The SPAACE Project

Speech Perception by Autistic Adults in Complex Environments

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The SPAACE project grew out of work at Autism@Manchester.

Emma Gowen had organized an Expert by Experience group at the University of Manchester and was interested in developing research co-production with autistic individuals.

AUTISM @MANCHESTER

www.autism.manchester.ac.uk

www.facebook.com/autismatmanchester

Alex Sturrock has been collaborating with Emma in various autism research activities within Autism@Manchester.

Graham Hanks and George Bendo, both of whom had autism diagnoses and were members of the Expert by Experience group, came forward with ideas for audio-related projects.

Hannah Guest and Chris Plack at the Manchester Centre for Audiology and Deafness were then invited to collaborate with the group.

One of the main diagnostic criteria for autism is difficulties with social communication and interaction.

Autistic individuals have generally been reporting issues with understanding conversations, but the information that was available was unclear for several reasons, including:

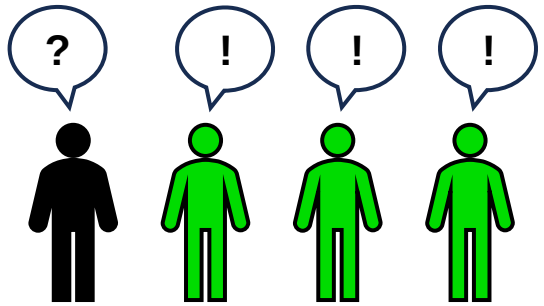
- Few autistic participants
- Tests not designed for real-world listening environments
- Hypotheses not sufficiently shaped by autistic experiences
- All autistic individual treated as having same listening difficulties

The goals of the SPACE project are to provide additional information on autistic people's listening difficulties by doing to following:

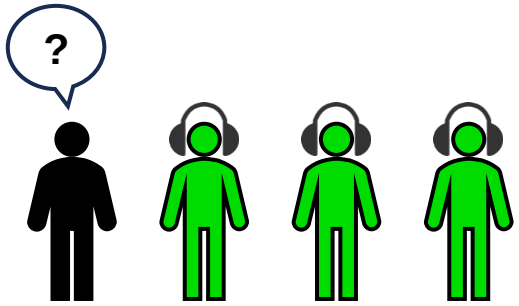
- Collaborate with autistic individuals on performing studies
- Include more autistic participants in studies
- Get information from autistic individuals about their experiences
- Create hypotheses and experiments designed around people's experiences
- Geet feedback from autistic individuals about the research and results

The basic overall research plan is broken into two parts:

- Get information from the autistic community to develop hypotheses about their listening difficulties.

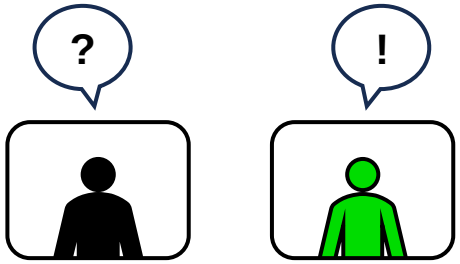


- Set up experiments to compare autistic and neurotypical individuals' listening abilities.



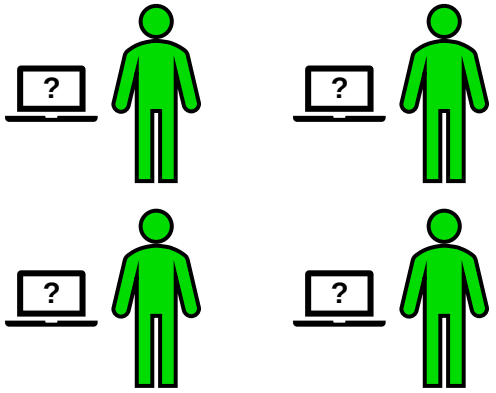
The initial investigations by the SPAACE Project have involved gathering information from autistic individuals:

- In-depth interviews
  - 9 interviewees
  - Online
  - Semi-structured
  - Thematic analysis



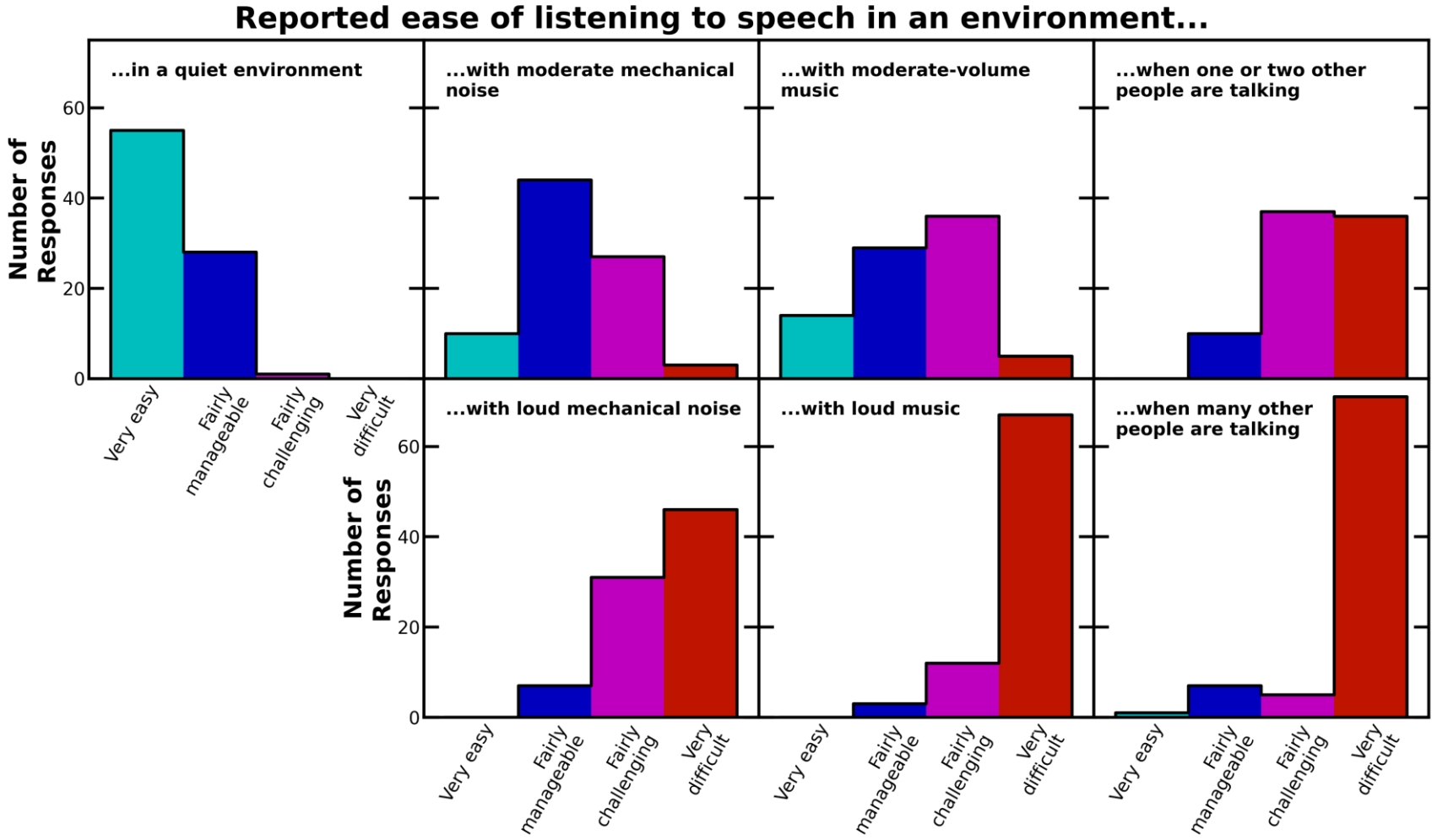
Sturrock A. et al., 2022, Chasing the conversation: Autistic experiences of speech perception, Autism Development and Language Impairment, volume 7, pages 1-12

- Questionnaires
  - 79 participants
  - Multiple choice (closed-set) and free-text questions
  - Quantitative and thematic analysis

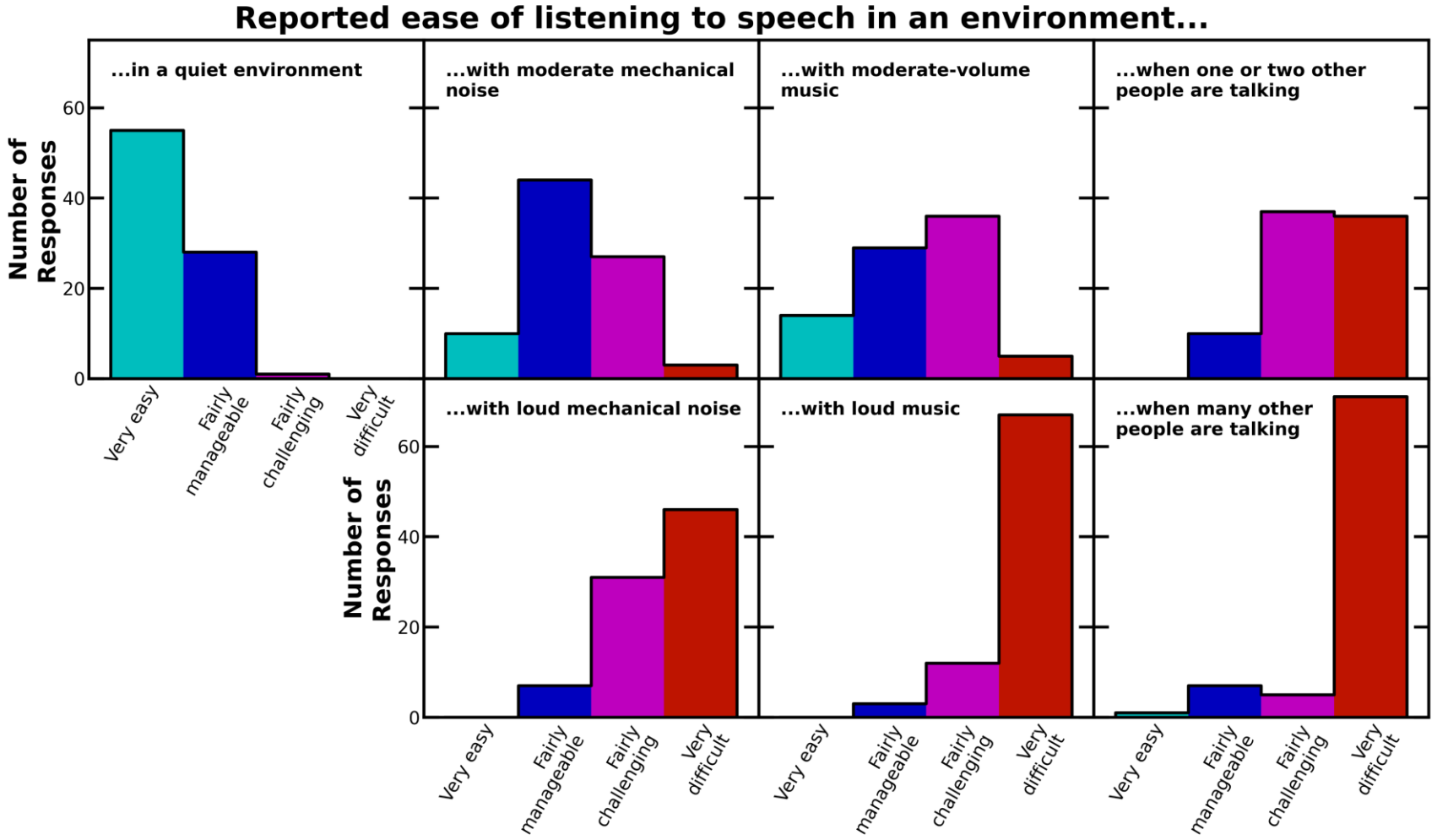


Bendo G. J. et al., 2023, The diversity of speech perception difficulties among autistic individuals, , Autism Development and Language Impairment (submitted)

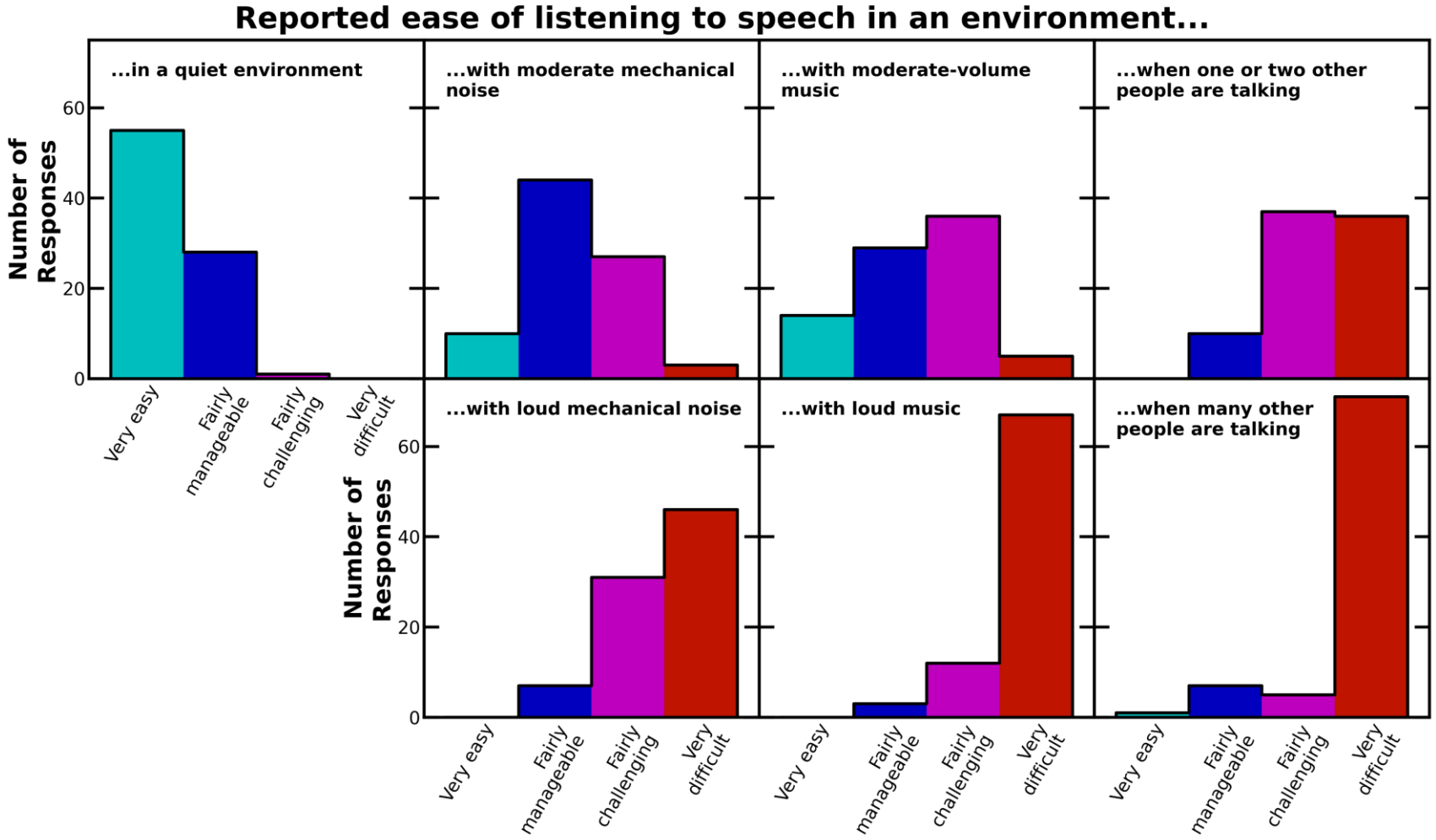
When asked specifically about listening environment, what stood out the most is how autistic individuals reported problems listening to a conversation when other conversations were taking place in the background.



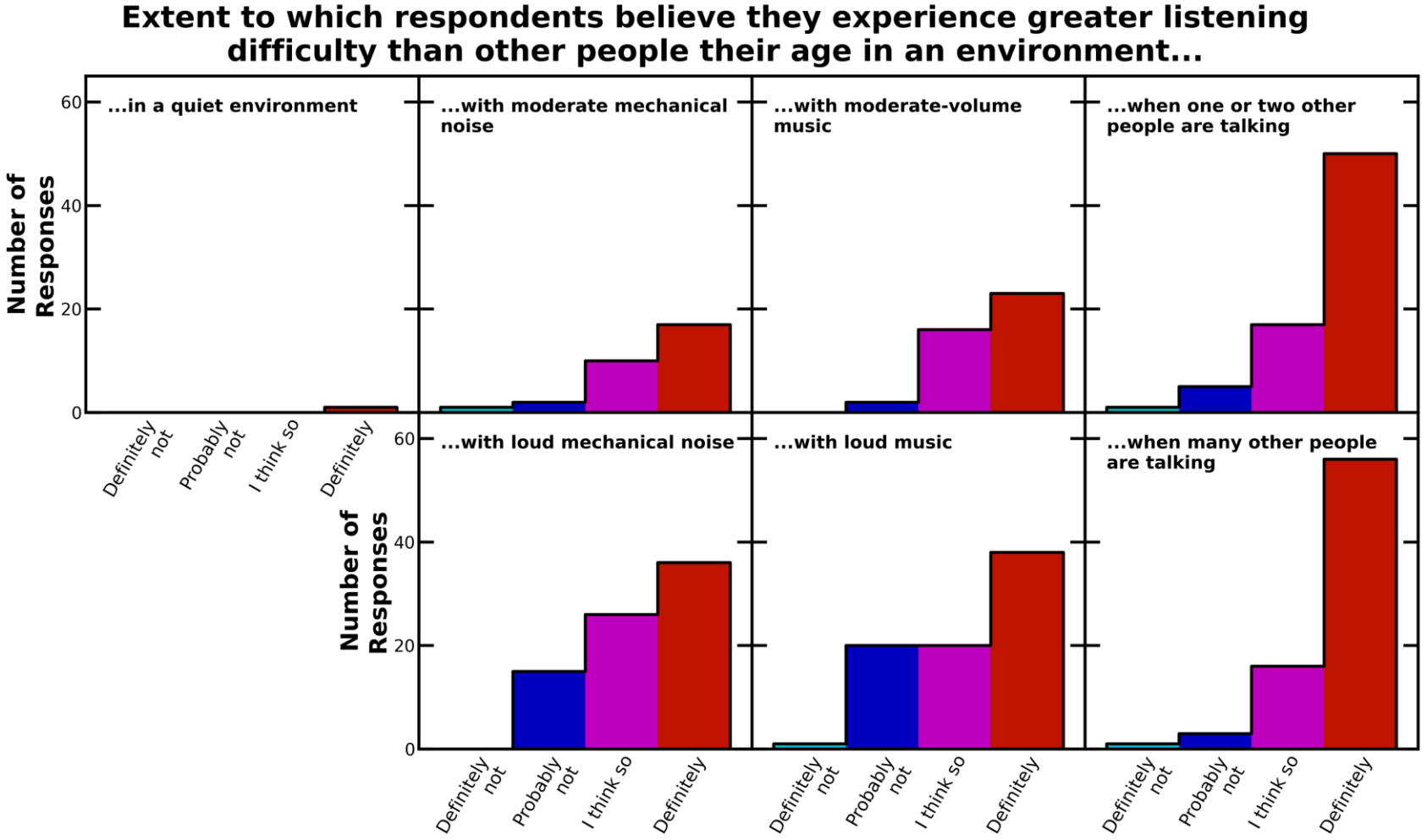
Autistic individuals described similar difficulties listening to speech in an environment where one or two people were talking in the background, where loud mechanical noise was present in the background, and where loud music was in the background.



What caused autistic people the most difficulty with listening to conversations was when many other people were talking in the background.

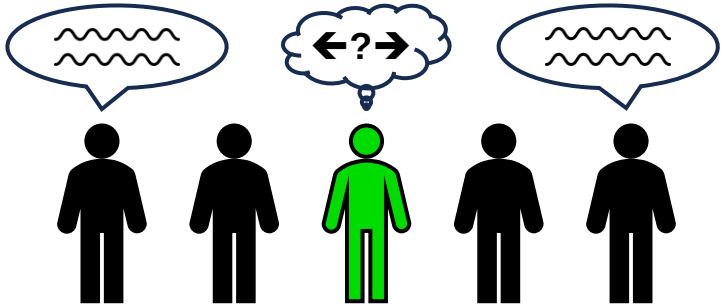


The participants also generally had the sense that they had more difficulty than their peers in terms of listening to other people speaking, although this was most pronounced when the background noise consisted of other people speaking.

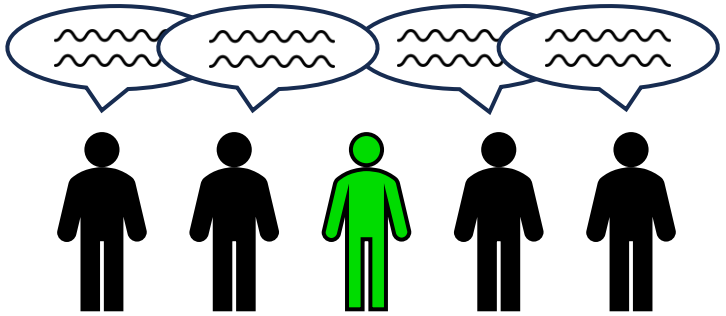


Many people described general listening difficulties that could fit into one of three categories:

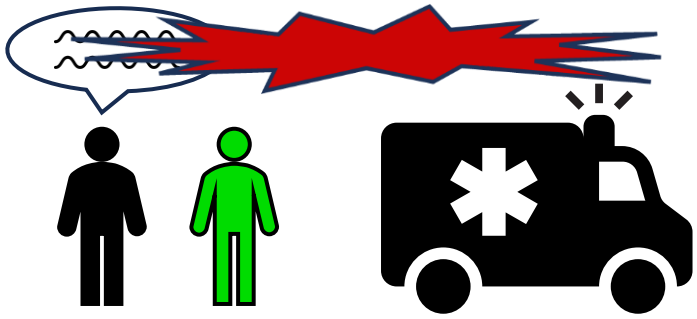
Difficulty focusing on a speaker.



Difficulty distinguishing a voice from other voices.



Drowning out of a voice by background sounds.



Many autistic individuals described listening difficulties that could fit into one of three categories:

Difficulty focusing on a speaker.

If there is one other conversation going on I am sometimes distracted listening to it.

Difficulty distinguishing a voice from other voices.

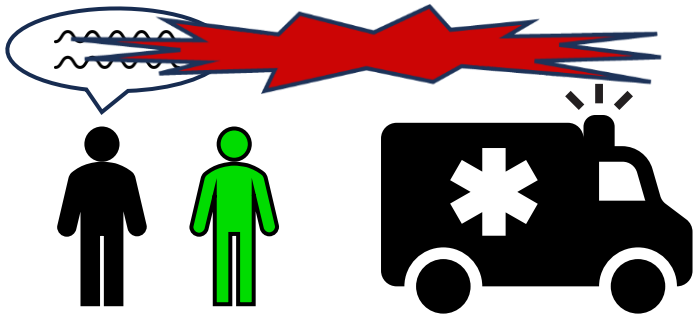
When talking to a person when multiple conversations are happening close-by, i can hardly hear what the person i am talking to is saying.

Drowning out of a voice by background sounds.

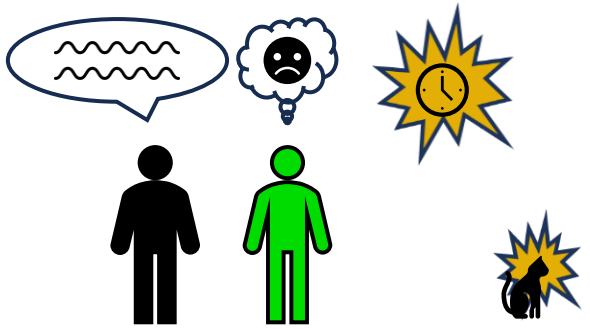
Bars with loud music are a nightmare, I can sometimes barely hear someone talking directly in my ear.

A few other acoustic factors affected autistic individuals' listening abilities, including the following:

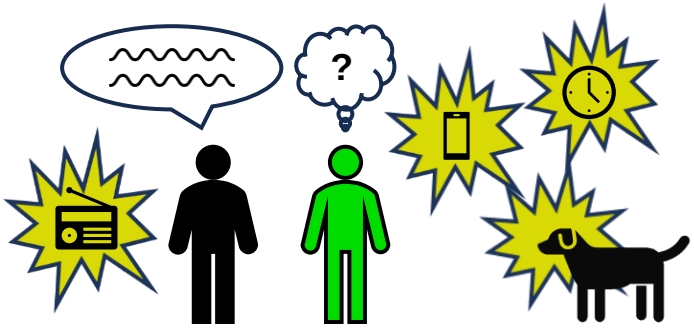
Loudness of background sounds.



Misophonia.



Diversity and complexity of background sounds.



A few other acoustic factors affected autistic individuals' listening abilities, including the following:

Loudness of background sounds.

I find traffic noises the worst to deal with and can not hear someone talking, even if they are standing in front of me, when the traffic is noisy.

Misophonia.

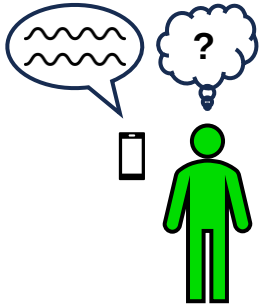
Also little noises that are distracting or annoying, like my cat licking or a light bulb buzzing. They make things hard too, and can even make me so uncomfortable that I vomit.

Diversity and complexity of background sounds.

Many low noizes at once like fan, oven, fridge, music etc is difficult to hear what people say.

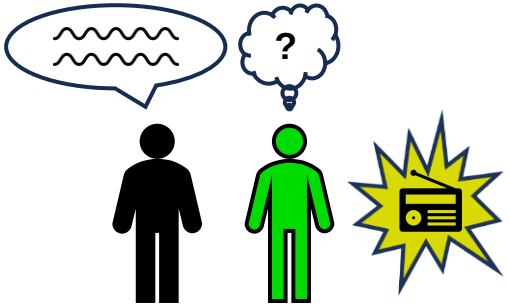
A few other acoustic factors affected autistic individuals' listening abilities, including the following:

Difficulty listening via phone or video call.



Difficulty listening to broadcast or recorded media.

Interference by recorded or broadcast audio.



A few other acoustic factors affected autistic individuals' listening abilities, including the following:

Difficulty listening via phone or video call.

…if you're speaking to me on the phone and there is any kind of noise going on in the room that I am in (music, people talking, lawnmowers etc.) I will really struggle to hear you.

Difficulty listening to broadcast or recorded media.

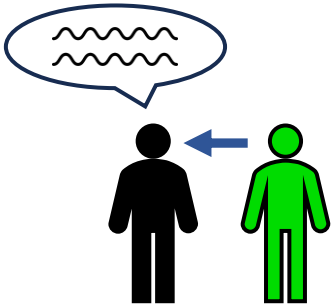
Dialogue in movies are very difficult, I cannot filter the sound effects, I always use subtitles.

Interference by recorded or broadcast audio.

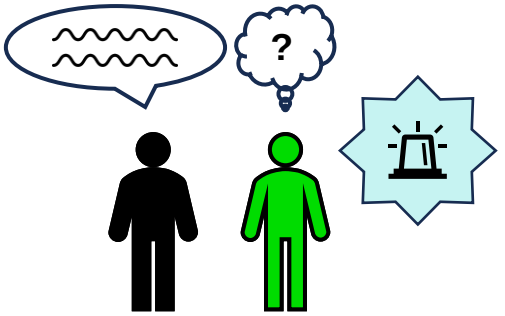
Music at anything above a very low background erases my ability to understand what people say.

Additionally, a series of other non-acoustic factors could affect autistic individuals' listening abilities:

Visual cues (e.g., lip reading).



Distraction by non-acoustic stimulation (visual, smell, heat, pain, etc.).



Discomfort in crowds.

Additionally, a series of other non-acoustic factors could affect autistic individuals' listening abilities:

Visual cues (e.g., lip reading).

It helps if I can see the person talking so I can sort of 'lip read' a bit.

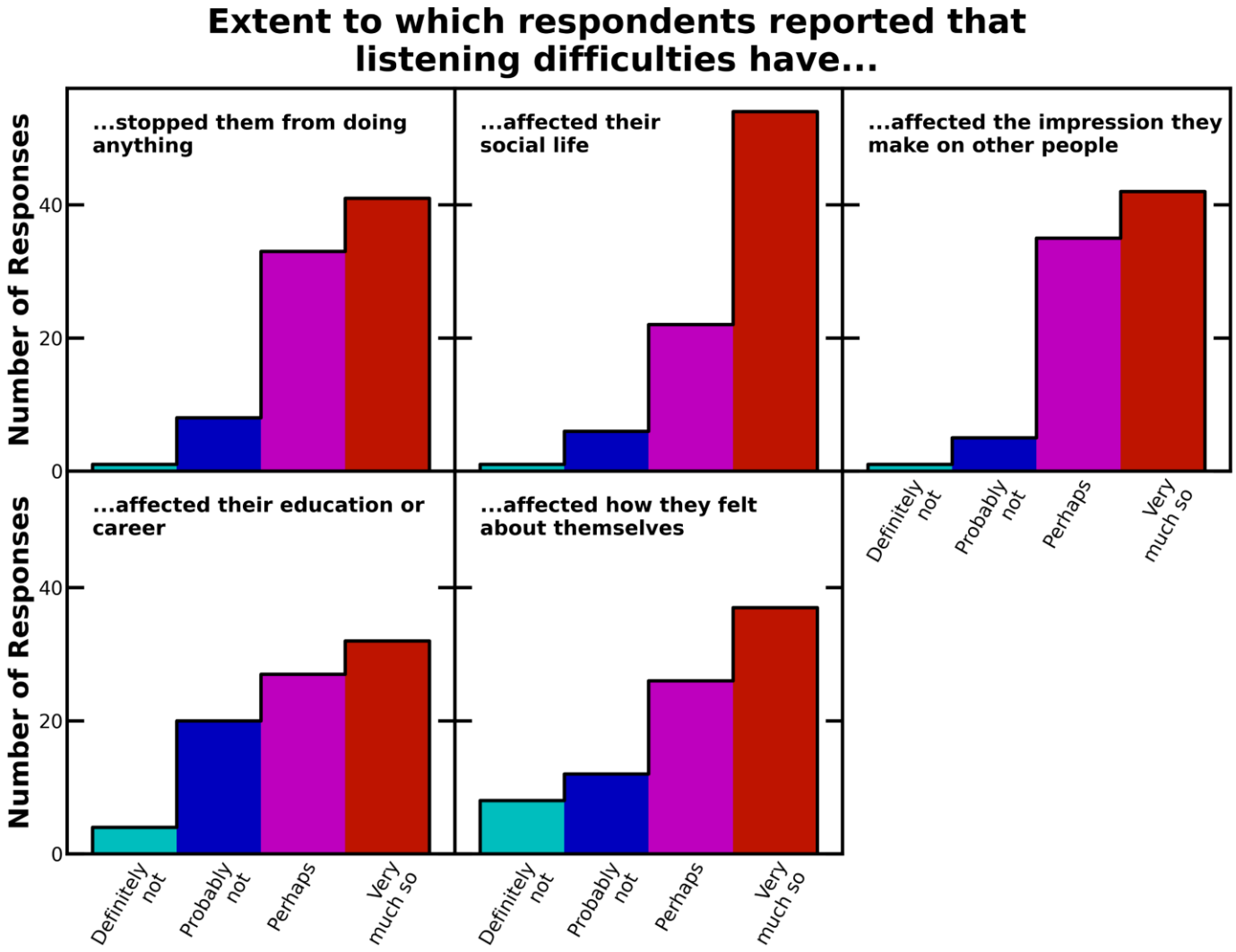
Distraction by non-acoustic stimulation (visual, smell, heat, pain, etc.).

If I have other sensory input happening such as a strong smell or a texture I don't like it makes it very difficult to hear what people are saying.

Discomfort in crowds.

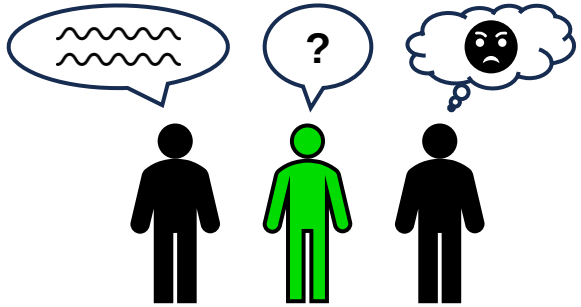
- being in a social crowded space with lots of stimuli to all of the senses tend to be very difficult.

These listening issues had a number of implications for social interactions and for autistic individuals' feelings and lifestyles.

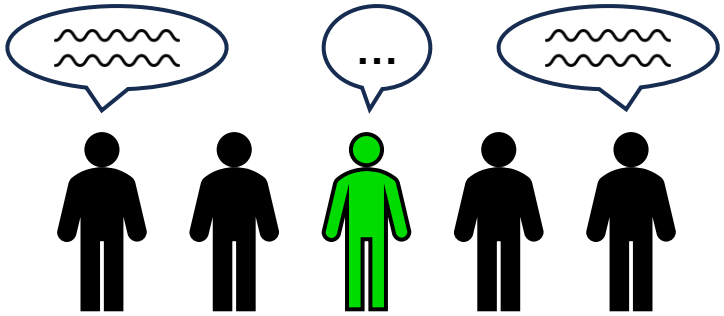


The implications for social interactions and for autistic individuals' feelings included the following:

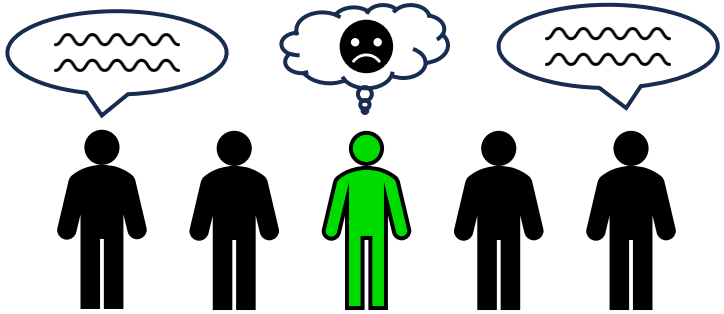
Lack of understanding of listening difficulties.



Barrier to participating fully in common social environments.



Negative emotional impact.



The implications for social interactions and for autistic individuals' feelings included the following:

Lack of understanding of listening difficulties.

No one ever talks about how people can have perfect hearing but their brains just don't process it correctly. It's so hard to explain to people.

Barrier to participating fully in common social environments.

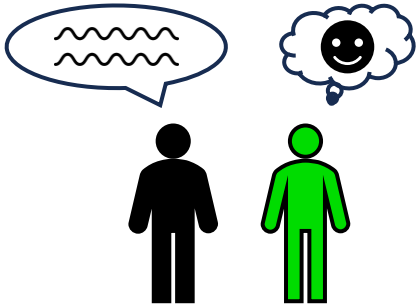
The worst are grouptalks where you and friends want to talknand have fun too many voices to keep track of and they alle expect you to listen

Negative emotional impact.

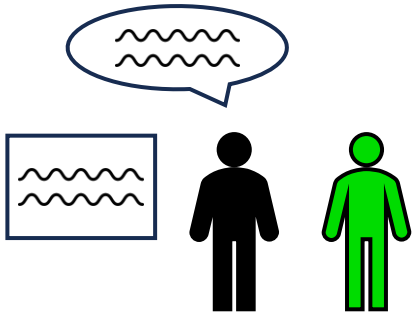
Going to noisy restaurants and malls can cause anxiety because the sounds themselves can feel overwhelming and carrying a conversation feels nearly impossible.

Quite a few autistic individuals described various coping mechanisms for dealing with their difficulties in listening to conversations, including the following:

Choosing a preferable listening environment.



Visual aids.



Blocking ears.

Quite a few autistic individuals described various coping mechanisms for dealing with their difficulties in listening to conversations, including the following:

Choosing a preferable listening environment.

I find it particularly easy to listen in environments where there's generally less people, and where people tend to use their "inside" voice more.

Visual aids.

If there are pictures to follow along with as someone talks (such as a lecture) it is much easier to follow what they are saying

Blocking ears.

I find that wearing earplugs can help drown out a lot of background noise, especially music and traffic noises, and can make it easier to hear someone talking.

The results from the initial interview and survey results have led us to make the following recommendations in terms of future research:

- Quantitative research in listening difficulties needs to be informed by input from autistic individuals.

- Future research on autistic listening difficulties needs to take the heterogeneity of listening difficulties into account.

- New more-specific questions should be asked in interviews and questionnaires.

Additionally, we came up with the following recommendations for helping autistic people:

- Additional work needs to be done on raising people's awareness about the challenges that autistic people have in listening in various environments.
- Work needs to be done in researching ways to provide better interventions for autistic people with listening difficulties.
- Information on coping mechanisms should be gathered from the autistic community and used for self-help materials.

To conclude:

- Autistic people have a broad variety of listening difficulties.
- Many of these listening difficulties may not be well understood by non-autistic individuals.
- These listening difficulties have a significant impact of autistic individuals' everyday lives.
- More work is needed to research autistic people's listening difficulties and to provide interventions for them.

Acknowledgments:

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Aspire The Female Autism Network

aural diversity

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