Research Statement: Teresa Girolamo

We all have moments when we are unable to express what we want to say. For example, when trying to describe *amphibians*, a person might produce a related word (e.g., reptiles) or the antonym (e.g., mammals). Similarly, we might struggle to understand something we hear; hearing *The mayor up for re-election said that staying home saves lives*, a listener might catch the general intent (e.g., staying home) or some portion of the message (e.g., it involves going out), but not follow the entire sentence. Such challenges in expressive or receptive language can be a marker of language impairment.

Individuals with language impairment face adverse educational, occupational, and social outcomes. My research aims to better understand language acquisition and language impairment in autism, and how these impact other life outcomes. I focus on how linguistic and cognitive processing mechanisms influence phenotypic variability in autistic individuals with language impairment by studying autistic young adults varying in linguistic and cognitive abilities, from impaired to typical language and from intellectual disability to average or above cognitive skills. My research has two primary aims: 1) to understand language acquisition and language impairment in adolescence and adulthood, and 2) to utilize our longitudinal knowledge of language development to support autistic minorities with language impairment.

(1) Understand language acquisition and language impairment

I am interested in better understanding the variability in language acquisition of autistic adolescents and young adults with language impairment. Many developmental models describe the structural language issues common to language impairment and the social communication issues intrinsic to autism. However, these models rarely connect language at the level of *brain* (e.g., individual differences in functional connectivity and signal strength during language tasks) and *phenotype* (e.g., individuals' language outcomes that are directly observable) using assessments sensitive to variability in individuals who perform well below age expectations. These models have also systematically excluded racial and ethnic minorities. Language acquisition in autism, however, is highly heterogeneous (Girolamo et al., under review). In a longitudinal case study, I collected comprehensive speech and language assessment from 13 Black and Hispanic/Latinx autistic young adults and analyzed those data for evidence of individual differences in language ability (Girolamo et al., 2020, under review). Findings revealed that all participants had language impairment and that abilities remained stable over three years. The study results indicated good diagnostic stability of language impairment and supported the utility of age-referenced language assessments for such individuals.

To further explore how language abilities may vary across autistic young adults with language impairment, my research considered assessments probing dimensions relevant to language impairment in this population. My longitudinal study found that morphosyntax measures were consistently the most sensitive to variability in the language abilities of autistic individuals with language impairment and varying NVIQ (Girolamo et al., under review). In contrast, assessments probing other linguistic dimensions relevant to language impairment, namely nonword repetition, vocabulary, and overall language, were less sensitive. This finding has implications for understanding the underlying mechanisms of language acquisition and impairment.

Extending my interest in understanding the bases of language impairments in autistic individuals with limitations in expressive language, my research incorporates functional near-infrared spectroscopy (fNIRS) to illuminate the influences of language and cognitive processing during language tasks. Unlike functional magnetic resonance imaging (fMRI) which presents numerous challenges for data acquisition and data quality, fNIRS is relatively insensitive to movement artifacts and does not require being enclosed in a small, noisy space. Preliminary work by collaborators Aslin and Sanchez-Alonso examines simultaneous fNIRS and fMRI during a visual task, language tasks, and a movie-watching paradigm with typically developing adults.
My research will utilize the movie-watching paradigm to investigate the extent and profile of language impairments in autistic young adults. Compared to control periods (eyes open at rest), it is expected that movie-watching will be tied to the hemodynamic response in brain regions associated with linguistic processing (i.e., Broca's area and left-lateralized superior temporal gyrus), and specifically that the presence of human speech (versus no human speech) will be tied to the hemodynamic response in these regions. It is also expected that lower performance on grammatical tasks (e.g., grammaticality judgment and syntactic structure learning tasks)

and NVIQ will yield lower intensity of signal (reduced activity) in these regions compared to individuals without language impairment. This project is funded via a postdoctoral T32 training fellowship in the Cognitive Neuroscience of Communication. Preliminary results will be used as pilot data for ASHFoundation New Investigator and Brain & Behavior Foundation Young Investigator grants, with the intent of establishing an evidence base to apply for an NIDCD R01 grant.

(2) Utilize longitudinal knowledge of language development to support autistic minorities

A second line of research focuses on mitigating bias in language and autism research. Although language impairment can significantly disrupt the long-term outcomes of autistic individuals and underrepresentation of racial/ethnic minorities is a priority to stakeholders in autism research, little is known about how to mitigate bias. Bias precludes minorities from equitably participating in research as a service that may advance the knowledge and advocacy base for their needs. My work addresses the underrepresentation in research of Black and Hispanic/Latinx autistic young adults with multiple marginalized identities (e.g., language impairment, intellectual disability, socioeconomic status). I adopt a Diversity Science approach, meaning that minority health disparities are attributed to systemic factors rather than to race or ethnicity themselves. Using a community-based approach to recruiting Black and Hispanic/Latinx autistic individuals themselves (rather than engaging their caregivers), I found that removing systemic barriers to participation (e.g., learning about each participant's identities and scheduling research activities at the convenience of participants in their communities) led to 92% retention (Girolamo et al., under review).

I am pursuing research that assesses the influence of systemic factors (e.g., community contexts) on common autism research measures, namely adaptive behavior and social responsiveness. My preliminary research indicates that systemic factors are likely to influence outcomes on those measures. This is important given that many studies use adaptive behavior and social responsiveness to develop supports without accounting for systemic factors. As part of this research, I am developing a protocol for administration of a self-determination measure to Black and Hispanic/Latinx autistic young adults with language impairment. I aim to measure how self-determination and systemic factors predict adaptive behavior and social responsive-ness. I plan to apply for an NIDCD R21 grant to support bringing this assessment to multiple sites to capture the experiences of individuals in different geographical regions and settings, as well as to use fNIRS to understand the validity of adaptive behavior, self-determination, and social responsiveness self-report measures for autistic individuals with language impairment. Understanding whether such measures yield meaningful responses is critical to developing accessible measures and supporting the autonomy of autistic individuals.

My research aims support my long-term research agenda of understanding language acquisition – and the underlying mechanisms of language acquisition and language impairment – in minority autistic individuals across the lifespan. I hope to expand investigation of language at the levels of brain and phenotype to include siblings and parents, who may show within-family phenotypic similarity and differences. Last, I aim to apply findings on language acquisition in this population in order to develop community-based supports to meet minority autistic individuals' language-based needs via participatory research.

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