Psychological Comorbidities in Stuttering: Self Report and Implications

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1. Introduction

Technological accessibility to electronic medical databases has begun to yield exciting insights into phenotype-genotype associations for medical comorbidities. There is much to be learned about the etiology and sequela of conditions with complex heritability and heterogenous presentation by acknowledging broader holistic phenotypes previously unassociated, yet present, with the given condition. Developmental stuttering is one such example. Stuttering is overtly characterized by involuntary disruptions in speech fluency, typified by abnormal rhythm, prolongations, and repetitions of sounds, syllables, words, and phrases (American Speech-Language Hearing Association, 1993). Despite decades of research, the exact etiology and mechanisms driving stuttered speech continues to be undetermined. It is now widely accepted in the literature, however, that stuttering is derived from a combination of genetic susceptibility and environmental influence (Felsenfeld et al., 2000; Rautakowski et al., 2012). More than 100 well-established comorbidities have been documented to occur at higher rates with those also diagnosed with developmental stuttering; these range from historical reports of speech and language disorders and anxiety to newly identified comorbidities identified via electronic medical records, like asthma, obesity, and anemia (Pruett, et al. 2021). Such findings motivated investigation into the potential for a broader phenotype of developmental stuttering. What characterizes the associations between stuttering and co-morbid conditions? Is there underlying genetic risk or common medical pathology between these conditions, or are they rather related as part of the sequela of being a person who stutters?

Most genes are not expressed in an isolated part of the body, nor do most have a single function. Many highly heritable disorders, including autism spectrum disorder (ASD), can present with diverse symptoms across bodily systems, yet still reflect a common underlying genetic etiology for the various expressed phenotypes (Diaz-Beltran et al., 2017). Similarly, developmental stuttering is known to be strongly genetically influenced; heritability estimates are above 80%, yet with highly heterogeneous genetic origin (Fagnani et al., 2011). Pedigree, linkage, and genome-wide association studies (GWAS) have indicated there is not a single gene mutation that can account for all or even most cases of stuttering (Kraft et al., 2011; Yairi et al., 1996; Shaw et al., 2021). Stuttering is thought to be a polygenic disorder with many genes contributing to the speech behaviors observed across the population. In addition to speech behaviors, historical research has sought to identify and associate the relationship between anxiety and stuttering with general agreement that anxiety arises and is maintained by the negative social consequences and stigma associated with stuttering (Iverach et al., 2014; Boyle, 2016). Still, there is much to be learned about the factors that contribute to these associations. In this abstract, we provide a summary of the preliminary findings from a self-reported health inventory of individuals who stutter and discuss the psychological underpinnings of developmental stuttering, considering factors that might lead to the development of negative reactions and self-stigma associated with stuttering.

2. Method

A self-report survey titled “The Other Health Inventory for Individuals who Stutter” (OHI) was developed based upon statistically significant conditions associated with stuttering from previous literature. The OHI was published on the Qualtrics platform (Qualtrics, 2022), and posted to multiple online stuttering community webpages (Facebook, Reddit) and university-affiliated research webpages. Individuals aged 18 and older, who self-identified as being a person who stutters or as having a history of stuttering, were invited to participate. Medical conditions were listed in a Yes/No format, and participants were instructed to select “yes” if they had ever experienced the

condition, regardless of whether it was formally medically diagnosed. If a disorder contained subtypes, a follow-up question would appear to further classify the condition (e.g., mood disorder can be further classified as major depressive disorder, bipolar disorder, etc.). One hundred sixteen individuals participated in the survey.

Group-wise proportion analysis was conducted using the self-reported positive rate of a specific disorder relative to population-based empirical prevalence data to determine significance (p-value < 0.05). Chi square analysis was completed to assess self-identified gender differences (p-value < 0.05). Additionally, a proportional odds regression was performed to identify if self-reported severity of stuttering was predictive for depression or suicidal ideation.

3. Results

Mood disorder, anxiety disorder, trauma and stress-related disorders, and suicidal ideation were all found to be significantly more prevalent on the OHI in the stuttering population than in the general population. Table 1 outlines the prevalence rate at which psychological disorders were found within each group, compared to the expected prevalence within the general population. There were no statistically significant differences in prevalence rates between self-identified genders. Proportional odds regression did not reveal a significant correlation between self-reported severity of stuttering and the presence of a reported mood disorder or suicidal ideation. Figures 1-3 characterize the percentage breakdowns of psychological disorder subtypes on the OHI. It should be noted that the results of this research are preliminary, as data collection is ongoing.

Table 1. Group-wise proportion analysis of self-reported positive rate of specific disorders on the OHI compared to empirical lifetime prevalence of the disorder in the general population

Statistically Significant Disorder	OHI Prevalence	OHI Sample Size	Expected Prevalence	Z-value	P-value (2-tailed)	Literature
Mood Disorder	39%	109	21.4%	4.6	<0.001	Kessler et al. (2012)
Anxiety Disorder	64%	108	33.7%	6.8	<0.001	Kessler et al. (2012)
Trauma and Stress Related Disorders	32%	106	7.8%	9.3	<0.001	Kessler et al. (1995)
Suicidal Ideation	39%	106	9.2%	10.6	<0.001	Nock et al. (2008)

Figure 1. Mood disorder subtype frequency as self-reported on the OHI

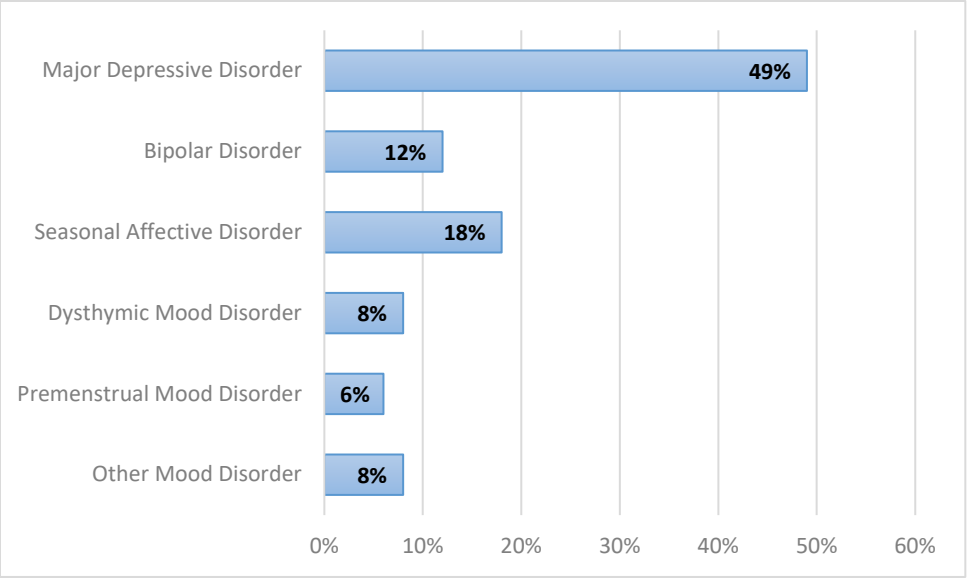


Figure 2. Anxiety disorder subtype frequency as self-reported on the OHI

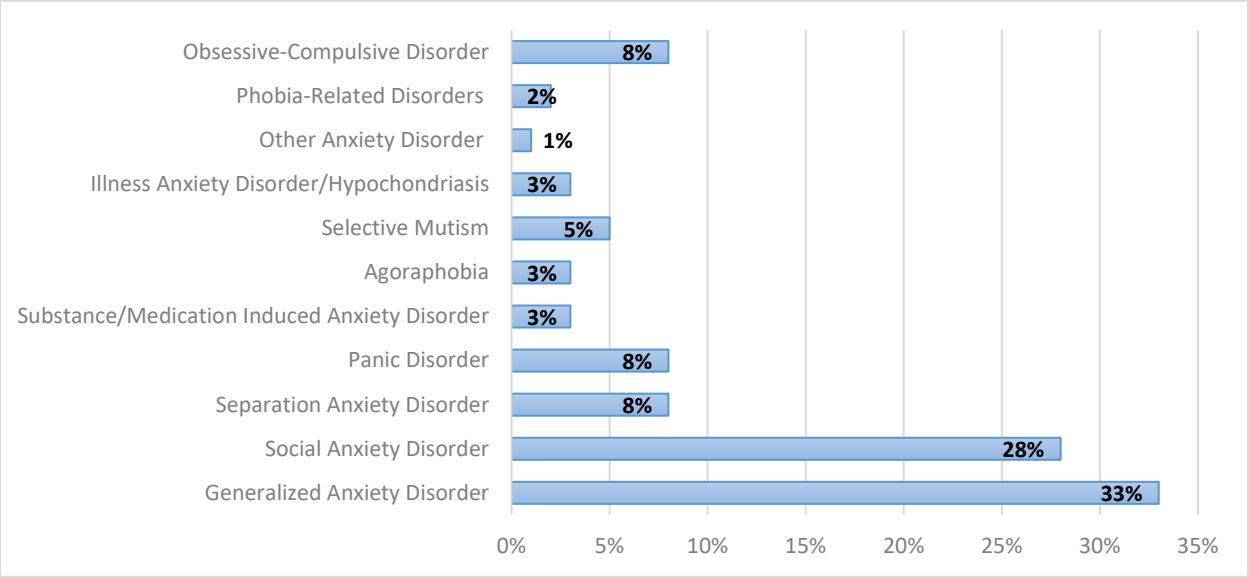
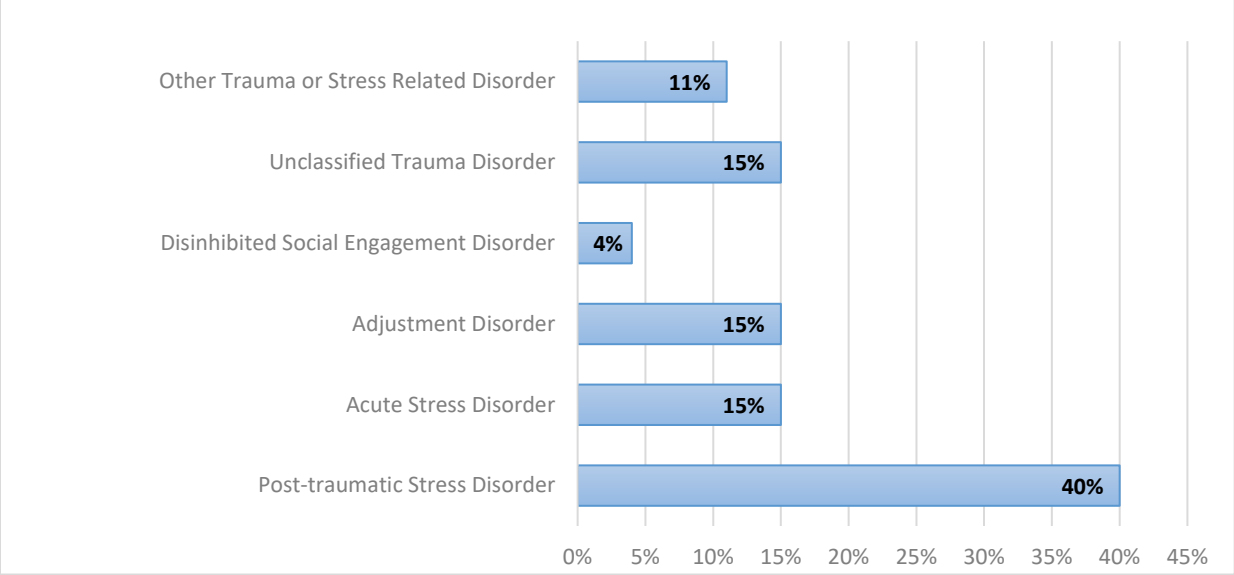


Figure 3. Trauma and stress-related disorder subtype frequency as self-reported on the OHI



4. Discussion

4.1. Psychosocial Implications

Though data collection is ongoing**,** a notably high rate of psychological comorbidities has been captured on the OHI. Mood, anxiety, and stress-related disorders have all been previously described in the stuttering literature as a consequence of experiencing a stuttering disorder (Mulcahy et al., 2008; Iverach et al., 2010; Smith et al., 2014; Craig et al., 2015). Only one study to date has discussed the relationship between suicidal ideation and stuttering (Briley et al., 2021). This study demonstrated that, when compared to people who do not stutter, both males and females who stutter had a higher reported rate of depression, and males who stutter also had higher rates of suicidal ideation than males who do not stutter. Interestingly, one of the strongest diagnostic risk factors for suicidal ideation is the presence of a mood disorder (Nock et al., 2021). Nearly all individuals who reported suicidal ideation on the OHI also self-reported at least one if not multiple psychological co-morbidities. Given the high rates of these

disorders, a connection becomes possible between stuttering and the increased risk for mental health related sequela, likely related to the negative social consequences as a result of being a person who stutters.

Depression is thought to be predisposed and perpetuated by alterations in neuronal function, which can be exacerbated by chronic stress, a well-documented consequence of stuttering (Greden, 2001; Pietraszek et al., 2017). Anxiety and stress are natural responses to a perceived threat; these reactions can be adaptive if they facilitate survival or improve performance. They become maladaptive, however, when they become persistent and excessive, and this can lead to negative health outcomes. Adults who stutter are reported to experience higher levels of stress and both trait and state anxiety (Pietraszek et al., 2017). These experiences can lead to maladaptive coping responses, including denial, self-blame, or cognitive/behavioral disengagement; over time, these reactions can be harmful to mental health (Mulcahy et al., 2008).

4.2. Genetic Implications

An underlying common genetic risk factor for these comorbid disorders cannot be ruled out at the present time. Stuttering is a highly heritable disorder, as are many of the comorbid disorders identified on the OHI. For example, Major Depressive Disorder has heritability estimates between 31-42% (Sullivan et al., 2000). Even suicidal behavior is thought to have some level of heritability; meta-analysis of twin studies has found significant genetic contributions to the broader phenotype of suicidal behavior, yet concordance rates vary substantially across studies (Voracek & Loibl, 2007; Pederson & Fiske, 2010; Ball et al., 2012). In contrast, genome wide association studies have to date found no evidence of genetic markers for suicidal behaviors (Mirkovic et al., 2016). In all, further investigation for shared neurological function and network pathophysiology of genetic risk between and among disorders is needed to identify any shared genetic contributions.

4.3. Clinical Implications

Findings from this research should inform the response of clinicians who treat stuttering. The frequency with which people who stutter experience psychological comorbidities underscores the importance of high levels of competency in counseling for speech-language pathologists and points to the need for mandatory training in counseling at the graduate level. If mental health related sequela to the negative consequences of experiencing a stutter remain under-evaluated, and if discussion of mental health issues remains taboo, then speakers will not receive the full scope of care and treatment required for optimal outcomes in therapy.

Findings also highlight the need to reframe goals for stuttering therapy so that appropriate emphasis is placed on implementation of coping strategies, self-acceptance, self-advocacy, and other techniques to reduce the stress and anxiety around stuttering (Tomisato et al., 2022). Note that we are not suggesting that speech-language pathologists should attempt to diagnose or treat psychological disorders; rather, our profession must recognize that psychological disorders and speech/language disorders are not mutually exclusive and can be highly prevalent in certain populations such as individuals who stutter.

4.4. Conclusion

The findings from this study reiterate the importance of acknowledging the mental health conditions that can co-exist with stuttering which may also significantly impact speakers' quality of life. In particular, further research is greatly needed to explore the vastly understudied relationship between suicidal ideation and stuttering. Additionally, future work to analyze genetic variants for both stuttering and comorbid disorders will help to further clarify the relationships between conditions.

Disclosures

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