Fall Risk of Population with Hearing Loss in the Community

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Introduction

Background

1 in 3 adults fall annually (WHO, 2008)

- Falls result in negative physical, emotional and economical consequences

Hearing loss is a risk factor for falls

- Every 10 dB increase in hearing loss increases the odds of falling by 140% (Lin & Ferrucci, 2012)

In Singapore,

26.6% of Singaporean older adults with hearing loss fell at least once in 2010 (Chen, 2017)

The Problem

➢ A strong correlation exists between hearing loss and falls.
  ○ Beneficial to screen elderly population with hearing loss for fall risk.

➢ Presently, no such balance screening procedures have been implemented in Singapore.

Research Aims

To establish the incidence of fall risk among community-dwelling elderly individuals with hearing loss

To include study protocol into existing screening programs to identify individuals at risk for falls

- E.g. NUH mobile hearing clinic

Hypothesis

A relationship exists between hearing loss and fall risk

The more severe the hearing loss, the greater the fall risk

Methodology

Study design

- Cross-sectional study of elderly adults with hearing loss who were seeking audiological treatment at National University Hospital (NUH)

Inclusion criteria

- **Above 60 years old**
- **Diagnosed with hearing loss**
  - **Pure tone average (PTA) > 20dBHL in the better ear (WHO, 2008)**
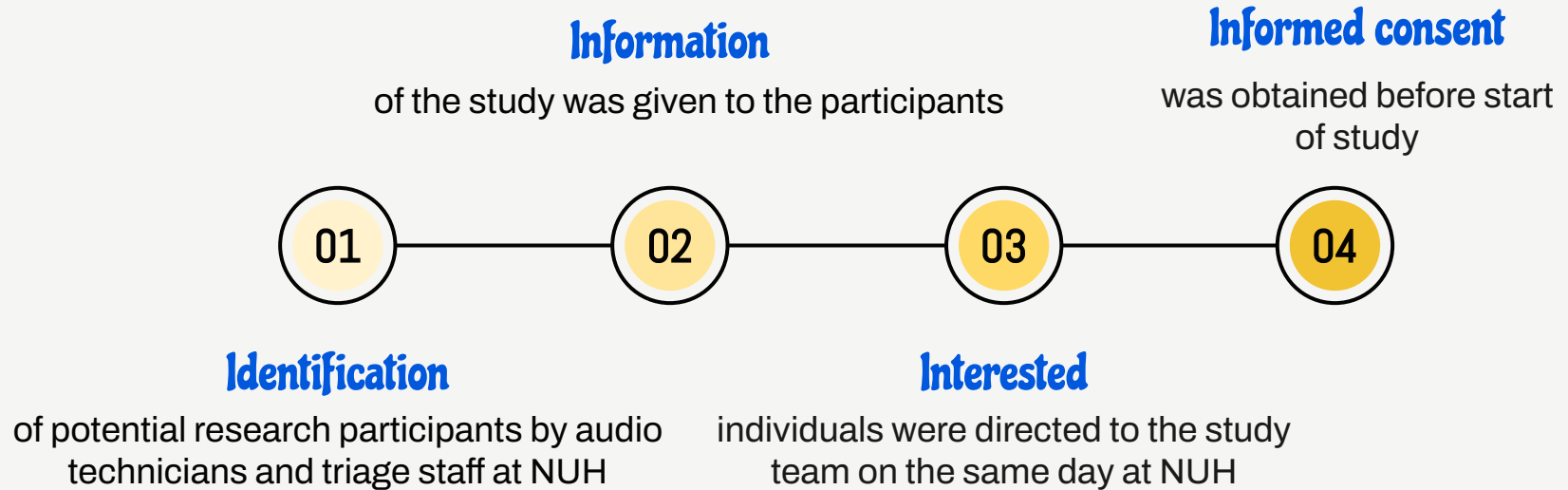- **Non-institutionalized**

Exclusion criteria

- **Patients with stroke, Parkinson's disease, rheumatoid arthritis, ischemic heart disease, or lower limb joint replacement in the last 6 months**
- **Any other neurological or musculoskeletal disease**

Procedures

- **Convenience sampling was used to recruit patients**

Information

of the study was given to the participants

Informed consent

was obtained before start of study

01   02   03   04

Identification

of potential research participants by audio technicians and triage staff at NUH

Interested

individuals were directed to the study team on the same day at NUH

Activities-specific Balance Confidence (ABC) Scale

- 16-item questionnaire
- Measure subject's level of confidence in performing functional tasks without falling on a scale of 0 to 100%
- Final score is derived as an average score of the 16 items

Activities-specific Balance Confidence (ABC) Scale

National University Hospital

Patient Subject no.:

The Activities-Specific Balance Confidence (ABC) Scale
*Adapted from Powell, L. E. & Myers, A. M. (1995). The Activities-Specific Balance Confidence (ABC) Scale. Journal of Gerontology Med Sci 1995; 50(1):M28-34.

For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following scale:

0% 10   20   30   40   50   60   70   80   90   100%
no confidence   completely confident

How confident are you that you will not lose your balance or become unsteady when you...

...walk around the house? _____%

...walk up or down stairs? _____%

...bend over and pick up a slipper from the front of a closet floor? _____%

...reach for a small can off a shelf at eye level? _____%

...stand on your tiptoes and reach for something above your head? _____%

...stand on a chair and reach for something? _____%

How confident are you that you will not lose your balance or become unsteady when you...

...walk around the house? _____%

Why ABC scale?

- **Simple and quick (15-20 minutes)**
- **Easy to administer (written)**
- **Has been translated into Mandarin (ABC-C scale) (Guan et al., 2012)**
- **Effective balance screening tool**

  - fallers have lower balance confidence than non-fallers (Cleary & Skornyakov, 2017)

  - Balance confidence is predictive of future falls (Landers, Oscar, Sasaoka & Vaughn, 2016)

  - Score of <67% can correctly classify fallers 84% of the time (Lajoie, 2004)
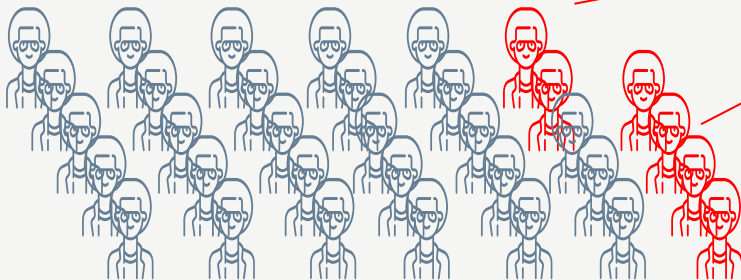
Results & Discussion
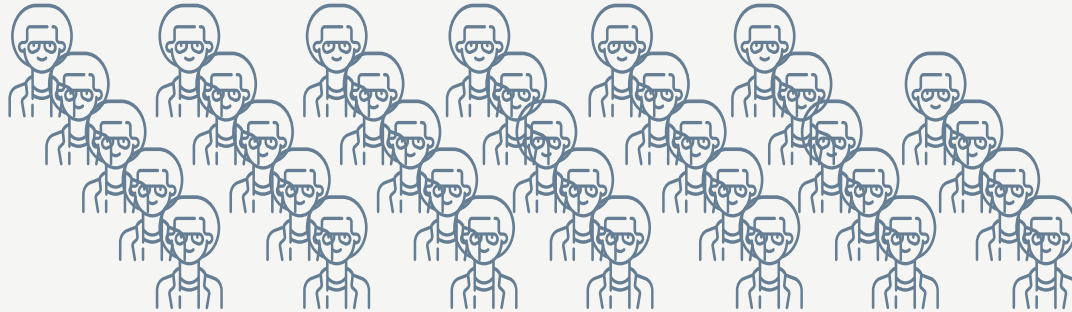
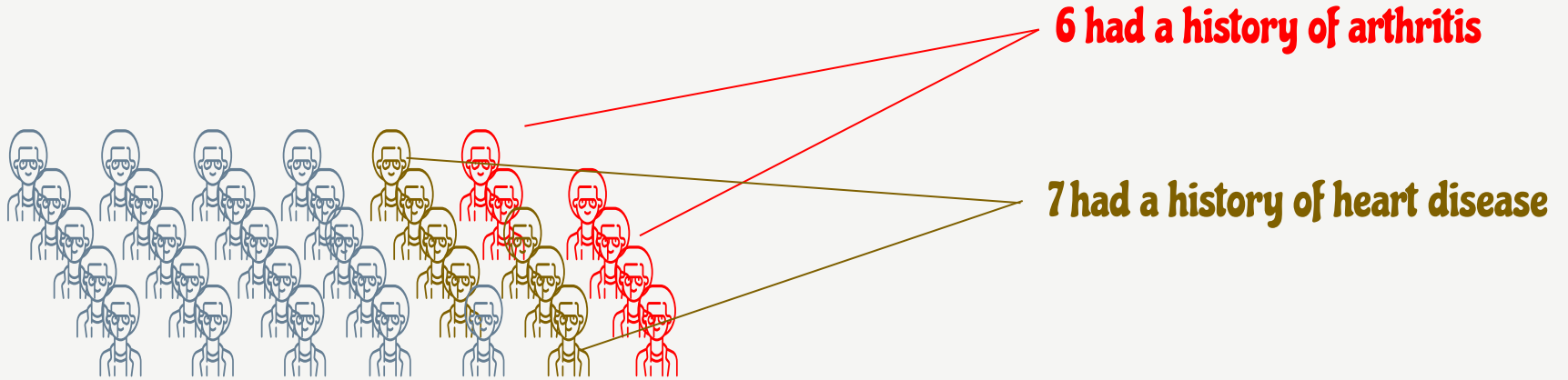**34 participants were referred to the study team via convenience sampling**

A further look into their medical history...

6 had a history of arthritis

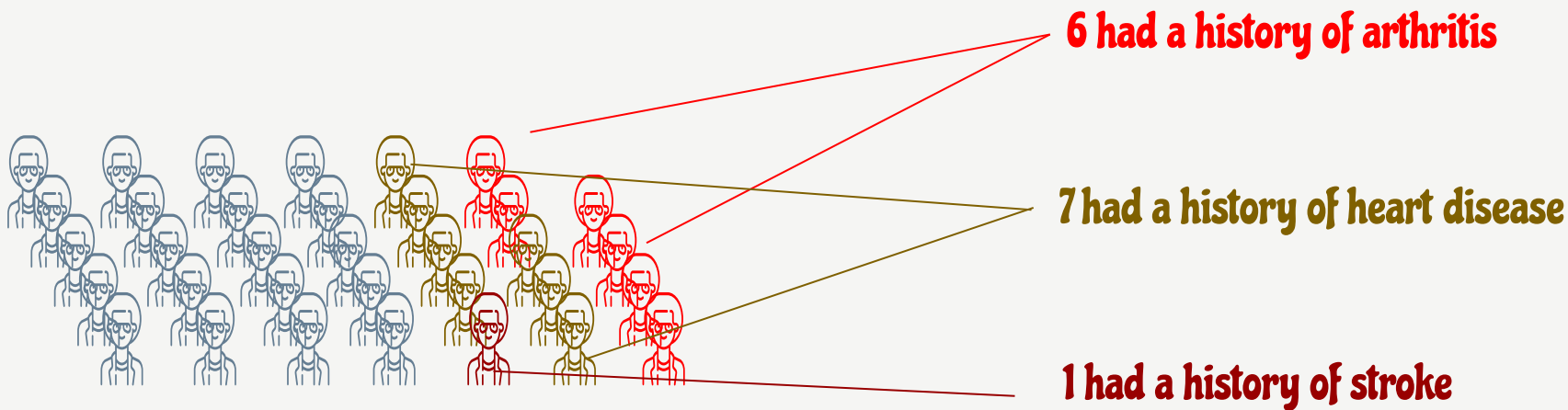A further look into their medical history...

6 had a history of arthritis

7 had a history of heart disease

A further look into their medical history...

6 had a history of arthritis

7 had a history of heart disease

1 had a history of stroke

A further look into their medical history...

6 had a history of arthritis

7 had a history of heart disease

1 had a history of stroke
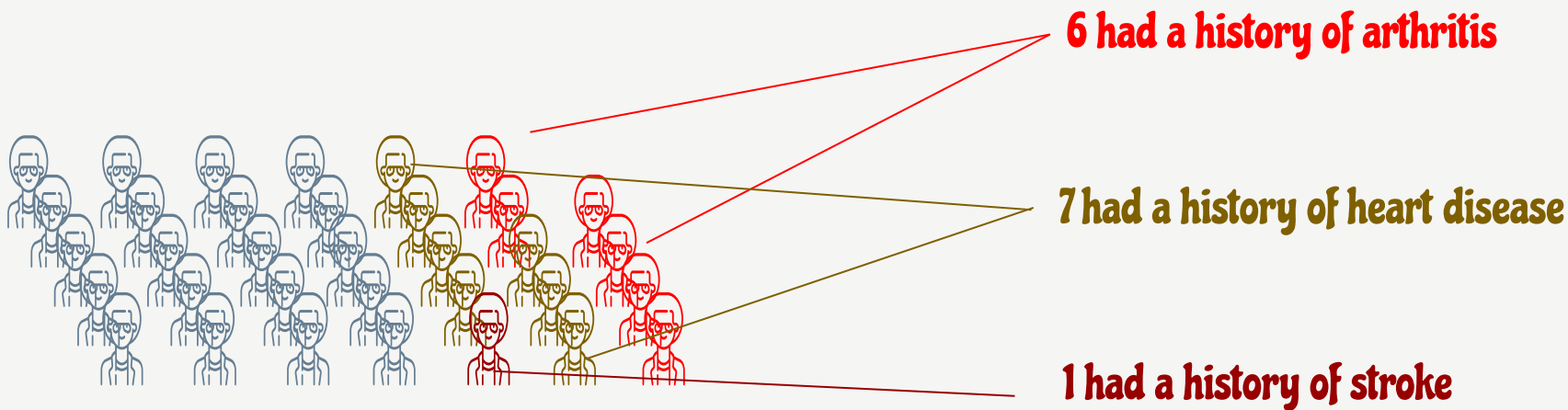
The results of these participants were excluded from analysis.
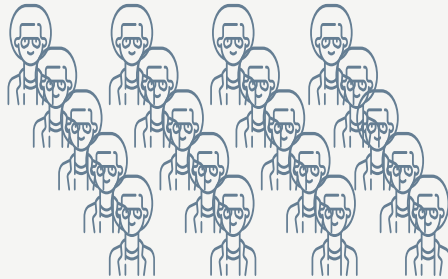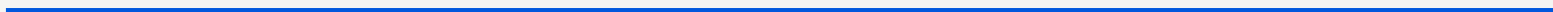
The ABC results of the remaining **20** participants were used for the analysis of fall risk and hearing loss.

Hearing loss and fall risk

Results

Gender

50% 50%

Age

61–84

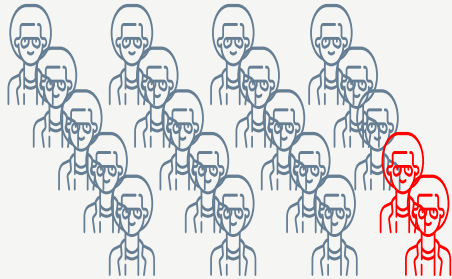Mean = 70.3 years

PTA values

27.5–66.3

Mean = 44.4 dBHL

ABC scores

21.9–100

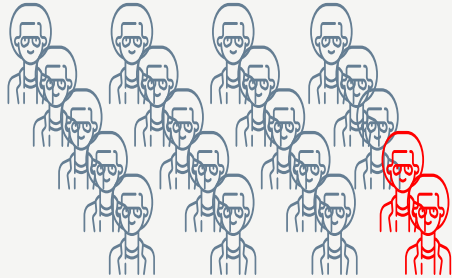Mean = 86.5%

Incidence of fall risk

Two out of 20 participants with hearing loss only were at risk for falls (ABC score <67%)

↳ Incidence of 10%?

Much lower than the 26.6% of reported falls among elderly with hearing loss in 2010 (Chen, 2017)

Incidence of fall risk

Limited sample size of study
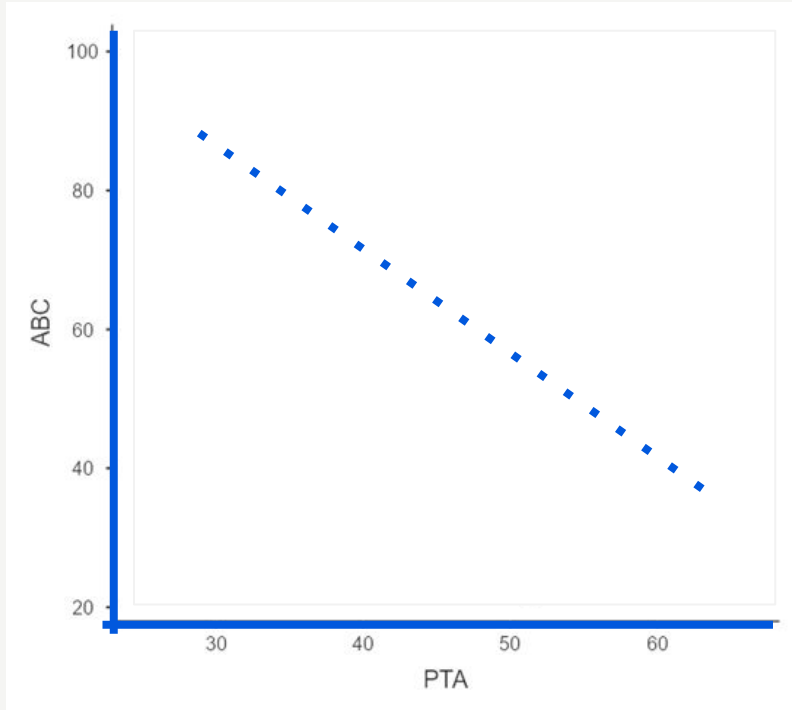
- **Targeted sample size of 76, but only 20 recruited**

  ⤷ **Low statistical power of 49.5%**
  Desired power level of 80%

  ⤷ **Results of this study cannot be used to estimate incidence of fall risk in the community**
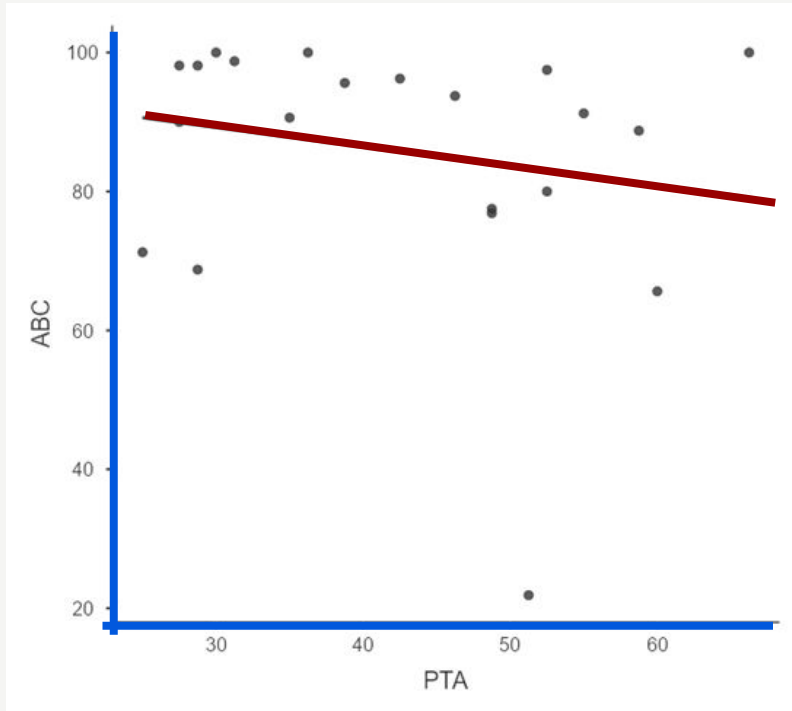
Relationship between hearing loss and falls

Hypothesis:

- **The more severe the hearing loss, the greater the fall risk**

Relationship between hearing loss and falls

Hypothesis:

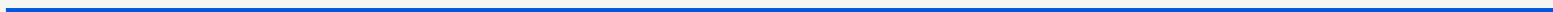- The more severe the hearing loss, the greater the fall risk

Results:

- No obvious relationship between hearing loss and falls

  - Differs from literature findings (Baloh et al., 2013; Lin & Ferruci, 2012; Jiam, Li, & Agrawal, 2016)
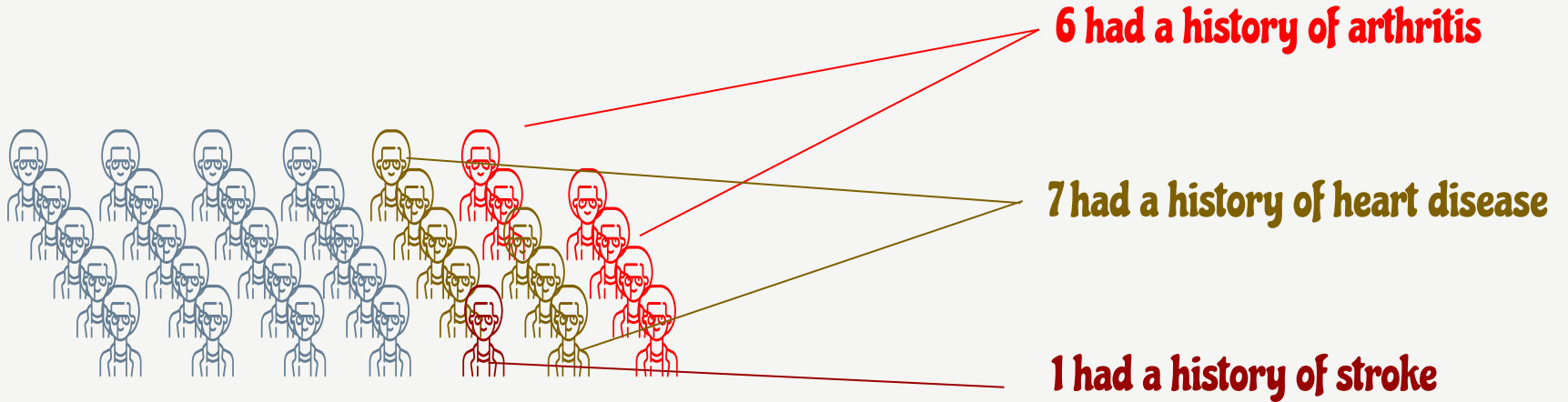
        Limited sample size?
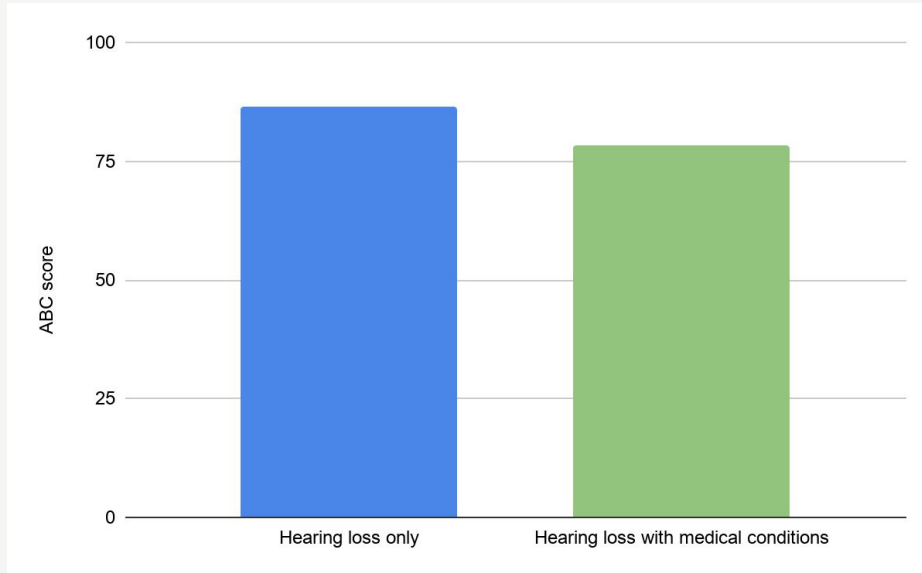
Medical conditions and fall risk

A quick recap...

6 had a history of arthritis

7 had a history of heart disease

1 had a history of stroke

14 out of 34 participants had underlying medical conditions.

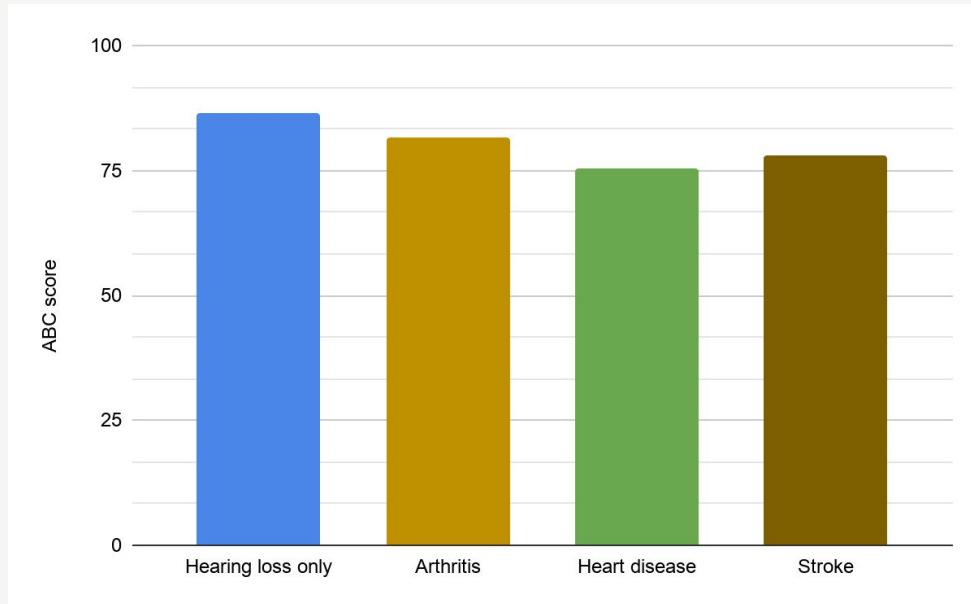# Do participants with medical conditions have higher risk for falls?

- Participants with medical conditions had lower mean ABC scores (μ=76.3) than those with hearing loss only (μ=86.5)

↳ Lower ABC scores may indicate poorer balance confidence → suggests greater balance issues

Mean ABC scores of participants with different medical conditions

Mean ABC scores:

Hearing loss only: 86.5%
Arthritis: 81.6%
Heart disease: 75.5%
Stroke: 78.1%

Mean ABC scores of participants with different medical conditions
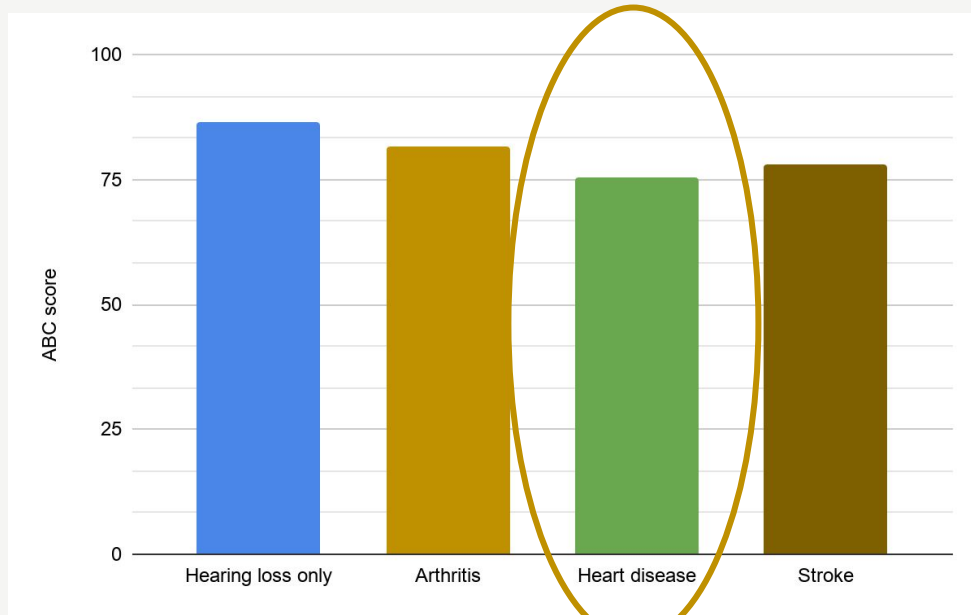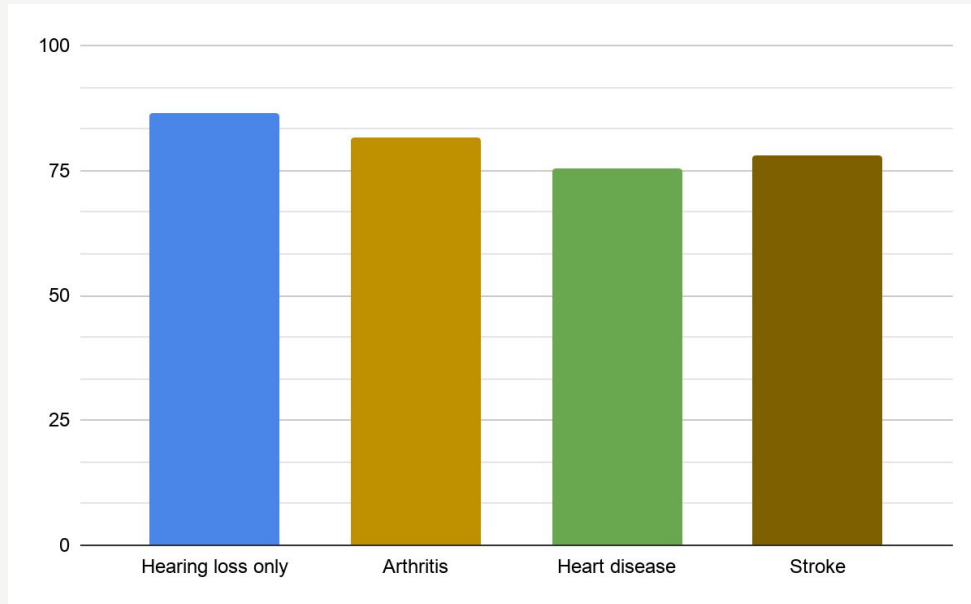
Mean ABC scores:

Hearing loss only: 86.5
Arthritis: 81.6
Heart disease: 75.5 (lowest)
Stroke: 78.1

Mean ABC scores of participants with different medical conditions

➢ **Results show general trend only**

➢ **Data analysis showed no significant difference between ABC scores and different medical conditions**

○ **Further information required on disease severity and disease management**

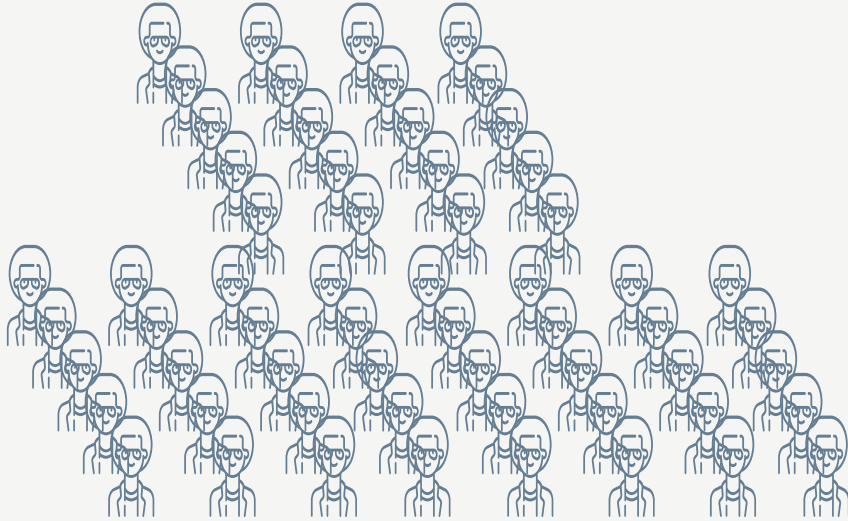# Limitations

- Small sample size
  - Inaccurate representation of population

- Limitations of the ABC scale
  - Subjective test
  - May be influenced by factors such as self-esteem

- Use of a single instrument
  - Multifactorial nature of falls makes it difficult for any one single screening instrument to accurately predict falls (Gates et al., 2008)

future work

1) Increase sample size

2) Use other functional tests in conjunction with the ABC scale
   E.g. Timed-Up-and-Go test, Berg's Balance Scale

   ↳ Improve discriminative ability of the falls screening protocol

Conclusion

- **Studies show a strong association between hearing loss and falls**
  - **Useful to screen patients with hearing loss for fall risk**

- **ABC scale is a simple balance screening instrument**

- **Results from this study showed no correlation between ABC scores and severity of hearing loss**
  - **Low statistical power due to small sample size**

- **Future studies should include a greater number of balance assessment tools to increase diagnostic accuracy**

THANK YOU

Q&A

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