

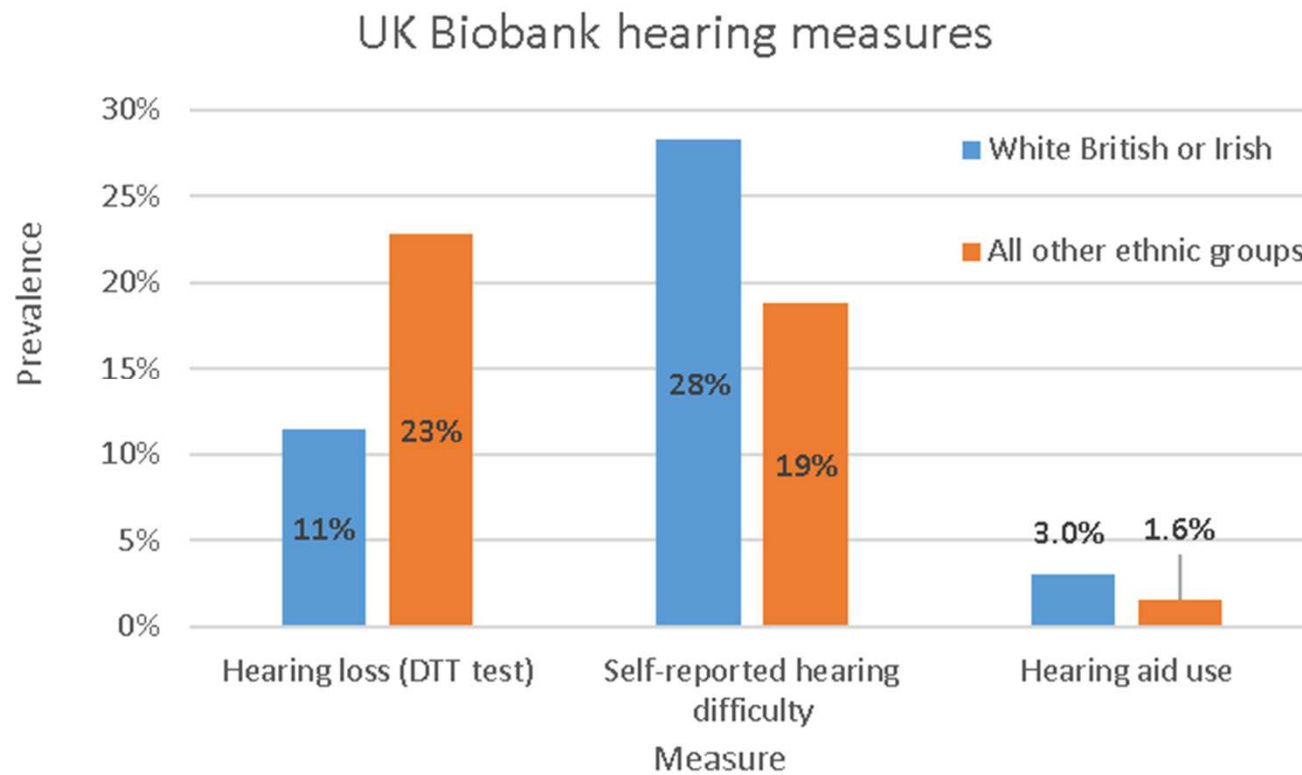


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Ethnicity and hearing health inequality: Observations from the UK Biobank

Harry Taylor

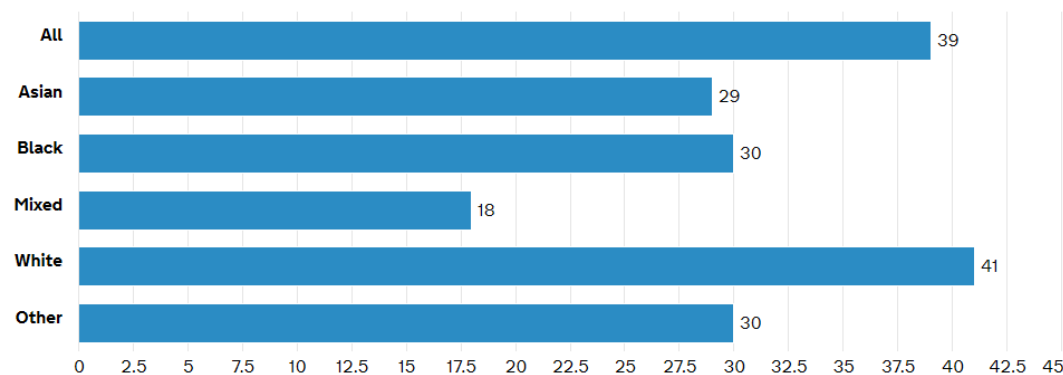
Key premise



Key stats

- Annual cost of unaddressed hearing loss estimated to be \$750-790 billion
 - ...evidence suggests that hearing aid use and early prevention of hearing loss are both highly cost-effective (WHO, 2017)
- 14% of the UK population is from a non-White ethnic minority background, and this proportion is forecast to increase to over 20% by 2050 (Rees et al., 2012)

Average (median) age by ethnicity

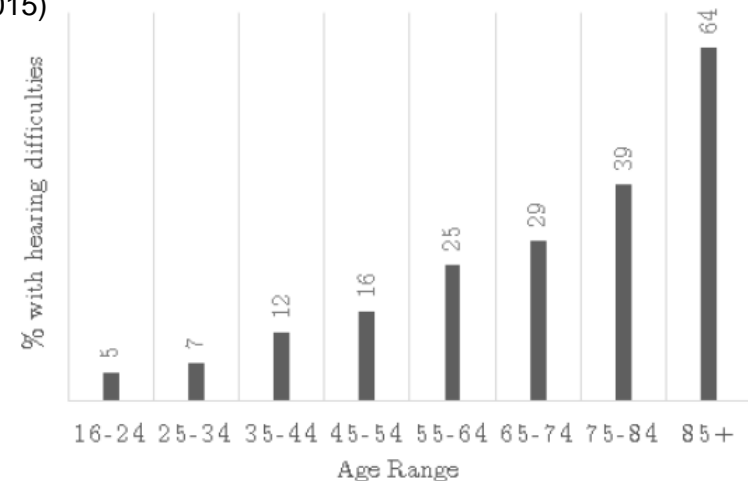


Source: ONS

What affects hearing health?

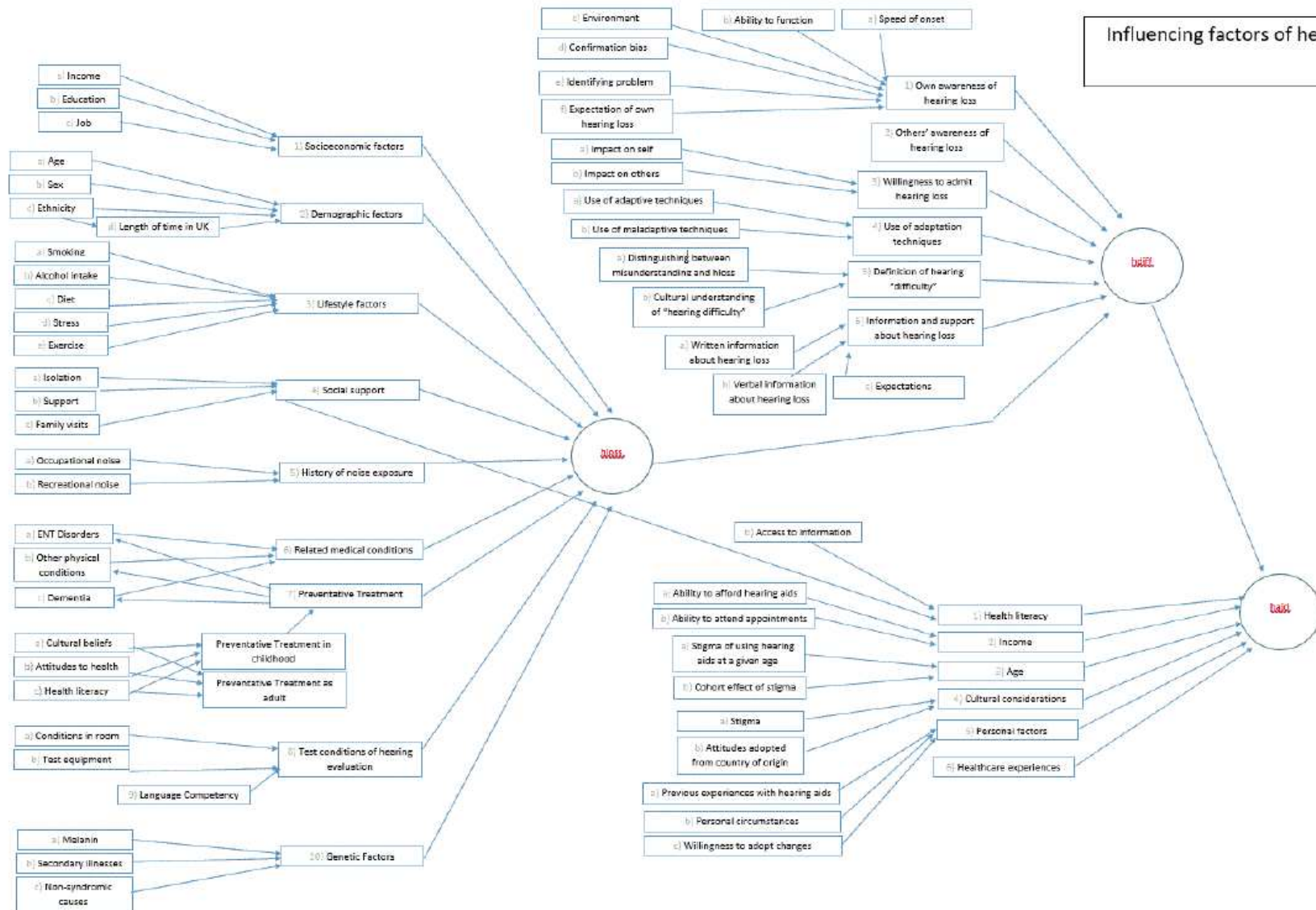
- Demographic factors, including:
 - Age (Davis, 1995)
 - Sex (Agrawal, 2008)
 - Ethnic group (Dawes et al. 2014)
- Socioeconomic factors, including:
 - Income (Davis et al. 2016),
 - Job type (Liljas et al. 2016),
 - Education (von Gablenz & Holube, 2017),
- Lifestyle factors, including:
 - Exposure to noise (Sriopas et al., 2017)
 - History of smoking (Chang et al., 2016),
 - Alcohol use (Popelka et al., 2000; Dawes et al., 2014),
- Comorbidity, including:
 - Hypertension (Brant et al., 1996)
 - Diabetes (Simovic et al., 2016).

Prevalence of self-reported hearing difficulties in UK adults (HSCIC, 2015)



Influencing factors of hearing health

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Why might hearing health vary between ethnic groups?

- Ethnic health inequalities exist generally (Marmot, 2010)
 - Socioeconomics/access to services/cultural differences etc.
- For naturalised migrants, could be:
 - Difference in level of hearing impairments in country of origin (Stevens et al., 2013)
 - Language penalty when taking speech-in-noise tests (Mayo et al. 1997)
 - Difficulty navigating NHS (Ronellentsch et al., 2004)
- Genetic causes (Murillo-Cuesta, 2010)
- Differences in working conditions (greater exposure to noise)

Summary of available datasets

| | ELSA* Wave 7 | | HSE** 2014 | | UK Biobank | |
|----------------------|--------------|------------|-------------|------------|---------------|--------------|
| | White | Non-white | White | Non-white | White | Non-white |
| Not hearing impaired | 7347 | 291 | 2465 | 135 | 133455 | 9857 |
| Hearing Impaired | 869 | 21 | 218 | 9 | 17669 | 3285 |
| Total | 8216 | 312 | 2683 | 144 | 151124 | 13142 |

*ELSA – English Longitudinal Study of Ageing

**HSE – Health Survey for England

UK Biobank

- Sample of 502,671 people aged 40-69 collected 2006-2010
- Participants underwent physical measurement, provided blood, urine and saliva samples and completed a detailed questionnaire about themselves
- UK Biobank population more White, affluent, healthy than general population (Fry et al. 2017)

| Clinic ID | Assessment centre | Dates of operation | Total recruitment |
|-----------|-------------------|-------------------------|-------------------|
| 11021 | Birmingham | 29/10/2009 - 21/07/2010 | 25,506 |
| 11011 | Bristol | 09/07/2008 - 28/11/2009 | 43,020 |
| 11008 | Bury | 14/01/2008 - 20/12/2008 | 18,326 |
| 11003 | Cardiff | 08/10/2007 - 31/05/2008 | 17,885 |
| 11024 | Cheadle (revisit) | 01/08/2012 - 06/06/2013 | 20,348 |
| 11020 | Croydon | 24/09/2009 - 09/07/2010 | 27,392 |
| 11005 | Edinburgh | 07/11/2007 - 07/06/2008 | 17,202 |
| 11004 | Glasgow | 16/07/2007 - 19/04/2008 | 18,653 |
| 11018 | Hounslow | 17/06/2009 - 26/06/2010 | 28,881 |
| 11010 | Leeds | 27/02/2008 - 11/07/2009 | 44,220 |
| 11016 | Liverpool | 28/01/2009 - 01/04/2010 | 32,825 |
| 11012 | London Barts | 27/08/2008 - 29/08/2009 | 12,584 |
| 11001 | Manchester | 16/04/2007 - 22/12/2007 | 13,943 |
| 11017 | Middlesbrough | 29/04/2009 - 06/02/2010 | 21,290 |
| 11009 | Newcastle | 23/01/2008 - 28/03/2009 | 37,011 |
| 11013 | Nottingham | 30/07/2008 - 12/09/2009 | 33,883 |
| 11002 | Oxford | 30/04/2007 - 27/10/2007 | 14,063 |
| 11007 | Reading | 14/05/2008 - 02/05/2009 | 29,426 |
| 11014 | Sheffield | 05/08/2009 - 13/07/2010 | 30,399 |
| 10003 | Stockport (pilot) | 13/03/2006 - 13/06/2006 | 3,799 |
| 11006 | Stoke | 05/12/2007 - 26/07/2008 | 19,441 |
| 11022 | Swansea | 11/03/2010 - 03/07/2010 | 2,284 |
| 11023 | Wrexham | 16/08/2010 - 01/10/2010 | 649 |

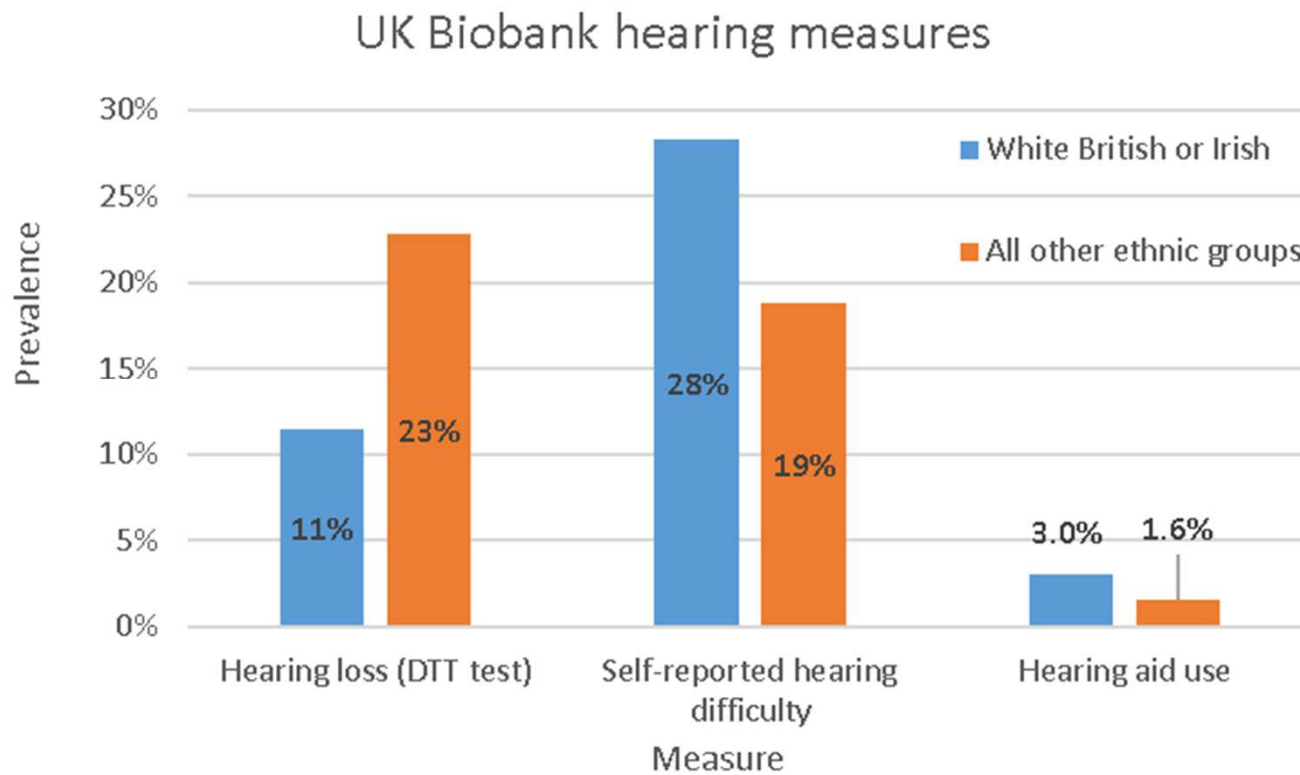
Locations of UK Biobank assessment centres throughout the United Kingdom



Digit Triplet Test

- Objective hearing test (Digit Triplet Test, or DTT) introduced in April 2009
- 164,266 participants have DTT information
 - 13,142 (8.0%) are from non-white ethnic groups
 - 20,994 (12.7%) have a hearing impairment
- Correlation between French DTT and pure-tone average measure: 0.77 (Jansen et al., 2010)
 - Research using more complex speech-in-noise tests (which use words rather than just numbers) has shown a 3dB penalty for non-native speakers (Mayo et al. 1997)

Key premise

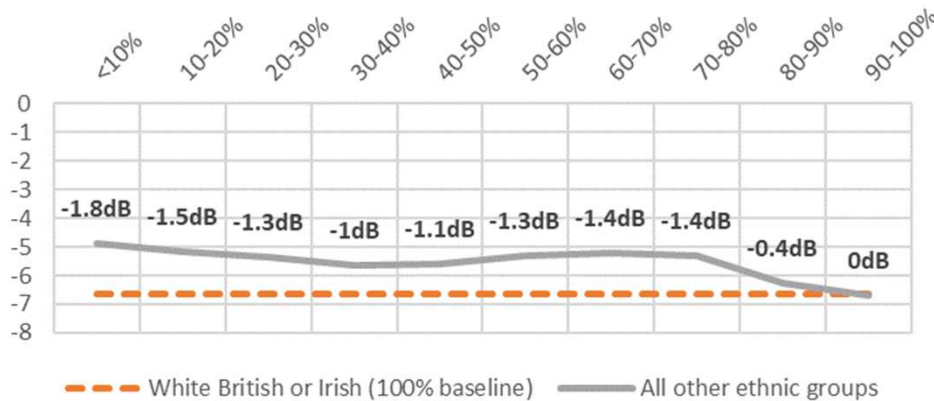


Ethnicity

- First language?
- Level of proficiency in the English language?
- How much of their life they spent in UK?
- Social class?
- Experiences of racism?
- Attitudes towards hearing health?

SRT inequality

- Gap between White British and all other ethnic groups appears to be a function of the proportion of life spent in the UK



SRT Vs Proportion of life spent in the UK

| | hloss | hdiff | haid |
|----------------------|--------|--------|--------|
| WBRI - born in UK | 11.4% | 28.4% | 3.0% |
| BME - born in UK | 9.7% | 20.5% | 1.5% |
| BME - not born in UK | 27.5% | 18.3% | 1.6% |
| N | | | |
| WBRI - born in UK | 140240 | 132702 | 140240 |
| BME - born in UK | 4936 | 4646 | 4936 |
| BME - not born in UK | 14267 | 13376 | 14267 |

Descriptive statistics of hearing health outcomes in UK Biobank

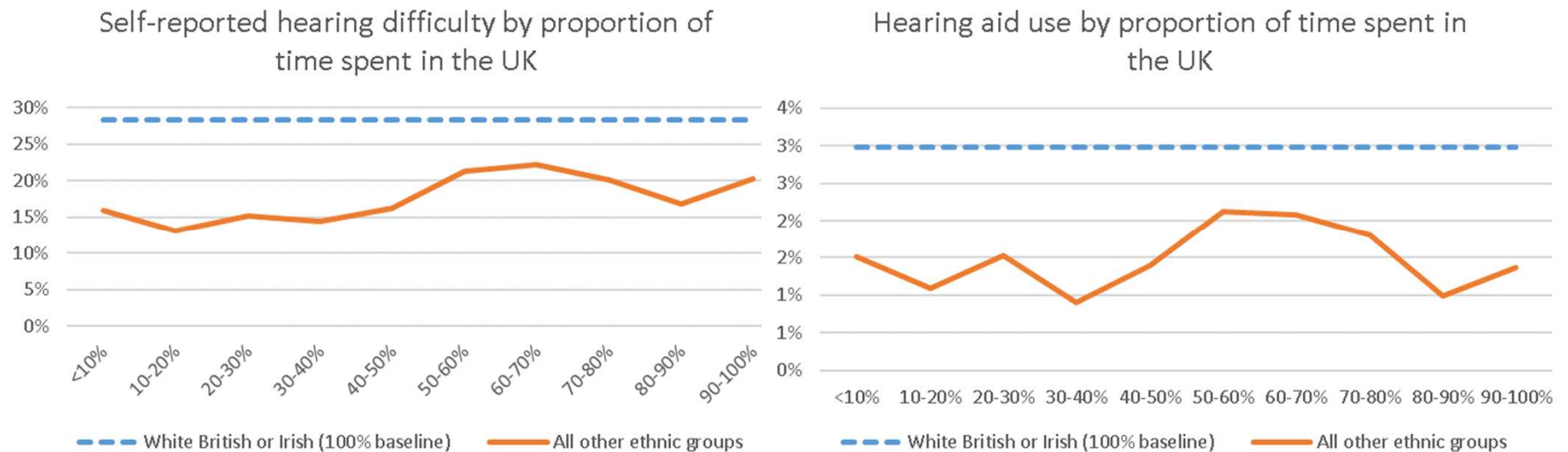
Hloss – DTT test

Hdiff – self-reported hearing difficulty

Haid – self-reported hearing aid use

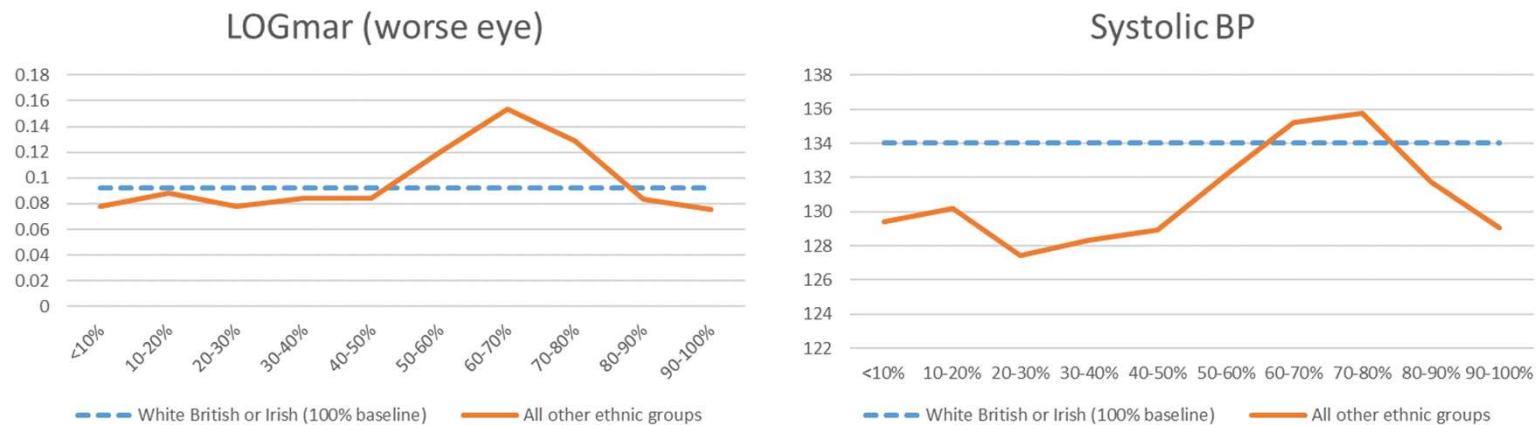
Other measures

- ...but this doesn't seem to be true for self-reported hearing difficulty or hearing aid use



Other outcomes and datasets

- Inequalities do not seem to exist in other health outcomes in the UK Biobank
- Nor do they exist in other datasets. Prevalence of hearing loss:
 - English Longitudinal Study of Ageing (ELSA): 12% (White) and 7% (Non-White)
 - Health Survey for England (HSE): 19% (White) and 12% (Non-White)
 - UK Biobank: 16% (White) and 45% (Non-White)



LOGmar (vision test) and Systolic blood pressure average outcomes split by proportion of life spent in the UK

“Now we would like to check your memory and reaction times by getting you to play some short games”

1) *“Stop means the same as?”*

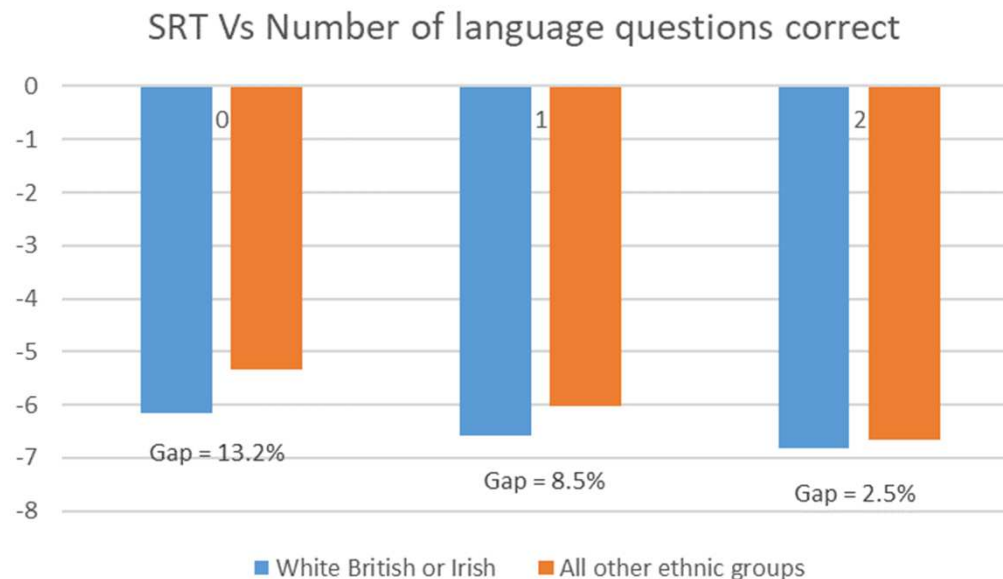
(Pause/Close/Cease/Break/Rest)

2) *“Bud is to Flower as Child is to?”*

(Grow/Develop/Improve/Adult/Old)

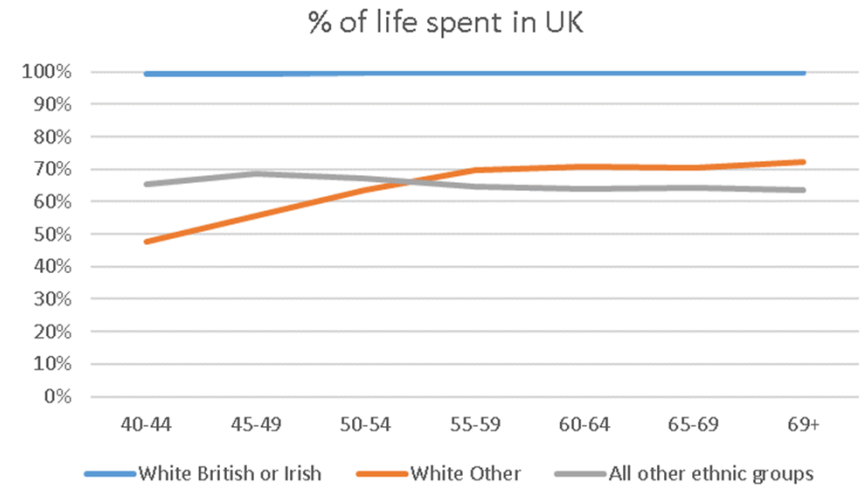
Fluid Intelligence

- The more language-related Fluid Intelligence questions a respondent got right, the smaller the gap in hearing health between White British and all other ethnic groups.

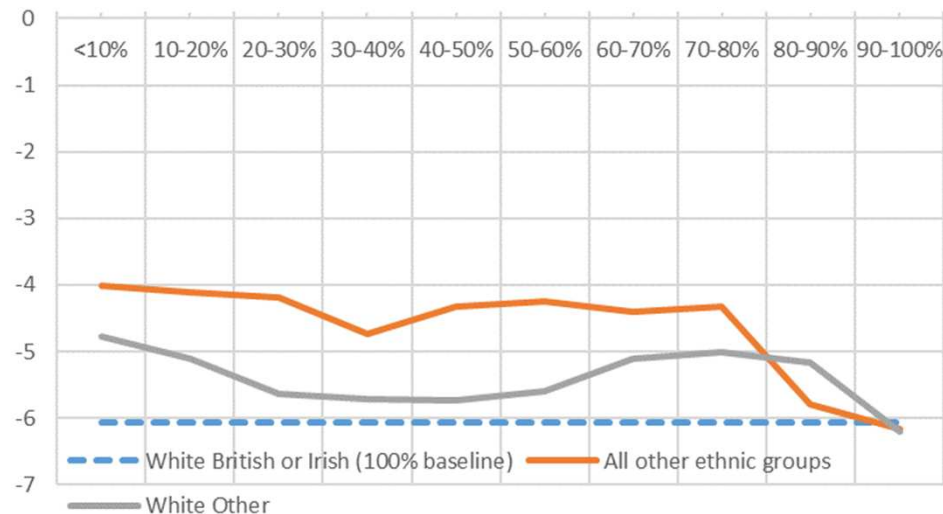


White Other group

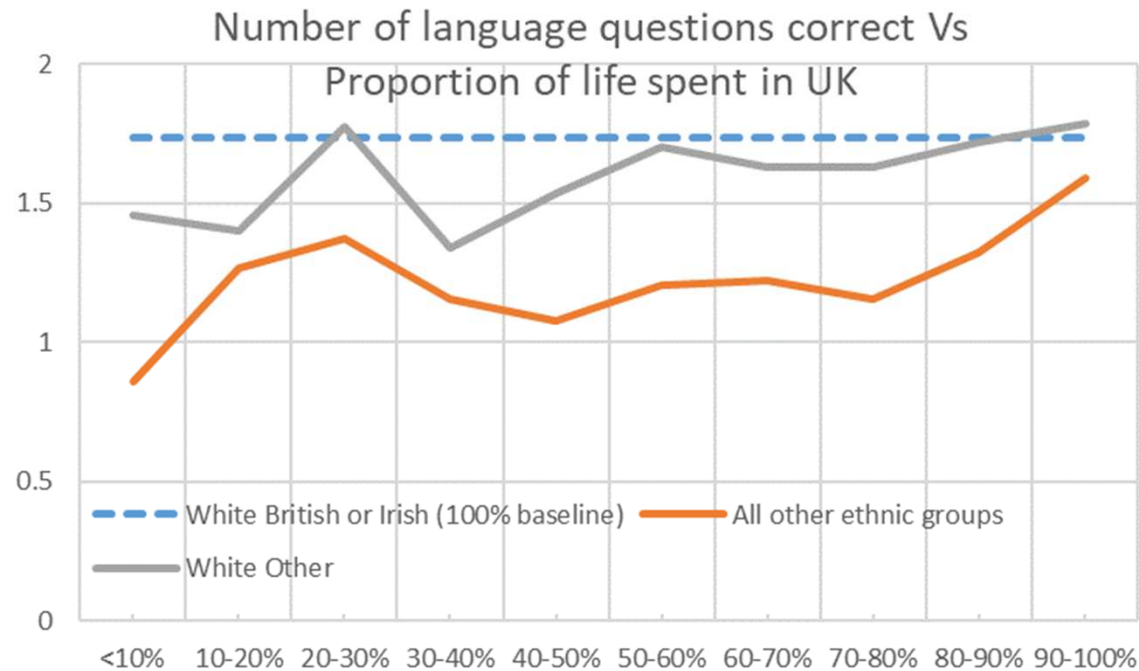
- White Other group sits between White group and all other groups – why?



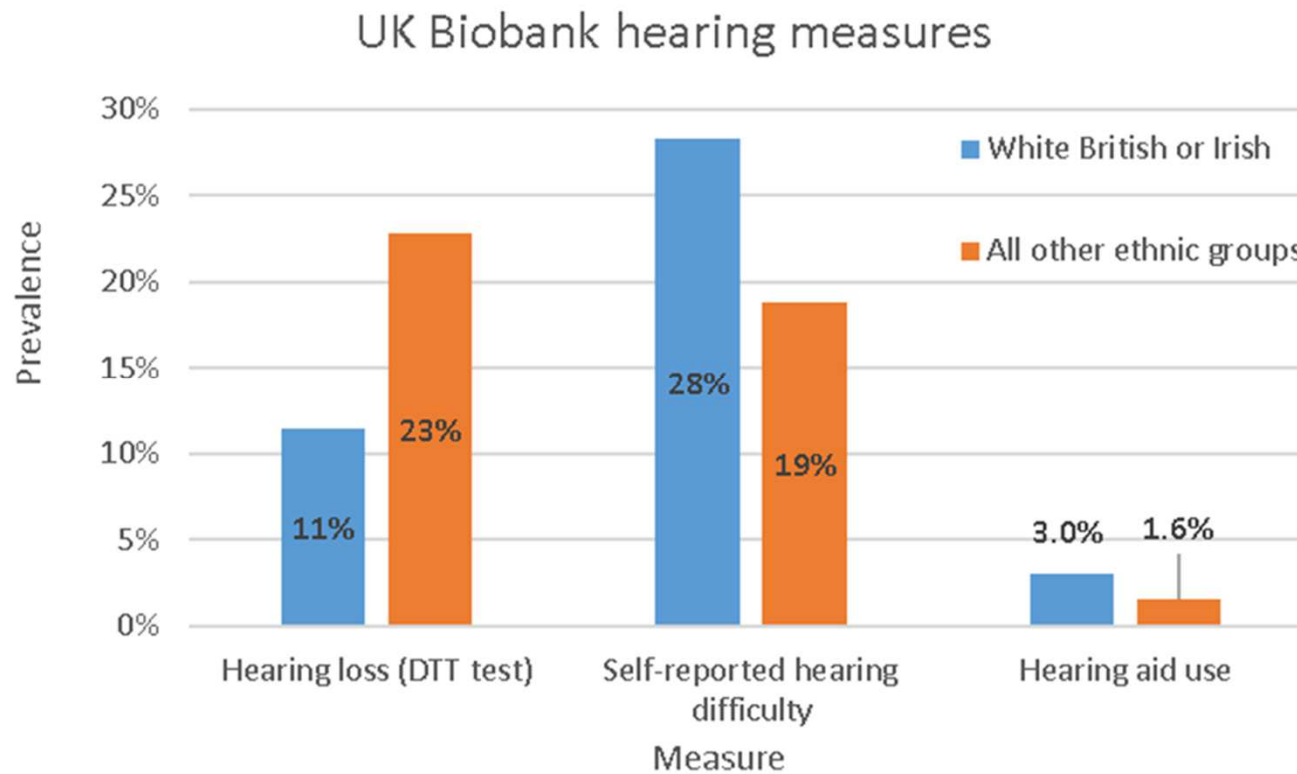
SRT Vs Proportion of life spent in the UK



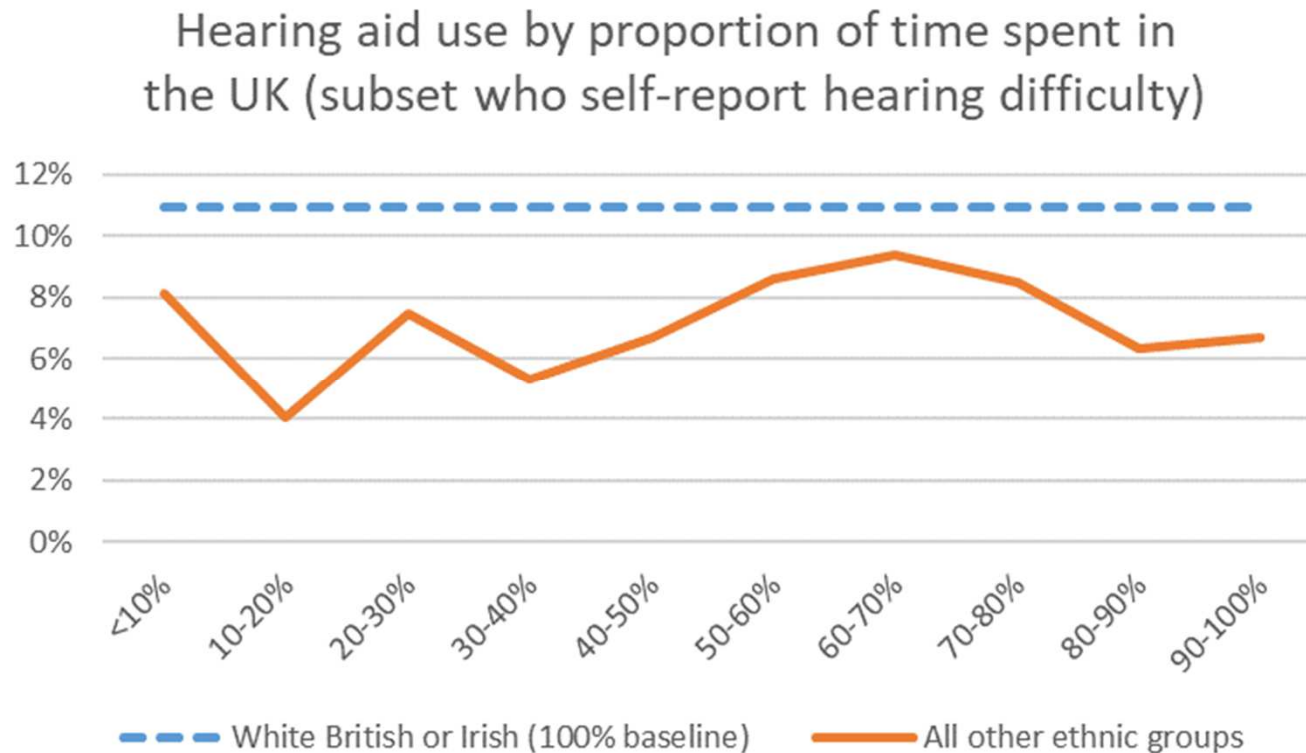
White Other group



Next steps



Inequalities in hearing aid use



Why might hearing aid use vary between ethnic groups?

- Before health-seeking
 - Differing attitudes to ageing and illness in general (fatalism/ God's Will – (Franklin, 2007))
 - Differing attitudes to hearing loss ("inevitable part of ageing process – (Wong and McPherson, 2008))
- Health-seeking
 - Availability of services may not be clear (provision not clear, information not reaching certain cohorts)
- After health-seeking
 - Quality of care and satisfaction with services does vary for people of different ethnic backgrounds (Lakhani, 2008).

Qualitative Study

- Exploring reasons for low use of hearing aids among minority ethnic groups:
 - General NHS / GP barriers
 - Issues of intercultural communication
 - Lack of knowledge about services
 - Those specific to using specialist services
 - Time off work, travel etc.
 - Those specific to hearing and audiology
 - How hearing loss is seen culturally
 - Stigma of hearing loss and hearing aids

Qualitative Study

1. Speak to audiology clinics and understand pathway to care as described by NHS audiology dept heads
 - Explore how it could differ between White and minority ethnic groups.
2. Interview service users to explore attitudes towards hearing loss and hearing aid use.
 - Identify structural and cultural barriers to use of hearing aids and audiology services.



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Thank you

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