doing all the vestibular testing takes quite some time, so we ran out of time necessary to do all of this stuff, so this [fall risk screening] was not seen as the most important part of our vestibular training". (P7)***
- ***"It starts at undergraduate level, because if we don't believe during our studies that it [fall risk screening] was really part of our studies, then we won't really believe afterwards oh, but this is something that we can do and should do" (P12)***

Fall risk screening is associated with vestibular patients:
- ***"We were trained to do a risk of falling assessment during -it was more like a screening- but to do it during our vestib block so I think that's why I keep on going back to vestib, because that's in my brain." (P6)***
- ***"I don't think I've ever, in my undergrad training, I've never come across it [fall-risk screening] like when we were at our hearing aid clinic block or diagnostic, you know- you trained to when you're doing a diagnostic it's case history, otoscopy, tymps and puretones. Never was it "oh and maybe consider fall risk" (P6)***

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4.5.1.3 Perceived knowledge sufficiency in the ICF framework to use it as a model for fall risk screening.

11/18 Participants did not know what the ICF was

- ***"I don't even know what the ICF is" (P1)***
- ***"I recall the name [ICF] from university because we had to know about that kind of thing. But no not really not very well." (P4)***

Views on how the ICF may be incorporated into fall risk screening

- ***"I think it helps you to then view the patient more holistically… we'll have the appropriate referral and intervention." (P6)***
- ***"Think you're going to be looking more at how is that fall risk going to impact that person's quality of life. How's it going to impact their care? how's it going to impact people around them? and their social engagements?" (P11)***

Conflicting viewpoints on the use of the ICF framework for fall risk screening

- **"*To be very honest, if I have to use the ICF model, like the way I was taught in varsity, then I probably, in order to implement fall risk screen, I probably wouldn't do it because I remember it being just so complicated." (P8)***
- ***"I think the ICF model is such a brilliant model"* (P17)**
- ***"ICF is like it's something that I fall back on for pretty much all the clinics that I do like in everything that I do I'm thinking about all of these things at the back of my head." (P18)***

4.5.2 AUDIOLOGISTS' VIEWS ON FALL RISK SCREENING IN AUDIOLOGY

4.5.2.1 Agreement: Views on the scope of the audiologist and their perceived role in fall risk screening.

Arguments for fall risk screening being within the audiologist's scope of practice	*Arguments for fall risk screening not being within the audiologist's scope of practice*
a) Audiologists are trained in vestibular testing and thus have a good understanding of the pathophysiology behind dizziness descriptors (n=16)	**a) *Fall-risk screening may not be viewed to be within the audiologists scope of practice by other MDT members (n=5)***
- ***"It falls within our scope because the audiologists' field of practice is both hearing and balance, and obviously fall risk falls under balance in what way." (P14)***	- "*I think whenever a patient has a balance problem, or they seem at risk for falling. They rather refer to the physiotherapist, or even the occupational therapist." (P6)*
- ***"…they use descriptors that only or primarily an audiologist is really well equipped to make a judgment call of whether to go any further with that or where to refer the patient for the complaint" (P3)***	- *"I think a physio would be better suited to then do this assessment." (P5)*
- ***"Falls squarely within our scope of practice because it's ear related and even if it's not necessarily an ear related balance problem, we can screen all of the systems to some extent, and refer appropriately" (P4)***	- *"By and large, I think this area was often seen as the scope of the physiotherapist, especially in terms of their training."(P10)*
- ***"I think it's a very simple part of vestib, is obviously very very complex, but I think fall risk doesn't need to be. So that's why I think we already very well educated to actually do it with the right tools." (P12)***	- *"I feel it is within our scopes but then everyone[MDT members] I think they're more likely to just overlook it" (P18).*
- ***"I just can't imagine too many other professions that are going to come into contact with older people, and understand the audio and vestibular system, understand cognitive change, and be able to offer this service. So, Yeah, it's an area that we should be, we should be servicing as a primary health care provider." (P3)***	- *"We work with the physios, we work with the ENTs…and it's not being spoken about in any of those multi-disciplinary teams." (P11)*
- ***"One of the jobs of an audiologist is to distinguish between a balanced problem that is caused by a specific disorder or disease, and to differentiate between otologic and non-otologic reasons for having an imbalance of some sort, and make the appropriate either tests diagnostic tests or a referral" (P3)***	**b) *It was not something that was taught or emphasised in graduate studies (n=1)***
b) *Older adult audiology patients have a higher fall risk and we work closely with the older adults (n=9)*	- "*It dates back to the training. So yeah, only if we have more training on the area in undergrad and postgrad, then yes, it could form part of the scope." (P5)*
- ***Participants specifically mentioned that audiology patients may be more commonly present the following fall risk factors: age, presbycusis, presbyvestibulopathy, imbalance symptoms, cognitive decline and deterioration in skeletal or muscular skeletal systems.***	- *"I think that people are very unlikely to do something that they haven't had specific instruction on" (P3)*
c) *Fall risk screening was important ethical duty and responsibility to promoting quality of life and holistic health for patients and prevent the harmful consequences a fall can have on their patients quality of life (n=5)*	- *"I personally think that if they don't think it's important, they're not going to teach you" (P15)*
- ***"I do believe it's part of a duty of care to our patients. I don't think it's actually something that's kind of a 'nice to have' or an optional …the same way we identify an asymmetrical hearing loss and discuss it with our patients, we should be identifying fall risk and discussing it with our patients- as I say it's an ethical duty of care to the patient."(P2)***	- *"I think that that maybe that it's not deemed as important as other topics that needs to be covered at undergraduate level" (P12)*
- ***"The same way that an ethical audiologists will discuss the need for early amplification as protection against accelerated cognitive decline, we need to be discussing that early identification of risk factors will actually have a protective influence against falls so I think I think we need to join the dots here."(P2)***	- *"It's more as if maybe that's not actually important, because they leave out this segment in the curriculum." (P17)*
- ***"So, I think it's acting in your scope of practice or in your ethical responsibility, number one and number two because we see such a large range of elderly patients that it would be missed opportunity if we don't do it." (P8)***	**c) *Audiologists not practicing in vestibular audiology, may not have the expertise to screen and manage fall-risk patients (n=1)***
- ***"It should be the duty of all primary healthcare providers" (P3)***	- *"I'm like okay, you are here for your hearing and if I don't think there's a 'balance balance' problem, you know, like a balance disorder that we treat in the vestib clinic, then I don't check for risk of falling because I kind of don't see it as in my scope." (P6)*
- ***"A fall can actually be a death sentence. And so, it is a life, lifesaving and harm preventing act" (P3)***	- *"The vestibular audiologist will be able to do more, they'll be able to intervene more effectively and maybe rehabilitate as well and address those various factors I think more effectively because they have more experience in it compared to a diagnostic audiologist" (P9)*
- ***"You would then be able to help the patient to prevent a serious fall that could be life-threatening to them or to their mobility" (P5)***	**d) *Fall risk was not a topic which is commonly discussed in professional audiology circles (n=1)***
d) *By definition fall risk 'screening' is quick and simple and acts as a preventative measure which could in actual fact be conducted by all healthcare professionals working with the older adults (n=4)*	*"I employ four audiologists who are relatively young and qualified not that long ago; and I don't notice them talking about it. I don't notice them focusing on it" (P3)*
	e) *Uncertainty was raised as to whether screening for 'non-vestibular' risk-factors was within the audiologists' scope (n=1)*
	- *"if I don't think there's a 'balance balance' problem, you know, like a balance disorder that we treat in the vestib clinic, then I don't check for risk of falling because I kind of don't see it as in my scope." (P6). "Let's say they don't have a vestibular disorder - let's say it's just an elderly person that came for hearing assessment. So, it's not a vestibular disorder and it's just someone that's off balance because they have a bad knee or bad hip, and they at risk of falling then I, you know, I don't really know how to intervene" (P6).*
	f) Audiologists should not be the first line of defence

APPENDIX 18 continued…

- ***By definition screening is something that should be deliverable at all levels of care and even though audiologists, are sort of, you know, a specific profession, basically screening means that anybody including volunteers should be able to do it." (P2)***
- ***"Any healthcare professional can actually play a role in a preventive form. (P6)"***
- ***"it's an area that we should be, we should be servicing as a primary health care provider." (P3)***
- ***"A Fall Risk Screening is quick, it's free. It's easy to do" (P1)***

e) *Audiologists are well positioned and are thus an ideal profession to address fall risk, primarily because of how often audiologists come into contact with the older adults (n=4)*

- ***"We've got access to a large portion of the elderly population in our clinics" (P1).***
- ***"We are able to at least watershed or filter patients who need this attention because the driving factors for fall risk will often correspond with many of the other services that audiologists are already providing." (P3)***
- ***"I think the kind of population that enters any audiologist's practice, you know, a large compliment of that client base is elderly patients" (P10)***
- ***"but it it should be because of the close link between vestibular function and older peoples hearing function. And because we are exposed to so many of those people who are at risk for falls. So should be that their first port of call for those people." (P14)***

f) *Prevention of falls also subsequently decreases the burden of falls on the healthcare system (n=1)*

- ***"I actually had a chat about this topic to a physio recently, and something she mentioned that I agree with is, if we do more screening, there are less incidents where elderly people fall and the problem is, if you and I fall, we don't break our hip but if an elderly person falls, they literally get fractures and break bones, and I think that burdens the system"(P6).***
- *"In terms of the identification, I don't think we would be the first line of people who actually see it, so it's everyone else …. If it was going to be an important role, then it's going to be the nurses or the doctors" (P18)*

g) *Older adults are expected to struggle with their balance as they age. Typical elderly adults are usually 'fine'(n=1).*

- *"For me it's like an elderly person, we are expecting them to struggle with certain things. We are expecting them to have those problems as they get older." (P18)*
- *"Like the typical elderly person that you see like now, we get eighty-year-olds who are still perfectly fine. Everything is working, so for me it's more of - if we think that they are going to have a problem- then do it maybe, but then if not, then I don't see the need to do that" (P18).*

4.5.2.1 Agreement: Views of audiologists perceived role in fall risk screening

Area of practice	Audiologist's roles as described by the participants	N=18	Quote exemplars
Pre-screening role	• *Preventative role* • Creating fall-risk awareness for older adults and their families • Educating MDT members on fall risk and the audiologist's role	***9*** ***1*** ***1***	• *"I think we certainly got a role in terms of prevention and promotion" (P2).* • *"I think the main thing is that nobody like slips through the system. And I think preventative. Yeah, and any healthcare professional can actually play a role in a preventive form." (P6)*
Screening role	• *Identifying fall-risk (screening)* - Asking questions about dizziness, imbalance and falls - Questionnaires - Identify risk factors - Formal fall risk protocols • Vestibular assessments • Define/understand the patients described symptoms • Identify the effects the patients' symptoms have on their ADL	*9* *2* *1* *1*	• *"Our role is literally to say, you know, identify how at risk this person is. I think it's as easy as that." (P14)* • *"I do think we could be able to identify risks. Based on our knowledge of the patient. (P11)* • *"To define or to understand what that patient is describing, and to make decisions about does this patient require a referral."(P3)* • *"If we find someone they are at the risk of falling, then we can then move onto, again it's that steppingstone, we can move on to doing a vestibular assessment so that we can find out why are they at risk? Is it something vestibular? Is it something central?" (P15)* • *"So I think our role is basically to touch base with how things are affecting their participation in life"(P9)*
Post - screening role	• *Making referrals* • Early intervention • Counselling • MDT collaboration • Vestibular rehabilitation • Maximising the patient's quality of life • Ensuring that the patient is safe • Providing a management plan • Making recommendations for environmental adaptations	***11*** ***3*** ***3*** ***3*** ***3*** ***3*** ***2*** ***2*** ***1***	• *"I believe our role would then specifically be to refer" (P1)* • *"We need to be working well with our other team members I think we need to be working really well with physios and OTS" (P2)* • *"The point is they need support to strengthen their vestibular system or their balance system. And that could take the form of a step in the rehab which audiologists could provide" (P2)* • *"…some counselling, you know, beyond, beyond saying like, oh, be careful we don't want you to fall because that will be a disaster, but actually having some suggestions" (P1)*
Other	• Be respectful of professional boundaries and what falls within and out of the audiologist's scope of practice.	*1*	• *"I think we need to be respectful of professional boundaries. And I do believe that you need to know, as an audiologist when you are out of your depth." (P2)*

APPENDIX 18 continued…

Fall risk screening should be a more prevalent role for the vestibular audiologist	*Fall risk screening should be the role of all audiologists*
- ***"Because balance- people who experience balance disorders- or who are experiencing dizziness, are obviously more at risk of falling…I think general movements for a dizzy or balance disorder or patient that has a balanced disorder. really places them at risk, and whereas the general audiological clinic setting is also not really" (P6)*** - ***"So, if only the ones that are doing Balance Assessment do for screenings, you are not engaging with majority of this society. So I would definitely say it's our role as audiologists- whether you specialize in balance or not" (P8).*** - ***"I think it would be easiest to be incorporated first in a practice that currently has an understanding, and sees vestibular patients and has those these referral networks" (P5)*** - ***"So why I feel uncertain I think because we both lack the training and the knowledge on it. I think in a, in a more vestibular balance clinic setting, you've got more of a background of fall and fall risk and but based on your patients coming in and out of your door not based on academic training" (P11).*** - ***"I'm mostly in the public setting, It's just not feasible. We don't have the time" (P18)***	- *"Because when you do audiology screening, it's supposed to cover everything. When you say the general audiology the vestibular and risk assessment is supposed to be part of that 'general', but we separate it."(P17)* - *"Hearing loss is an independent risk factor for falls, and so therefore if you are in an audiology clinic, you need to actually be thinking about it" (P2)* - *"We should all be doing it. It's not precious. It's not complicated. It's something that everybody should be doing not only people who are specifically trained in vestibular" (P1).* - *"I think this really goes back down to what the definition of screening is. Screening is a process in which one has a refer or a pass criterion. By the time you reach a vestibular balance disorder clinical setting, a patient reaches that, you're no longer at the screening stage you're actually at okay there's definitely a problem we need to know more about it, we need to find out more about. So I think that fall screening should happen on a more generalized level. They aren't even close to enough vestibular balance disorder and clinics really, for, for a sufficient number of people to be seen to call it some form of screening. Then that's just, you know, ad hoc you find out there's a fall risk for this particular patient, that's the diagnostic process." (P3)* - *"So I think if a patient is going to see a vestibular or balance audiologist they already know that they're having a problem. So, their risk for fall has already been identified. Whereas if they're coming to see me, they might not even know that something can be done for the fact that they feel the room is spinning. But I then identify it, and then can refer and make sure something can be done" (P7)* - *"If only the ones that are doing balance assessment do for screenings, you are not engaging with majority of this society. So I would definitely say it's our role as audiologists- whether you specialize in balance or not." (P8)*

4.5.2.2 Perceived self-efficacy: Comfort in performing fall risk screening

Examples of factors that made participants feel confident in conducting fall risk screening

- ***"I think just working with the elderly and so, I mean we do, I do vestibular testing and I'm familiar with the relationship between the balance system components" (P1)***
- ***"One of the nice things about studying vestibular work is you also learn what is not the vestibular system. And so, you cover all of the stuff that goes into fall risk that has nothing to do with the end organ itself. So yeah, it's, it's made me feel a lot more confident, looking for it, because I know what I'm looking at." (P3)***
- ***"I've been exposed to balance and fall risk with our webinars and with a lot in house training. So that has been, I would say the biggest factors my in-house training." (P8)***
- ***"I think I'm just maybe personal experience, observing just other audiologist doing it. Also just reading up about it, but also kind of developing confidence in yourself by just looking at them and identifying where this person is at risk." (P9)***

Examples of what participants felt they would need to feel more confident in conducting fall risk screening

- ***"I feel it's it would be unethical of me to say, oh, I know exactly what to do, and I have loads of confidence. But I have only done it on one person before, so I think lack of experience. And yeah, lack of opportunity to really do it." (P6)***
- ***"I think you know specific training in in areas that I need to screen for- maybe a checklist and scales that, that I can physically implement with patients - questionnaires as well. Just more resources that focused on areas that can be used to identify someone who's at risk of falling." (P10)***
- ***"So, I think it just boils down to practical experience. I didn't get enough practice on it, so I think if I were able to just sort of brush up on the theory, and then to do even just one or two again, I would feel much more confident in being able to do it" (P7).***
- ***"Just more resources that focused on areas that can be used to identify someone who's at risk of falling." (P10)***
- ***"I am not well trained, or educated in the fall risk assessment. So, I am uncertain because I do not know exactly what to do. I didn't have a protocol, if I have an audiologist protocol. I will feel different about it." (P14)***

Participants correlated their discomfort with vestibular testing to their discomfort with fall risk screening

- ***"I wouldn't be at all comfortable with the vestibular patient, let alone doing a further screening"(P5)***
- ***"I think that audiologists typically are under confident when it comes to the vestibular side of things" (P1).***
- ***"If an audiologist isn't working within the field of balance, are they, as, I don't know, as qualified as knowledgeable to do a fall risk screening and do whatever the follow up would be on that for a screening, if they're not familiar with balance."(P11)***
- ***"I think in a, in a more vestibular balance clinic setting, you've got more of a background of fall and fall risk and but based on your patients coming in and out of your door not based on academic training." (P11)***
- ***"I do not have all the vestibular and balance education I've got is from after my degree and conferences and things that I went to. That's all I know about it and I do not do vestibular or balance in practice. Yeah, because I feel I have insufficient knowledge, and this fall risk- I thought its part of that [vestibular services]- because I do not have enough knowledge." (P13)***
- ***"I think that audiologists typically are under confident when it comes to the vestibular side of things (P1).***
- ***"i'm not comfortable with vestibular testing."(P5)***
- ***"Like I'm not vestibular trained, obviously I have vestibular knowledge but I haven't done the courses… I just think it's out of my comfort zone and something that's unfamiliar and new." (P11)***
- ***"And I am not comfortable with balance or vestibular testing because I feel I really do not know enough."(P13)***

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4.5.2.3 Motivation: Interest to learn and perceived importance of fall risk screening

Interest to learn more

- *"I would like to know where can we acquire more knowledge and become more confident and get a hold of more resources and training." (P16)*
- *"I Just think it would be nice if more people were trained on it…I would like to be trained more on it as well." (P18)*
- *"Personal responsibility as an audiologist to keep up to date" (P11)*
- *"A lot of the things you become experienced as you go and it's your responsibility to get training and find someone who can do this stuff. And then you learn from them." (P18)*
- *"You are an audiologist you should be competent in everything, but audiologist pick and choose what they want to do...I think sometimes audiologists can really become so narrow minded- in the sense of 'okay I am focusing on my field of expertise, and this is what I want to become really good at so this is what I'm going to focus on'. But we as practitioners really need to have a holistic approach because the ears are not just about hearing, it's just as much about balance." (P18)*
- *"The last thing is the desire to actually want to do it…we are content about what we actually came out with an undergraduate, and we go like I'm doing something. So, and we stop there. So, wanting to grow. The desire to grow your profession or your own skills is, I feel like it's a factor on a lot of audiologists because you can talk about vestibular, they won't show any interest in it" (P17)*

4.5.2.4 Outcome expectancy: anticipated changes to clinical practice and participant's views on fall risk screening as an expansion of the audiology profession.

Outcome expectancy

Medical model to biopsychosocial model healthcare approach shift

- *"There might be certain procedures that we may do differently…. And have a multifactorial understanding of your patient" (P3)*
- *"I just think that you will feel like you're doing a more complete job of providing more complete service to your patient. And you're not just being ear specific but you're also looking at other aspects of our scope of practice, which we should be providing to our patients but we're actually not doing at the moment." (P14)*
- *"I think that our patients often need to know that we're looking at them holistically, that we aren't you know we aren't focused on that one organ, but we're looking at, you know, how, how are you interacting with your life" (P3)*
- *"it really just helps you to look at the patient holistically. So instead of just me, honing in and being like, Okay, how am I going to be able to help this patient hear and communicate to the best of their ability- instead of me focusing in on that, it allows you to have a broader perspective, to really look at the patient as a whole and see his life in all the different aspects"(P7)*
- *"I think looking back at saying you're looking at the patient more holistically, you not just checking if they have a hearing loss, okay they have a hearing loss, so let's fit them with a hearing aid and then they are off our caseload. I think it's going to make you see the patient more holistically and actually see other areas that we could have input and could have like benefit for the patient, looking at all those other systems… So I think the whole way in which, at least audiology is going is actually looking at like patient centered care. And I think you have to look at the patient as a whole. So I do think it can make your treatments and intervention and everything from start to finish with that patient more holistic.(P11)*
- *"it just gives you a more holistic approach to treating your patients, where, instead of just, you know, sending them away with hearing aids and doing all you can do there, you can also give them all of the balance testing and the, you know, screening for things like that where they might not necessarily be screened in other places." (P4)*
- *"I think it will help us operate in a more holistic view off the patients. Seeing as we are meant to be trained in hearing and balance and so in practice such as that" (P5)*
- *"Well it becomes more of a rehabilitative conversation as opposed to just diagnostic. Yeah, and probably results in quicker referrals or more focused referrals for rehab." (P1)*
- *"It might guide, because there are choices that we have to make for rehab" (P3)*
- *"If we had the screening tools, if we actually knew what we're supposed to do in after doing this, where does it lead to? I think half of the time we wouldn't do a full vestibular diagnostic" (P18).*
- *"If we are initiating the screening. The fall risk screening, then it's more proactive as opposed to responding." (P1)*
- *"The same way that an ethical audiologists will discuss the need for early amplification as protection against accelerated cognitive decline, we need to be discussing that early identification of risk factors will actually have a protective influence against falls" (P2)*
- *"I think we would be able to then identify much earlier. Patients needing more diagnostic testing. You know, and follow up, treatment and intervention." (P10)*
- *"Well, it could increase the amount of patients that are being correctly referred to the balance clinic, and so by doing that, it would then allow the right patients to be assessed and identified and be treated early. And so, then the because of the early identification, it can be picked up earlier so then the vestibular and balance clinic will be able to make a bigger impact because of the early identification can have positive effects on the, the prognosis of the patients" (P7).*

Product (hearing aid)reliant income model to service reliant income model shift

- *"it's a service to your patients, and it demonstrates to your patient that your care goes beyond what is traditionally associated with hearing clinics, which is to provide a product" (P3)*
- *"Well, it definitely streamlines the testing. It guides you as to which testing is more important or which ones you know that scheduling of your, of your testing. Yeah, I think, I think that's one of the main things just streamlining and doing the right tests first, especially if it's an elderly patient you can't maybe manage a full, full balance assessment and you at least do the ones that will give you the most information first- based off of what their findings were from the screening."(P8)*
- *"If it was an area in which audiologists could build, it would mean that they could rely on more service delivery and less on the sales of widgets or devices" (P14)*

Fall risk screening and expansion opportunities for the audiology profession.

- *"It is firstly it's an ideal opportunity for audiologist to inhabit just a little bit more of their scope of practice in balance, without necessarily having a massive investment in equipment. And it's a service. It's an important service to the community that we offer services to." (P3)*
- *"I think if you can do a screening on all your patients, you would of course identify more people" (P1)*
- *"I feel like fall risk not really necessarily is even an extension of vestibular but it's kind of something that can come pre-vestibular testing, so it can almost lead you into more specialized areas of audiology. But it's also something that can actually give you a more holistic approach to how you see your elderly hearing patients" (P4)*
- *"It will also stimulate inter-professional activities" (P3)*
- *"Well, it definitely offers expansion because especially with the risk of over-the-counter hearing aids coming into play. We can't just call ourselves hearing aid audiologists anymore, because we need to start expanding the profession being more specialized. And I definitely think what this will do, fall risk screenings. It will help us identify those patients that are kind of flying under the radar. And more and more balanced assessments can be made, and which is done by us – which will increase our assessments, vestibular assessments for sure. and obviously vestibular rehab as well" (P8)*
- *"If it was an area in which audiologists could build, it would mean that they could rely on more service delivery and less on the sales of widgets or devices" (P14)*

APPENDIX 18 continued…

- ***"So, I think the whole way in which, at least audiology is going is actually looking at like patient centred care. And I think you have to look at the patient as a whole. So, I do think it can make your treatments and intervention and everything from start to finish with that patient more holistic." (P11)***
- ***"The general public rarely knows that an audiologist actually treats balance and dizziness. Yeah, so I think it's an opportunity to more branch out on that part. And I also think it's opportunity for more interprofessional collaboration." (P6)***
- ***"I think, well just for one, awareness from the actual patient's perspective, but also, it would allow us to identify more patients that are having this problem, and then by finding more patients it would increase the demand for vestibular or audiologists practicing in vestib. It would expand our practice, our profession and allow more people to be identified, early identified and helped. It would make it less of a, sort of, you know, specialized field in the sense of more people will be doing it because there's a greater need because, as well as having taken on a greater need because the patients are already out there but because they are being identified then more audiologists will be needed, and then for the expansion." (P7)***
- ***"I would not think that a fall risk screening would actually be the role of the vestibular balance clinic. It's like saying I'm going to an audiology practice for hearing screening. No, we do diagnostic hearing assessments. Yes, we might do fall risk screening in an audiology practice, but in a vestibular or balanced clinic- It shouldn't be a screening it should be a full assessment." (P14)***
- ***"I think we got a long way to go before it's even accepted by the audiology profession never mind expanding it… changing clinical practice is often an uphill battle"(P2)***
- ***"how many people really would do the fall risk screening in the profession, so I don't think it's a place of expansion" (P18).***

4.5.2.5 Perceived feasibility: Views on the challenges to implementing fall risk screening clinically.

4.	**Limited motivation/desire to grow and learn and Resistance to change**	- *"The last thing is the desire to actually want to do it...we are content about what we actually came out with at undergraduate, and we go like I'm doing something, and we stop there. So, wanting to grow. The desire to grow your own profession or your own skills is, I feel like it's a factor on a lot of audiologists because you can talk about vestibular, they won't show any interest in it and ya" (P17)* - *"I think we got a long way to go before it's even accepted by the audiology profession never mind expanding it." (P2)* - *"I think changing clinical practice is often an uphill battle" (P2)*
5.	**Group compliance- audiologists will only do it if the majority seem to be doing it.**	- *"Because that's the thing I mean if you didn't see that it's something that a lot of people are doing. Then, you know, why would I do it you know, why would I be the only one that will waste a bit more time doing it if no one else is doing it? you know, but if you know that more people in the profession are doing it then that changes that."(P12)*
6.	• **Audiologists don't always accept responsibility for their full scope of practice**	- *"You are an audiologist you should be competent in everything. But audiologist pick and choose what they do, so now doing something is seen as additional work on top of what they have. So, I think it's a thing of 'there are people who are interested in that. So, I would rather send or leave that for them" (P18)* - *"Other audiologists who don't have the privilege to expand their own knowledge, they just sit with what they have, and our profession doesn't grow with that, we will stay here as hearing therapists"(P17)*

APPENDIX 18 continued…

4.3.3 AUDIOLOGISTS REPORTED PRACTICE OF FALL RISK SCREENING

4.5.3.1 Fall risk screening: reported implementation and clinical experience.
4.5.3.2 Fall risk screening tools participants would reportedly use.

Reasons for selecting fall risk screening tools/not

- ***"My reasoning behind it is that's the way I was taught. I don't have so much experience in the fall risk yet so I can't go- 'I'm doing this because of this and I'm adapting it" (P9)***
- ***"it's [choosing fall risk screening tools] a fluid and intuitive kind of kind of a thing and it probably grows organically from my encounter with the patients." (P2)***
- ***"I think time in the practices obviously if you're going to screen every single patient. Time is a factor. So, you got to make it at least reasonable sensitivity and specificity and at the same time you want to make sure that you're not spending your entire session on this particular task." (P3)***
- ***"Well, we don't have a protocol officially, we're going to work on that. So that's pretty tricky to answer." (P3)***
- ***"You just go by what the patient has said, and you go with the time is not necessary a proper protocol If I can say- its thumb suck and hope you're right- which is not good, because you just work with what you have at that given moment." (P17)***
- ***"We don't have space and equipment to do fall risk screening and assessments" (P16)***
- ***[Reason for using self-reported measures] "if there's a language barrier, I think that's the biggest thing, you will see in state, but we have clerks who kind of just fall in if there's a language barrier and they automatically translate for you so that kind of addresses that barrier" (P9).***
- ***[Reason for not using 'other' tests] "Maybe not feeling competent enough to do it. I think that's the thing too, it's having that opportunity to actually practice it and become confident in it so that other measures might also not be so scientifically reliable or valid or significant so there might also be more cautious of it because they want evidence based practice that can also be a barrier of it." (P9)***
- ***[Reason for not using 'other' tests] "I think I think for me, I would be honest in saying that my knowledge is limited I'm still getting in the field and I think with time and more learning, I will probably be to stage where im better able to practice you know holistically and implement all of the proper protocol it's needed.***
- ***[Reason for not using performance-based measures] "One- we don't know about them. We don't have them. Nobody has told us about it. It the first time I actually saw this list." (P17)***
- ***[Reason for not using 'other' tests] "Nobody has taught us about it. It's something that we are not aware of, it's not common knowledge. If I can say as well so That's, why, we don't do it." (P17)***

Only screening for fall risk if patients had specifically been referred for a vestibular assessment.

- ***"So, at the moment it's only I'm only screening patients who are sent to me for vestib". (P4)***
- ***"Ya no, I am only screening for those being referred for vestibular testing. So, I won't do a diagnostic balance test on someone who say for hearing evaluation, and I pick up they have a bit of a gait problem, then I'll usually booked them for a vestibular test." (P8)***
- ***"Only vestibular patients are being considered for fall risk. Hmm yes, I think we currently only screening, those patients that have been referred for the vestibular testing." (P10)***

Participants strongly correlated 'fall risk' with 'vestibular pathologies' and did not often consider that a person's fall-risk may be associated to alternative risk factors

- ***"We can say listen, this is what I am seeing, lets maybe move you on to vestibular assessment to see why- so it is just again that steppingstone to help them as well." (P15)***
- ***"Even though I'm not necessarily seeing vestib patients, it would be very important for me to do this (fall risk screening) so that I can refer to an audiologist that is practicing in vestib" (P7)***
- ***"I think earlier intervention and appropriate management. And yeah. And obviously, you know identification of the cause of the fall. In terms of whether it's a central component or a vestibular component, again, you know, narrow down the management job of the particular condition." (P10)***

4.5.3.3 Multidisciplinary Team Collaboration when Screening for Fall Risk.

- ***"Well, look I think it is a good way for us to incorporate with other allied health, and not just be working in our own little circle and I think for you for it to be successful the adequate protocols, trainings, and stuff need to be in place and adequate and Referral networks where people need to know where it's beyond their boundaries. And I think that's what's important." (P5)***
- ***"I do also believe that we need to be working well with our other team members I think we need to be working really well with physios and OTS. I think we need to be respectful of professional boundaries. And I do believe that you need to know, as an audiologist when you are out of your depth." (P2)***
- ***"And then collaboration and planning with other professionals is necessary. I think there's only so much knowledge I do have, which I admit, because there's only so much experience you have, but then you learn so much from the physios when I speak to them. And then you also speak to the OTS and you kind of learn their way of thinking and then you can contribute to it and that's why that collaboration is very helpful." (P9)***
- ***"It's supposed to be a matter of a multidisciplinary team, because usually when it comes to falling assessment, it's hard to pinpoint, actually what is the cause. So, we need each other. The doctors, the audios and the ENTs, let's work together into doing the screening. It can't be in isolation everybody needs to understand their role, and we need to work together" (P17)***
- ***"It would not only be training for myself, or us as audiologists needed; it would be training for even ENTs and doctors and OTs- everyone who has come on board" (P18)***
- ***"First and foremost, right now is all about awareness of the balance side of our profession. We need to educate our patients, we need to educate our fellow audiologists as well, doctors nurses, even our ENTs, that there's more that we do when it comes to falling side." Furthermore, education and discussions about the MDT members roles and when to refer to whom needs to be clarified: "I don't know who to refer to- I think that links with not knowing what to do after I've identified the risk". (P17)***
- ***"I definitely felt it won't be given any priority- one or two people will take it seriously and you will have one or two referrals, but otherwise I don't think it would be given a priority because now if I feel like it's a thing of, they're going to prioritize where they feel services are needed the most. Yeah, but then if you are coming with statistics and actual things that happen in reality, then I think maybe it might expect that interest in in everyone. Yes, if it's a serious problem." (P18)***

APPENDIX 19
Ethics Clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Van Rie

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H20/09/56**
PROJECT TITLE	South African Audiologists' views, perceived knowledge and reported practice in the realm of fall risk screening of older adults
INVESTIGATOR(S)	Miss K Van Rie
SCHOOL/DEPARTMENT	Human and Community Development/
DATE CONSIDERED	18 September 2020
DECISION OF THE COMMITTEE	Approved Risk Level: Minimal
EXPIRY DATE	22 October 2023

DATE 23 October 2020 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Prof A Kanji and Dr A Naude

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

_____ _____/_____/_____
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX 20
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