


Efficacy of a Noise-Induced Hearing Loss Prevention Education Programme in Group Exercise Instructors

ZOE TEO (A0119032U)
PROF WILLIAM MARTIN

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Background: Sound Recommendations

- Music not conventionally thought as noise source
- But noise in NIHL is not limited to unwanted sounds
- NIHL is irreversible but preventable
- Recommendations on sound limits by Singapore's Workplace Safety and Health (Noise) Regulation 2011:

85 dBA for 8 hours
3-dB exchange rate

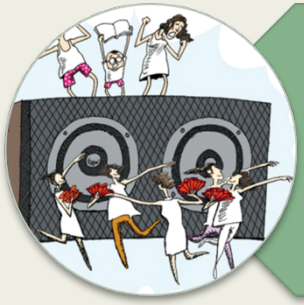
Background: Group Exercise

- Music is prevalent – sets the rhythm, enhances enjoyment, motivates participants, decreases sense of exertion, improves performance and endurance

Study	Country	Average Sound levels (dBA)
Beach & Nie, 2014 (1997 – 1998)	Australia	90.7
Beach &		
Mirbod e		
Nassar, 2		
Palma et		
Sa et al., 2014	Portugal	86.9
Yaremchuk & Kaczor, 1999	America	78 to 106

Singapore?

Aims



To measure knowledge, attitudes and behaviour of GXIs

To measure sound levels of GX classes conducted in Singapore

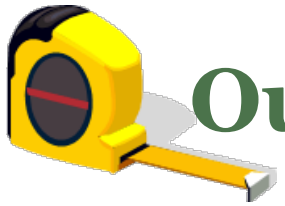
Determine the effectiveness of a NIHL prevention education programme on GXIs

Dangerous Decibels

- Established evidence-based intervention program
  - Proven effective for changing knowledge, attitudes and behaviour regarding sound exposure and appropriate use of hearing protective strategies among children and adults
  - (Martin et al. 2013; Reddy et al. 2013)
- Modified for one-to-one presentation to GXIs
  - Examples unique to GX classes
  - Individual GXI‘s class sound levels (baseline measures) used in educational presentation

Study Participants

- 21 participants
  - Intervention group: 10 GXIs
  - No-intervention group: 11 GXIs
- Participants taught pre-choreographed music-based GX classes of the following types
  - cardio workouts
  - weights-based workouts
  - dance workouts
  - stationary bike workouts



Outcome Measures

- Measure changes in **knowledge, attitudes, intended behaviour and self-reported behaviour**
  - Questionnaire-based evaluation tool
  - 18 knowledge questions, 4 attitude questions, 2 intended behavioural questions, 7 behavioural questions
- Measure **objective behavioural** changes
  - Dosimetery measurements to determine average sound levels during the classes (L_{avg}) in dBA
  - Microphone of dosimeter placed near/on stage at the front of GX studio

Outcome Measures

	0	1	3	10	11
Intervention	Baseline Dosimetry Measurements		1. Baseline Questionnaire	1. Follow-up Dosimetry Measurements 2. Follow-up Questionnaire	
No-intervention	Baseline Dosimetry Measurements		1. Baseline Questionnaire 2. Dangerous Decibels 3. Post-Intervention Questionnaire 4. Post-Intervention Dosimetry measurements	1. Follow-up Dosimetry Measurements 2. Follow-up Questionnaire	

- Timeline for participants were staggered

Baseline Measures

- No significant difference between both groups
- Knowledge – certain deficits
  - All did not know the physiology of NIHL
  - Majority did not know that sound exposure of ≥85 dBA for 8 hours can cause NIHL
  - Deficits in recognizing some sources of sounds that are typically able to damage the ears
- Attitudes
  - Class participants' preferences most important

Baseline Measures

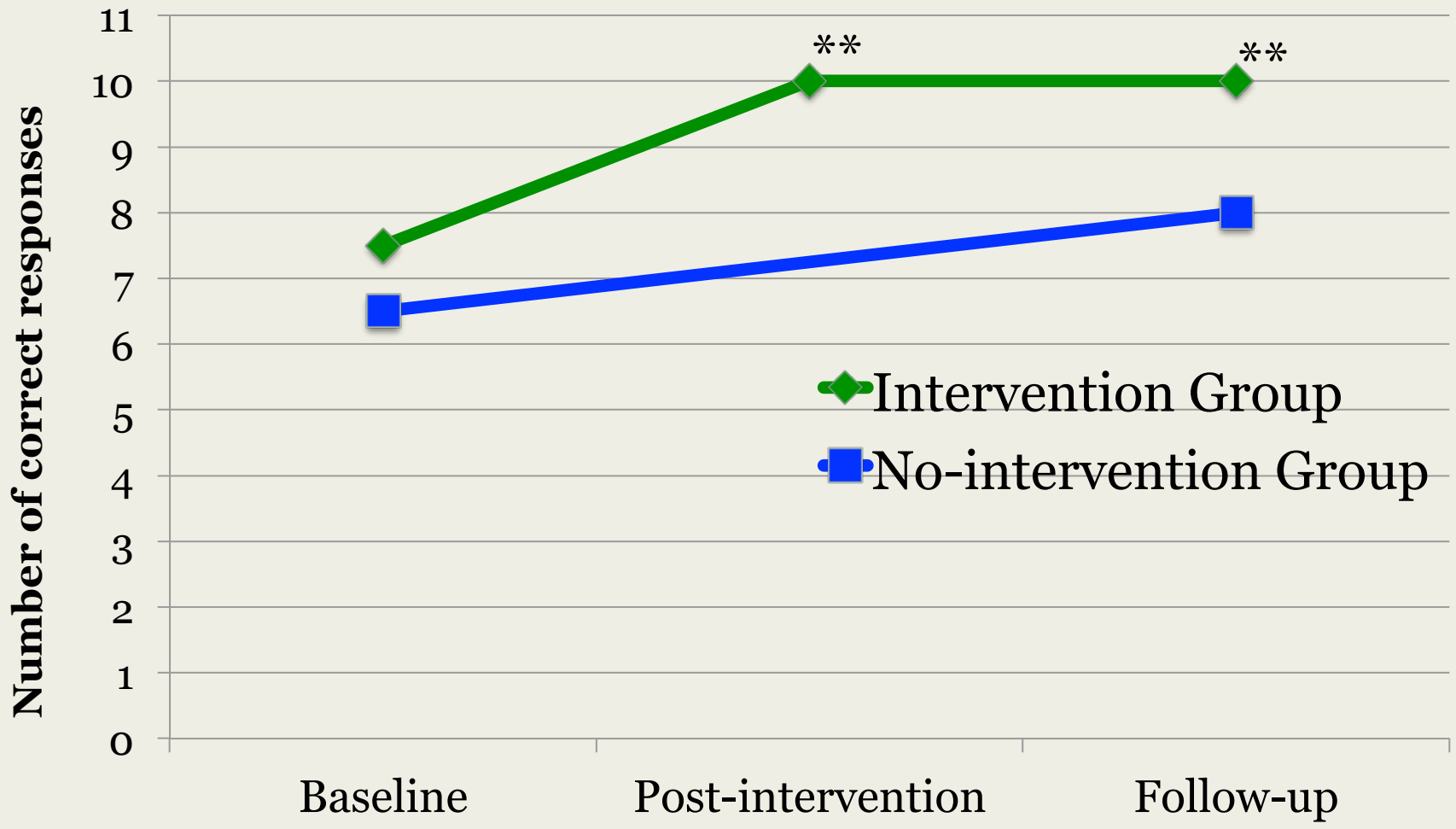
Baseline Sound Levels

Study	Country	Average Sound levels (dBA)
Beach & Nie, 2014 (1997 – 1998)	Australia	90.7
Beach & Nie, 2014 (2009 – 2011)	Australia	89.7
Mirbod et al., 1994	Japan	93 to 96
Nassar, 2001	England	89 to 96
Palma et al., 2009	Brazil	95.9
Sa et al., 2014	Portugal	86.9
Yaremchuk & Kaczor, 1999	America	78 to 106
Current study	**Singapore**	**96.3**

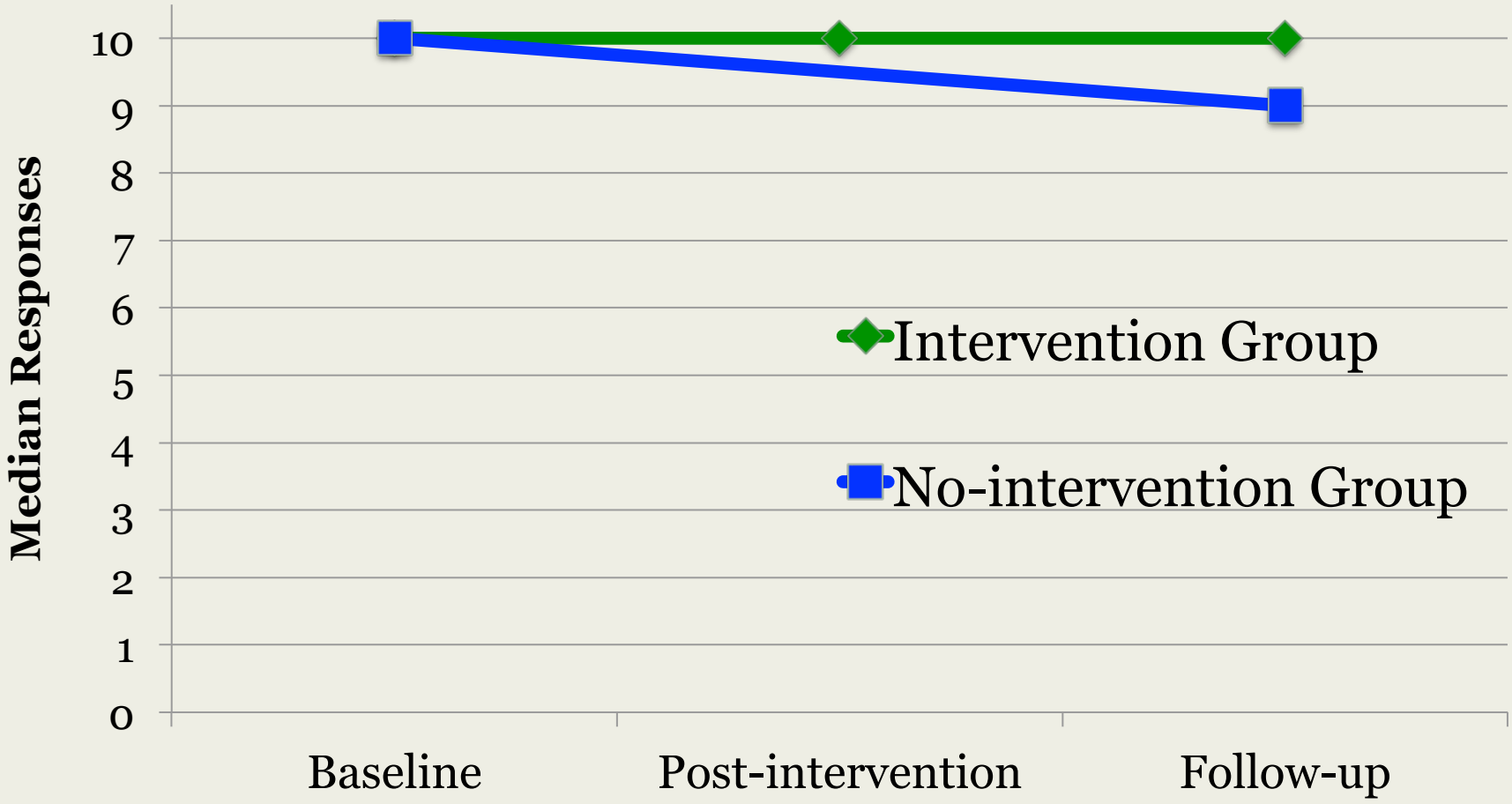
Results

- Intervention group: compare baseline measurements with
  - Post-intervention (immediate improvements from DD)
  - 7-week follow-up (sustained improvements from DD)
- No-intervention group: compare baseline measurements with
  - 7-week follow-up (changes not resulting from DD)

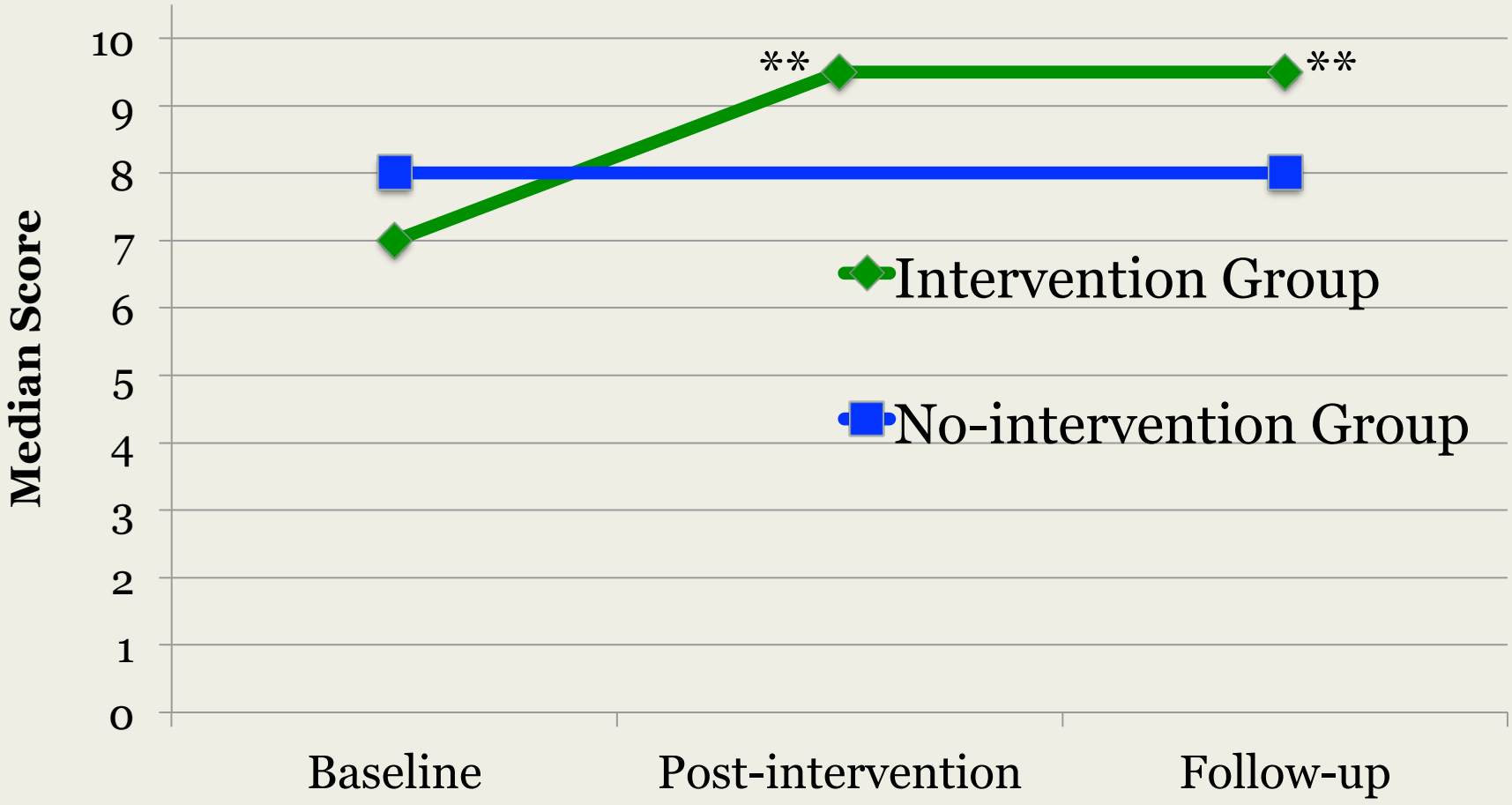
Results: Knowledge



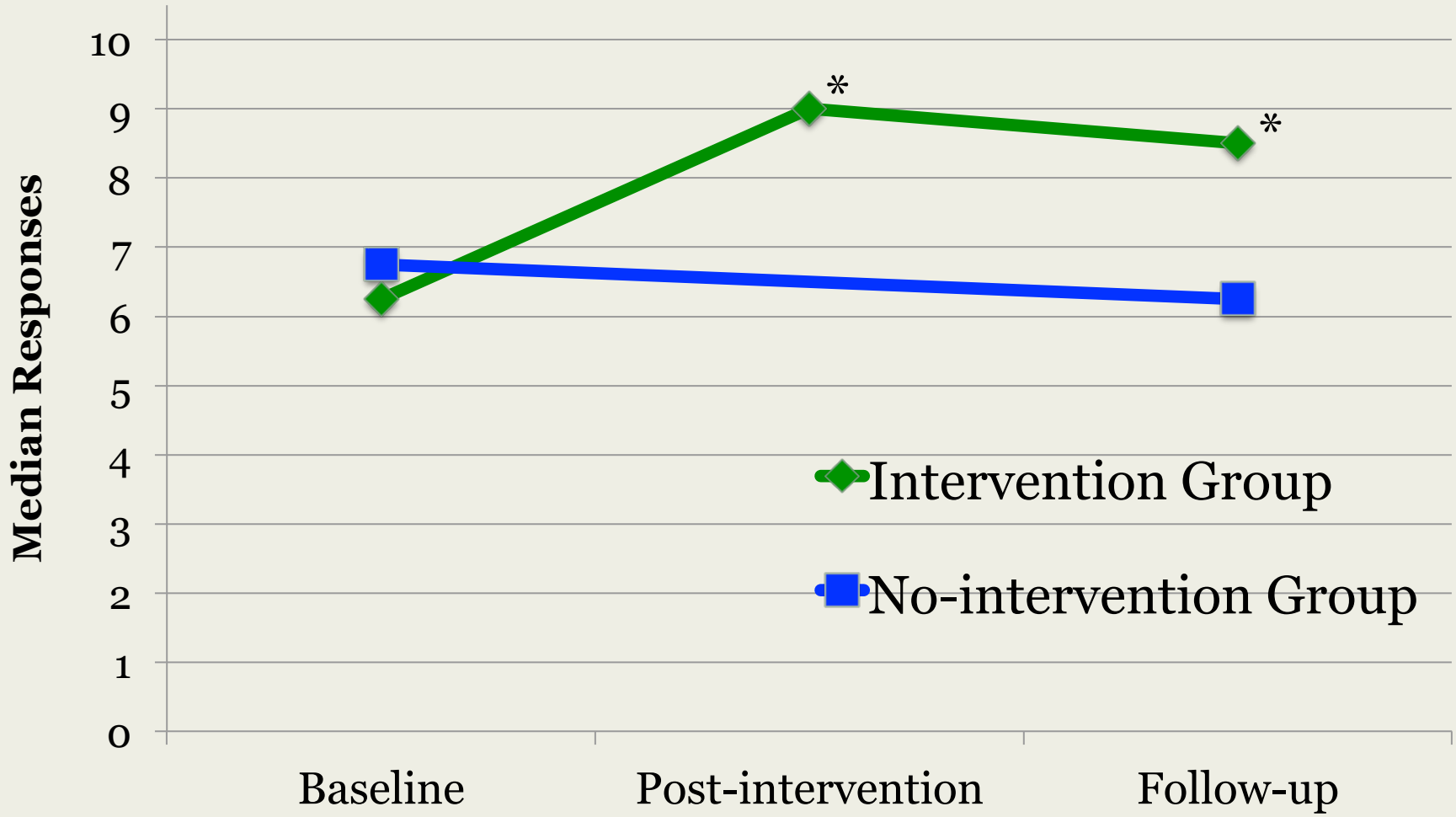
Results: Attitudes



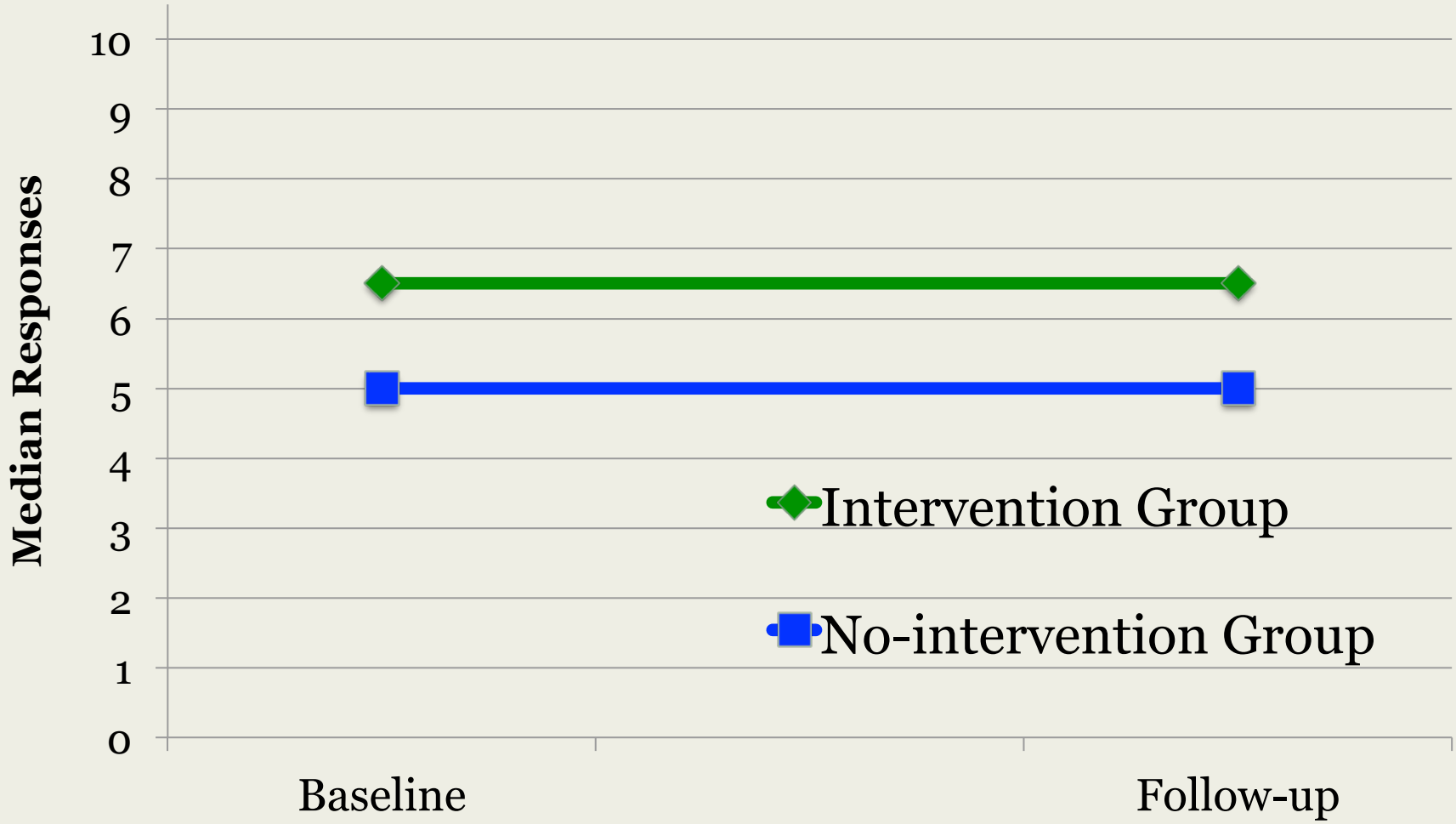
Results: Attitude A2



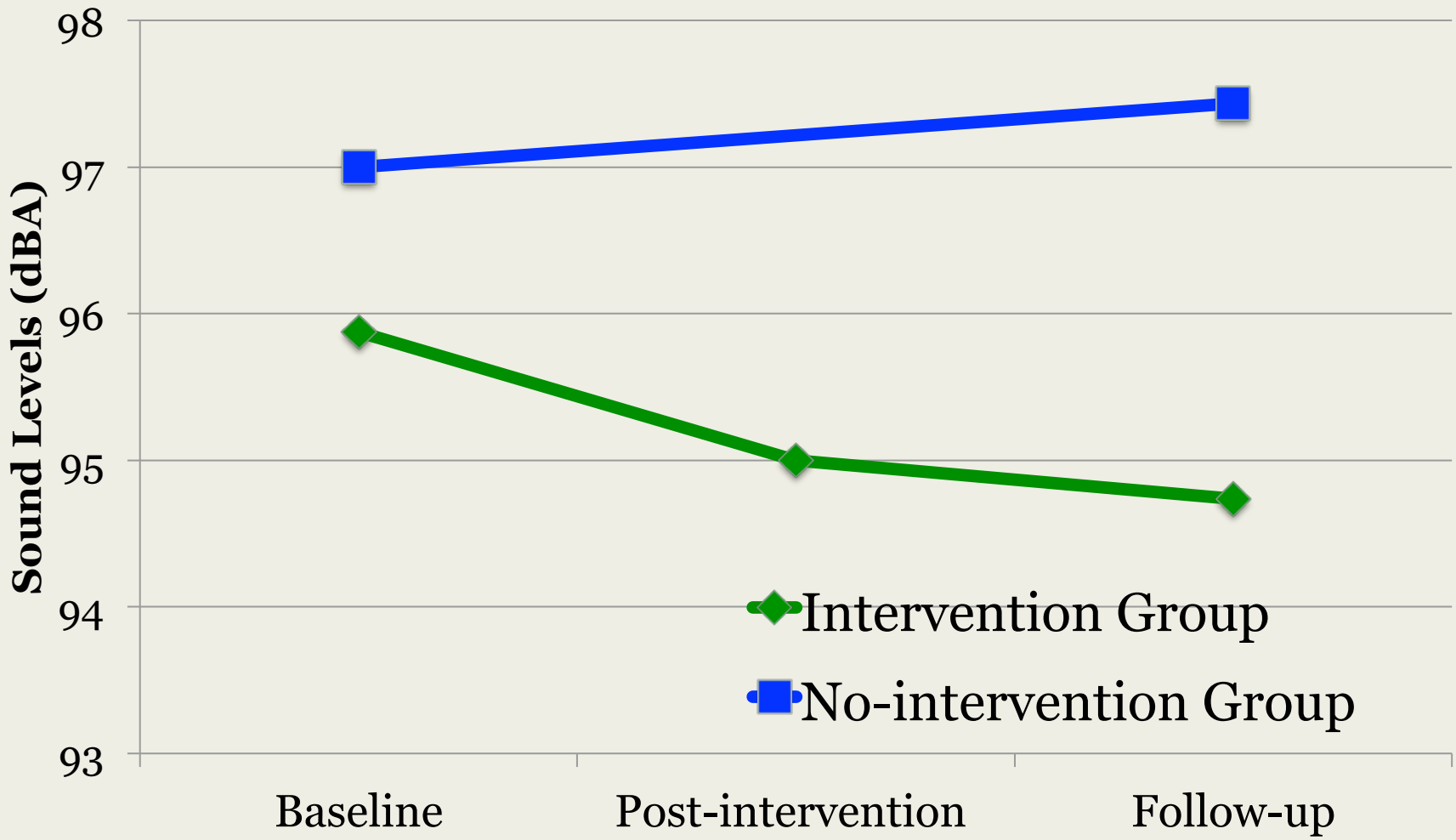
Results: Intended Behaviour



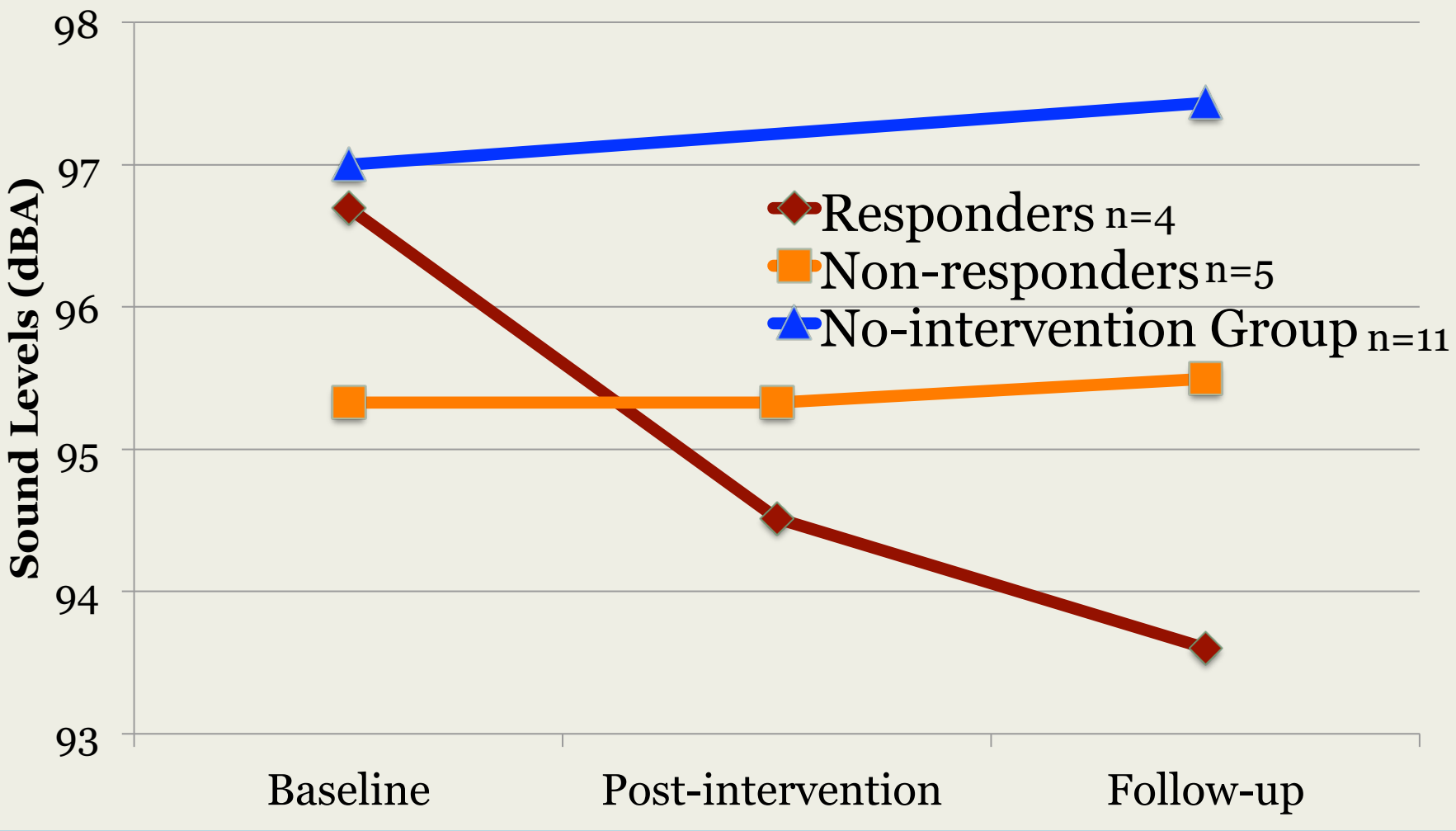
Results: Behaviour



Results: Sound Levels



Results: Sound Levels



Discussion

- Dangerous Decibels effective at improving knowledge
- Some improvements on attitudes and intended behaviour
- Limited effect on behaviour
  - Why? Socially accepted to use high intensity music in GX classes, perceived preferences of class participants, pressure from class participants to increase sound levels, lack of support from management
- But some effect in a subgroup
  - Both responders and non-responders showed similar improvements in attitudes and intended behaviour
  - Further studies to differentiate responders and non-responders

Cummulative Sound Exposure

- Full-time GXIs
  - 95.9 dBA for 19.5 hours per week
  - Equivalent annual exposure that is 805% of recommended exposure
  - > 8 years of exposure in 1 year
- Part-time GXIs
  - 97.0 dBA for 5.1 hours per week
  - Equivalent annual exposure that is 189% of recommended exposure
  - Nearly 2 years of exposure in 1 year
- A need for action to reduce sound levels used in GX classes

What's next

- Random, controlled study
- Longer interval for follow-up measurements
- Booster programmes
- Intervention on GXIs, class participants, managers of fitness institutions
  - GXIs' selection of music based on perceived preferences of GX class participants
- Setup of GX studio and studio acoustics
- Evidence-based selection of music

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time for questions