

## Research Statement

Attached please find my research statement and 3 manuscripts representing samples of some of my recent research. As described in more detail below, the primary areas of focus and aims of my research program are to: 1) better understand how operant and respondent learning processes influence the clinical course of tic disorders; 2) propose and interrogate theory-driven mechanistic processes that underlie evidence-based treatments for tics (**see Work Sample 1**); 3) to develop, test, and refine nonpharmacological and transdiagnostic interventions for tics and associated comorbidity; and 4) to identify and address barriers to the adoption and utilization of evidence-based interventions for CTD and related conditions (**see Work Sample 2**). A secondary and more recent area of research interest focuses on understanding and promoting healthy relationships and quality of life for individuals with autism spectrum disorder (**see Work Sample 3**). Across each of these areas of focus, my work utilizes a wide range of research methods and designs including small-N designs (multiple baseline, reversal, and multicomponent designs), mixed qualitative/quantitative and community/ stakeholder engaged methods, survey research, and randomized controlled trials. The work samples I have selected demonstrate some of my work in these areas as well as a sample of some of the research methods that I employ.

### **Overarching context for my program of research:**

Chronic Tic Disorders (CTDs) are a class of complex neurodevelopmental disorders characterized by involuntary motor and vocal tics. Recent research has shown that tics occur in up to 20% of school-aged children, fall along a continuum from transient/benign to persistent/problematic, and are a clinical indicator of risk for a broad range of internalizing and externalizing psychopathology. Historically, CTD was conceptualized as a “purely neurological” condition and treatment was limited to pharmacotherapies with adverse side profiles (e.g., neuroleptics). More recent research, including some of my own, has shown that cognitive, behavioral, and psychosocial (i.e., contextual) processes can substantially influence the clinical course of tics and a behavioral treatment aimed at modifying these processes- referred to as Comprehensive Behavioral Intervention for Tics (CBIT)- has been shown to be efficacious for reducing tics with effect sizes comparable to those reported in medication trials. Although CBIT is now recommended as a first line intervention within best practice guidelines, it is not a panacea; it is a highly resource intensive intervention, only ~50% of children who complete treatment show a clinically meaningful response, and it remains underutilized and unavailable to many. My research attempts to address each of these shortcomings.

### **Understanding how contextual factors influence tics.**

For the past several years I have been pursuing a contemporary behavior analytic framework to better understand how biological, cognitive, developmental, and contextual factors interact to influence both tics and comorbid symptoms. I argue that conceptualizing CTDs from this theory-driven framework will accelerate our understanding of the clinical nuances of CTD and ultimately lead to more efficacious interventions. For example, several of my early studies demonstrated that tic suppression/expression can be motivated by operant reinforcement and brought under stimulus control (Woods & Himle, 2004; Himle et al., 2007b, Woods et al., 2008, Conelea et al., 2018). Based on this work, we developed a function-based assessment and intervention (FBAT) protocol to systematically identify operant variables associated with tic exacerbation (Himle et al., 2014). Although the FBAT protocol is a core part of CBIT, it has never been validated and component analysis studies are nonexistent. My lab is currently in the process of validating the FBAT conceptual model and treatment protocol using functional analysis and a novel reinforced suppression paradigm that I developed (Conelea et al., 2018). For example, we recently completed a project in which we were able to demonstrate that, for some children, symptom expression was altered when tics (or periods of tic absence) were

followed by reinforcement even when children were not aware of the contingency (manuscript in prep), and we are currently using brief functional analysis to examine the validity of the self-report FBAT procedures used to guide treatment in CBIT (data collection ongoing). Ultimately, the goal of this line of research is to better understand how learning processes impact symptom expression, individualize treatment for CTD, and enhance intervention outcomes.

**Learning Mechanisms Underlying Tic Control:** A realted focus of my research is to better understand the behavioral mechanisms by which Habit Reversal (HRT, a primary component of CBIT) is effective for reducing tics. The prevailing hypothesis is that HRT facilitates habituation to aversive premonitory pre-tic urges, thereby extinguishing an automatically maintained negative reinforcement cycle. Several recent studies from my lab, however, have cast doubt on whether children habituation to pre-tic urges during suppression (Conelea, Himle, et al., 2018). Most reacently, we examined continuous recordings of urge ratings during tic suppression and HRT using a dynamical systems approach (**Wellen et al., 2024a; see Work Sample 1**) and failed to find strong evidence of habituation. This is consistent with some of my previous research showing that pre-tic sensations are likely not “functional” early in the course of the disorder (Chang et al., 2009) but the stimulus function of the “urge” changes over time. These findings support our current FBAT approach which selects intervention techniques based on mechanisms of change (i.e., targeting the specific function of specific tics). We are also planning a series of studies to examine alternative plausible mechanisms of change including inhibitory learning and examination of a possible punishment-based functional account of HRT (similar to the presumed mechanism underlying response interruption and redirection for stereotypy).

**Implementation and Dissemination:** Large patient surveys have shown that most patients desire CBIT but relatively few receive it (6-34%). Patient surveys and a recent PCORI-funded patient-centered research summit (Woods, Conelea, & Himle, 2010; Conelea et al., 2024; **Wellen et al., 2023, see Work Sample 2**) have identified practical factors (e.g., travel, time, cost) and lack of trained and knowledgeable providers as among the most commonly cited barriers to receiving CBIT. Accordingly, my lab has undertaken several steps to address this “research-to-practice gap”, including several studies examining the efficacy, acceptability, and feasibility of CBIT delivered via telehealth (see Himle et al., 2010b; Himle et al., 2012; Ricketts et al., 2016; Capriortti et al., 2023); partnering with the company Psych Tech, LLC to develop and test an individualized, self-paced online program for delivering CBIT (called [TicHelper.com](https://www.tichelper.com)); and most recently developing an online platform called CBIT-Trainer to train interdisciplinary providers to administer CBIT. Both TicHelper and CBIT-Trainer were developed using an iterative, stakeholder-informed, contextualized technology adaptation process (CTAP) aimed at identifying potential barriers/facilitators to adoption early in the development process. Given the overwhelmingly positive results from our initial pilot feasibility testing (Himle et al., in prep), we are now testing CBIT-Trainer against a traditional in-person training model- on both therapist and patient outcomes- in a large-scale effectiveness-implementation hybrid noninferiority trial. If shown to be effective, CBIT-Trainer has the potential to significantly reduce the cost and burden associated with CBIT training, thereby allowing more therapists to be trained.

#### **Understanding and promoting healthy relationships in youth with ASD.**

A secondary area of research that has emerged for me more recently is understanding and promoting healthy sexual development, sexuality, relationships, and quality of life for individuals with Autism Spectrum Disorder (ASD). I have been particularly interested in understanding how individual, family, and community factors (attitudes, policy, etc.) interact to influence the development and maintenance of intimate relationships, physical and sexual health, and quality of life. Recent research has emphasized the importance of promoting independence and optimizing QOL for adolescents and young adults with ASD, yet the areas of sexual development, romantic relationships, and sexual health have been neglected, in part due to misconceptions that individuals with ASD are disinterested in such relationships. To the contrary, most individuals with ASD are interested in romantic/sexual relationships, yet struggle

to secure and navigate them, which we have shown has significant implications for their quality of life as well as their mental and physical health. Further, support systems are often under-prepared to help neurodivergent individuals navigate this important topic. Ultimately, the goal of this line of research is to better understand the experiences and needs of neurodivergent families with regard to relationships, sexual development, and sexuality in order to help them and their support systems promote independence, relationship satisfaction, and quality of life (**see Work Sample 3**).