

### **Newsletter December 2021**

## Kia ora from Minds for Minds and the Werry Centre!

Thank you for your patience as we developed new ways to do our research over the past year. We wish you and your loved ones a peaceful break over the summer, and we look forward to connecting with many more of you in the new year.

# Update on the New Zealand genetics project

Thank you to all the individuals and families who have so generously been part of our research. We have almost finished the final analysis of our project funded by Cure Kids and A Better Start National Science Challenge. This last phase has focused on finding new ways to detect copy number variants, these are large deletions or duplications of genetic material in the genome, and our approach has been working well.

For example, in one of our participants, we have identified a deletion of DNA in the neurexin 1 gene (a deletion too small to be detected by current clinical approaches). The neurexin genes encode important proteins that help form a handshake between two brain cells to help them communicate. We hope to confirm these copy number variants in the new year, and together with our clinical genetics' colleagues, we will relay them to the families.

Thanks to funding from the IHC Foundation and the Stevenson Foundation, we have also identified very rare types of genetic changes that are exceedingly complex, often involving many genes. These changes in the DNA are very hard to find as they often don't result in big losses or gains of genetic material (which we often call "balanced"). PhD student Chris Samson has been working hard on developing a bioinformatic workflow to detect these variants and he hopes to finish his PhD and write up the results in the new year. This has been a project in collaboration with experts at Massachusetts General Hospital and Harvard Medical School.

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Finally, please contact us on arnnz@auckland.ac.nz if you would like a progress update specific to your family.





## Update on the Fragile X Sheep Project

Fragile X syndrome (FXS) is the most common inherited cause of intellectual disability globally. Autism (Takiwātanga) commonly presents in people with FXS. So much so that FMR1, the gene responsible for FXS, is the most common single-gene cause of autism, accounting for 2-4% of autism cases. There is currently no treatment for FXS that targets the underlying cause. We are creating a sheep model of FXS to discover and trial new treatments. We designed and trialled precise gene editing in cultured sheep cells to create the sheep model. We then used these editing methods to modify the genomes of single-celled sheep zygotes, which were then implanted into surrogate ewes. Our aim of editing is to mimic the molecular cause of FXS by preventing the function of the FMR1 gene.

In early November, the implanted lambs were born, and one female lamb had the desired edited gene. Our next step is to breed from our founder lamb to produce a generation of sheep carrying the mutation. We will then characterise the resulting flock, in particular, to determine how similar the condition in sheep is to that in humans. We undertake this work with the sheep living outdoors in a normal farming environment.

Lastly and excitingly, we have also been developing a potential gene therapy treatment for Fragile X. Our approach is to introduce a copy of the FMR1 gene replacing the non-functional copy. Once our sheep model is established, we plan to trial this therapy in these animals.

## Werry Centre Research Updates

#### *Efficacy of faecal microbiome transfer to improve gut issues in autism*

The Werry centre is working with the Liggins Institute at the University of Auckland to investigate whether transferring gut microorganisms from non-autistic people can improve gastro -intestinal symptoms and well-being of young adults on the autism spectrum.

They are now looking to recruit 100 young autistic people, aged 16-30, with gastro-intestinal symptoms who are able to attend a limited number of clinical appointments and swallow treatment capsule.

Please contact Mary-Rose Cavanagh at <u>m.cavanagh@auckland.ac.nz</u> for more information.



#### Autism NZ wants your feedback!

They would really appreciate if you could complete a questionnaire about your awareness and knowledge of the Autism NZ Outreach Service. Click this link: https://www.surveymonkey.com/ r/Outreach-uptake

Information from this questionnaire will help them improve access to the Outreach Service. If you have any questions please contact the Research and Advocacy Advisor, Larah van der Meer at: research@autismnz.org.nz



## Minds for Minds Publication Highlight

*Improving Emotion Perception in Children with Autism Spectrum Disorder with Computer-Based Training and Hearing Amplification* 

Researchers from the School of Psychology at the University of Auckland investigated how auditory training in autistic children affected their social perception abilities.

12 children on the autism spectrum (aged 7-12) were given remotemicrophone hearing systems that they used during computer-based social perception training exercises and also at school over a 3-week period. The researchers found that after this intervention, the children had improved social perception scores and neural responses to emotional stimuli that were similar to those of typically developing children. This indicates that auditory training may improve the emotional perception abilities of children on the autism spectrum.

Article details: Leung JH, Purdy SC, Corballis PM. Improving Emotion Perception in Children with Autism Spectrum Disorder with Computer-Based Training and Hearing Amplification. *Brain Sciences*. 11 (4):469. (2021). https:// doi.org/10.3390/brainsci11040469



minds for minds

## **International Autism Research**

*Pre- and probiotics in the management of children with autism and gut issues: a review of the current evidence* 

In this paper, researchers from the University of Queensland look at a range of studies to review the evidence of using prebiotics and/or probiotics to manage gastrointestinal (GI) issues in children on the autism spectrum.

They found that while there is not a large number of studies that have investigated this topic, there is promising evidence that pre- and probiotic supplementation has a beneficial effect on GI symptoms and also behavioural symptoms. Pre- and probiotics were found to change the composition of gut microbiomes and/or molecules the microbiome produces, and also reduce signs of gut inflammation. The researchers believe that pre- and probiotics influence features of autism and GI symptoms through the gut microbiome, which is known to have a relationship to the brain and to gut health.

This review has highlighted some very promising results, and pointed out an interesting avenue of future research to help aid GI symptoms in people on the autism spectrum.

Article details: Mitchell, L.K., Davies, P.S.W. Pre- and probiotics in the management of children with autism and gut issues: a review of the current evidence. *Eur J Clin Nutr.* (2021). https://doi.org/10.1038/s41430-021-01027-9

## **International Autism Research**

*Animal Assisted Therapy for Children and Adolescents with Autism Spectrum Disorder: Parent Perspectives* 

Researchers from the University of Sydney explore in this paper how having assistance dogs in therapy sessions for young autistic people can help achieve the goals of their therapy and improve symptoms through the perspective of parents.

All parents in this study found that including assistance dogs in their child's therapy helped with the engagement, enjoyment and motivation of the child. Most parents also reported that this helped improve their child's community engagement, communication and behavioural regulation.

The researchers believe that dogs were able to assist in achieving therapy goals as they are nonjudgmental and nonverbal communicators. This study indicates that animal assisted therapy has positive outcomes for young people on the autism spectrum.

Article details: London, M.D., Mackenzie, L., Lovarini, M. et al. Animal Assisted Therapy for Children and Adolescents with Autism Spectrum Disorder: Parent perspectives. J Autism Dev Disord 50, 4492–4503 (2020). https:// doi.org/10.1007/s10803-020-04512-5

Read the abstract <u>here</u>.

Recent ultra-rare inherited variants implicate new autism candidate risk genes

Working with the SPARK consortium, researchers use whole-genome sequencing data to look for ultra-rare variants in 3,474 families with autism.

Most research on the genetics of autism focuses on variants that are not inherited from parents and are new in the child. The researchers of this paper wanted to look at different variants that are inherited from parents and change how the gene functions. They found that 95% of these inherited variants were found in new genes that had not previously been associated with autism in earlier research. They estimate that these variants are around in families for 2-3 generations.

These findings have given researchers new avenues to investigate in the underlying biology of autism.

Article details: Wilfert, A.B., Turner, T.N., Murali, S.C. et al. Recent ultrarare inherited variants implicate new autism candidate risk genes. *Nat Genet* 53, 1125–1134 (2021). https:// doi.org/10.1038/s41588-021-00899-8

Read the abstract <u>here</u>.



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## Study opportunities, workshops, and new developments from the wider Minds for Minds team and their community partners





#### U21 Autism Research Network

The U21 Autism Research Network was set up with funds from the Universitas 21 Researcher Resilience Fund, bringing together 6 autism research groups from U21 universities. Researchers from the School of Psychology at the University of Auckland are part of this team. The Network aims to make a starting point in addressing challenges to collaboration across borders as well as the lack of diversity and inclusion in autism research. If you would like to sign up to take part in autism research with us, please do email us at u21autismresearchnetwork@contacts.bham.ac.uk.



U21 Autism Research Network Auckland Team photo







# Auditory Processing and Functional Language in Autism Spectrum Disorder (ASD)

We are seeking children who have ASD, with no hearing difficulties, aged 7-12 years old, who live in Auckland.

Auditory processing deficits have been demonstrated in children with ASD. This may play a role in the communication difficulties children with ASD experience. We want to see if there is a relationship between auditory processing and functional language in children with ASD.

This study requires up to 2 hours of participant time. This can be done in one or two sessions, as preferred by the participant. Participants have the option of doing it in-person (University or home) or via video-conferencing (Zoom). It will include:

- A basic hearing screen.
- An assessment of non-verbal intelligence.
- A language assessment that looks at spoken language comprehension.
- Two listening assessments with different patterns of tones.
- A social perception assessment looking at understanding of communicative speech cues.
- A prosody assessment looking at understanding of stress, intonation, and emotion in speech.
- Parent/caregiver questionnaires about autism symptoms, communication skills, and sensory sensitivities.

A \$20 voucher will be given to you upon completion of your participation in the project.

We hope to gain a better understanding of communication difficulties in children with ASD and to explore whether they are related to auditory processing problems.

If you are interested, or would like more information, please contact

Principal investigator: Joan Leung (joan.leung@auckland.ac.nz)

People with Autism Spectrum Disorder often experience auditory processing difficulties

# Common auditory processing difficulties

- Difficulty hearing speech against background noise
- Difficulty listening with several people talking at the same time
- Being overwhelmed by noisy or complex auditory environments e.g. classrooms, shopping malls
- Difficulty following, processing, and remembering spoken instructions unless brief and simple
- Problems with speech, language, phonics, spelling, reading, or written language

Auditory processing difficulties can lead to increased anxiety in noisy environments, difficulty understanding subtle nuances of speech such as emotion or humour, difficulty engaging socially in a large group, having undue sensitivity to loud sounds or noise, and having poor listening skills.

# Auditory processing difficulties can be effectively treated

Research shows that treatments for auditory processing disorder (APD) are also effective in reducing similar difficulties in children with autism spectrum disorder (ASD).

Research in New Zealand, Australia, and the USA has shown benefits from both auditory training and the use of specialised assistive listening devices, also known as remote microphone hearing aids (RMHAs).

Benefits shown for children with ASD are:

- RMHAs improve listening in noise, ease communication, and reduce stress levels in noisy classroom environments
- RMHAs can be used along with auditory training to improve listening skills
- RMHAs can be used along with social perception training to improve social skills
- Using RMHAs may lead to changes in brain activity that indicate improved sensitivity to tones of voice

#### SoundSkills specialises in the diagnosis and treatment of APD to help enable better learning.

The multi-disciplinary team of professionals at SoundSkills is experienced in assessing auditory processing skills in people with ASD and providing appropriate treatment.

For more information, a brochure, or to attend a FREE SEMINAR about APD please contact SoundSkills at:

🖾 clinic@soundskills.co.nz 🛭 😮 Call 09 930 8573



teaching the brain to hear

SoundSkills Clinic: The Stichbury Bidwill Centre, 251 Campbell Rd, Greenlane

www.soundskills.co.nz