

Do Language Disorders in Childhood Seal the Mental Health Fate of Grownups?

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The association of language disorders (LDs) with mental disorders in children and adolescents has been well documented.¹ Studies to date have focused mostly on children who speak English and other European languages, with our work documenting similar overlaps in Spanish-speaking and dual-language children.² The evidence for this association is broad, spanning from clinical to epidemiologic, and from cross-sectional to longitudinal studies. Longitudinal studies have shown that LDs in the early school years predict (i.e., are risk factors for) psychopathology in middle childhood, adolescence, and young adulthood.¹

The overlap between psychiatric disorders and LDs in childhood presents a conundrum to the practicing child and adolescent psychiatrist with minimal to no training in child language development and disorders, as psychiatrists rely heavily on linguistic exchange for their work, and their patients' level of language competence often closely influences their success in therapy and adaptation.

According to definitions of the American Speech Language Hearing Association and the American Psychiatric Association's *DSM-5*,³ communication disorders include LDs and speech sound disorders (SSDs). By adding social (pragmatic) communication disorder, the *DSM-5* communication disorders capture deficits in the four core domains of child language development. These developmental domains are: phonology and grammar (the "form" of language), semantics including vocabulary (the "content" of language), and pragmatics (the social "use" of language).¹

The *DSM-5* defines LDs as persistent difficulties in the acquisition and use of language owing to deficits in comprehending or producing language in terms of vocabulary, grammar, or discourse. These individuals present with language abilities that are "substantially and quantifiably" below age expectations, typically documented through standardized language testing, with scores decreasing 1.25,⁴ 1.5, or (as defined by the *International Classification of Disease, Tenth Revision*) 2 standard

deviations below the mean. Estimated prevalence of language disorders in 5-year-olds (peak age) is approximately 8% overall and higher in families with low parental education.¹ In contrast, SSDs refer to deficits in articulation (articulation disorders), or in the way the mind organizes contrasting perceptions of sounds, called *phonemes*, in the sound system (phonological disorder), with mispronunciations persisting beyond the age by which they are developmentally expected, such as saying *tar* instead of *car* or *one* instead of *run*. Estimated SSD prevalence in 6-year-olds is close to 4% overall and generally higher in boys than in girls.¹ LDs and SSDs overlap approximately twice as often as expected by chance, i.e., LDs and SSDs are likely to co-occur. In the study by Beitchman *et al.*⁵ that motivates this editorial, an LD with or without an SSD is conceptualized, consistent with prior findings, as the main risk marker.

How could LDs lead to poor mental health outcomes? In our society, school learning is based mostly on language. Much of what takes place in formal education depends on the mastery of oral language or its offspring, written language. Learning to read followed by reading to learn builds on the early bricks and mortar foundation of vocabulary and grammar. Receptive vocabulary in kindergarten is one of the strongest predictors of reading ability in second grade and overall school success. Mathematical ability and reasoning are strongly based on language abilities. Therefore, it is not surprising that most learning disabilities originate in language deficits or disorders. It has been argued that in affected children, LDs lead to low achievement, to experiencing academic demands as overwhelming, and to stigma, which become pathways to psychopathology.

The study published in this issue by Beitchman *et al.*⁵ addresses whether LDs and SSDs in childhood predict poor adult mental health outcomes later in life, at 31 years of age. The article presents findings from a longitudinal study conducted in Canada originally composed of 2 samples of 142 5-year-old

children, one sample comprised of children diagnosed with an LD and/or SSD and the other made up of children with normally developing language. The LD/SSD sample was divided into an LD (with or without SSD) group and a purely SSD (without LD) group. The samples were followed through childhood, adolescence, and adulthood. Outcome findings at 31 years are presented for the 3 groups—LD, SSD only, and control groups.

This is largely a negative psychiatric finding study, which, contrary to a large body of literature and previous findings from the same samples, fails to find a difference in psychosocial and psychiatric outcomes between groups of adults with histories of language-normal versus language-disordered childhoods. This is a topic of considerable importance, and the surprising negative finding is, potentially, of great consequence. Such a long follow-up is unique in North America, and the dataset's potential owing to its wealth of information is significant. Psychiatric and psychosocial outcomes for the smaller SSD-only group were also not different from those for the controls, although this is consistent with most of the literature, and the group was too small for the findings to be conclusive.

Are we there yet?

Can we tell the parents of our young patients with LDs that we are reasonably confident that there will be no psychosocial or psychiatric consequences resulting from their LDs when they grow up? Probably not, and this is why. The study has a number of limitations. It took place in Canada, where, as the investigators state, policies or societal characteristics could provide protections not available in other societal contexts. The study includes only cases of mild to moderate LDs and other limitations recognized by the investigators. Importantly, there are significant missing data, particularly (and unevenly) decimating the LD cohort (but not the control or SSD group) in the last wave of data collection, at 31 years of age. In all research studies, data are missing for a variety of reasons: a researcher forgot to administer a questionnaire, a survey was missing 1 page, or a busy teacher felt she did not have the time to complete a child questionnaire. Missing data are much more common in longitudinal and developmental studies, particularly when the follow-up period is prolonged, as in the present study; a participant may no longer be reachable, willing to participate, or alive by the next wave of data collection. Thus, it is not uncommon to miss data on 40% or more of the participants of large longitudinal epidemiologic

studies,⁶ and the authors of this paper merit commendation for their success—and, surely, extraordinary efforts—in retaining such large fractions of the original samples. However, there is no denying that missing data play an important role in our ability to interpret and generalize these findings. It is crucial to make a decision about how missing data will be treated in the analyses because some old approaches (such as deleting from the analyses all participants who are missing variables of interest, an approach called “listwise deletion”) can produce distorted, biased results, i.e., the true values in the population.⁷ Missing data rarely occur at random or by chance but more often result from processes that will lead to biased results and conclusions. Research participants who are at higher risk or less healthy are more likely to be lost to follow-up for a variety of reasons. Their families may be under more stress, poorer, or have no phone or stable mailing address. Losing the most vulnerable participants and analyzing only data on the children who stayed in the study may bias the results to erroneously suggest that participants did not do so poorly over time. In the example of the present study, those who were the most affected by their childhood LD could have had worse psychiatric, legal, or health outcomes leading to higher rates of nonparticipation (e.g., participants in the LD group were more than twice as likely not to be located and more than twice as likely to be dead compared with the controls or participants with SSD). However, the investigators used a robust statistical technique, known as *multiple imputation*, to try to remediate the biasing effect of nonrandom missing data and produce a better estimate of what is “really” going on in the population.

In sum, this study provides a first glimpse of a hopeful possibility. Future studies may be able to confirm or deny this possibility. &

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