ACADEMIC PROFILE

I investigate the key mechanisms by which psychotherapy facilitates individuals' ability to expand their emotional and relational experiences, enhance their resilience to psychological distress, and achieve meaningful personal growth and well-being. My extensive experience conducting process-outcome studies, combined with years of practice as a therapist and supervisor in clinical psychology, has brought me face-to-face with the profound human suffering associated with mental health challenges and the limitations of current practices. These experiences have deepened my commitment to advancing precision in mental health care.

My work is inspired by significant shifts in clinical science, moving from manualized, disorder-focused treatments to a transtheoretical approach that emphasizes building a consensual knowledge base that integrates evidence-based interventions and processes central across diverse therapeutic models, and tailoring interventions to meet patients' specific needs at specific times. Recognizing the limitations of traditional research methods in studying these complex processes, I established a research program leveraging advanced artificial intelligence (AI) and multimodal technologies to explore the dynamics underlying therapeutic change. In my role as Research Director of the Community Clinic at BIU, I have fostered a vibrant ecosystem of co-creation, where clinicians and researchers collaborate to design studies that are both scientifically rigorous and clinically meaningful. Central to this effort is the large-scale dataset I developed at the clinic, which serves 250–300 patients annually. Over eight years, my team has collected more than 20,000 recorded sessions paired with repeated measures of linguistic, vocal, facial, kinesthetic, physiological, hormonal, immunological, and clinician assessments throughout treatment.

The integration of theories and methodologies from within and beyond the clinical domain, the interdisciplinary collaborations I have forged with world-leading mental health and AI researchers, and the rich, multifaceted data I have collected have enabled the development of two main research lines. The first focuses on identifying multimodal intra-personal dynamics within the patient and the therapist, as well as inter-personal dynamics between them, and their associations with treatment outcomes. The second focuses on using AI to advance precision in the treatment of mood disorders, particularly depression. Below, I describe how these research lines have evolved in recent years and highlight my future research plans.

(1) Exploring multimodal intrapersonal and interpersonal dynamics that drive therapeutic change in psychotherapy

The enduring question that has long intrigued clinicians and researchers—what works for whom in therapy, and when—remains as vital as ever. What has evolved, however, is our ability to investigate this question with greater precision and depth, yielding increasingly robust insights. Mental health is a complex and dynamic phenomenon, and the vast array of therapeutic options available to clinicians at any given moment makes addressing this question a formidable challenge.

By integrating a top-down, theory-driven approach with bottom-up, data-driven AI methods my team has identified key intrapersonal and interpersonal dynamics that drive therapeutic change. Several key insights emerged from these studies. Our findings regarding intrapersonal dynamics reveal the central role of psychological flexibility - the capacity to dynamically modulate responses from one moment to the next - as a robust predictor of treatment outcome. Flexibility—in emotional experience, facial expressions, voice, cognitions, and even physiology—was associated with fewer symptoms and better treatment outcomes (see papers 1,2,10,18,19 in the since last promotion publication list). For example, my team used facial expression data and an automated facial recognition system to examine the link between emotional flexibility and depression by analyzing 283 video-recorded sessions from 58 clients undergoing psychotherapy (10). The results indicated a significant association between emotional flexibility and depressive symptoms at both the patient and session levels. While facial expressions convey the valence of emotions, vocal tone conveys the arousal of affective states. In a recent study, we analyzed facial expressions and vocal channels to investigate intrapersonal affective flexibility (18). We found that patients who exhibited higher flexibility in facial and vocal affective measures during sessions experienced greater improvements in well-being,

both within individual sessions and across the course of treatment. Physiological measures provide another promising channel for examining affect dynamics in psychotherapy, as they provide an implicit measure of emotional arousal and regulation. In one study, we explored Respiratory Sinus Arrhythmia (RSA), a measure of parasympathetic nervous system activity, as a biomarker in depression treatment (19). The results showed that greater RSA reactivity during sessions indicated better therapeutic progress. In another study (1), we explored the potential of oxytocin, a hormone known for its role in social bonding and stress regulation, as a biomarker for symptom change in psychotherapy for depression. We found that patients with higher oxytocin reactivity during therapy experienced greater improvement in depressive symptoms over the course of treatment, suggesting oxytocin reactivity as a biomarker of therapeutic progress.

Whereas facial expression, vocal tone, and physiological measures provide insights into non-verbal dynamics, text analysis offers a window into the verbal aspects of therapy. Many of my studies have utilized state-of-the-art natural language processing (NLP) techniques to analyze text from transcribed psychotherapy sessions (e.g., 17 in the since last promotion publication list, and 1-7 in the peer reviewed conference STEM list). For example, using transformer-based emotion recognition models to analyze 139,061 patient utterances, we examined the relationship between verbally expressed and self-reported emotions. Through multilevel modeling, we found that coherence in negative emotions significantly predicted improved functioning, highlighting emotional coherence's role in therapeutic outcomes (17).

Our pioneering studies on interpersonal dynamics in psychotherapy employed advanced data analyses to examine moment-by-moment patient-therapist interactions that drive positive change (e.g., publications 4, 6, 9, and 10 in the since-last-promotion list). These studies underscore the critical role of synchrony—the temporal alignment of affect, physiology, or behavior between interacting individuals—in achieving successful therapeutic outcomes. However, as research on synchrony in psychotherapy has expanded, it has become evident that while synchrony is often associated with favorable outcomes, this is not always the case. Our systematic review and meta-analysis (6) emphasized the importance of context in determining when synchrony is beneficial and when it may not be. For instance, in one study (2), we measured physiological synchrony between patients and therapists while accounting for emotional context. Synchrony during productive emotional experiences was linked to patients' favorable session evaluations, whereas synchrony during unproductive moments was not. Additionally, our studies suggested that the benefits of synchrony depend on other factors, such as therapists' ability to induce coregulation patterns (20).

These promising results led to the establishment of a novel theory - Multimodal Intrapersonal and Interpersonal dynamics (MIND; see paper 2 in non-refereed publications), which aims to model the complex nature of individuals' experiences and therapeutic interactions, creating a roadmap for personalised interventions. Contrary to previous views that focused on trait-like classifications and manualized disorder focused treatments, MIND emphasizes modifiable intrapersonal and interpersonal dynamics tailored to patients' specific needs at the moment.

I have had the privilege of presenting on multimodal intrapersonal and interpersonal dynamics at a semi-plenary, multiple panels, and structured discussions at the Society for Psychotherapy Research (SPR) international conferences, as well as at the EU-SPR webinar, and serving as guest editor for a special issue of Psychotherapy Research on this topic. These opportunities highlight the growing recognition among researchers of the importance of studying interdependent dyadic processes within and between patients and therapists—such as flexibility, synchrony, congruence, influence, and receptiveness—to better understand the complexity of psychotherapy interactions. SPR has been my scientific home, offering a platform to share and develop my work while fostering a vibrant community that has inspired many close professional and personal international connections. I have been honored to contribute to SPR's activities by serving on the scientific program committees of several international conferences. Together with my colleagues in Israel, I have actively promoted SPR locally and played a key role in organizing SPR conferences held in Israel. It was a tremendous honor to receive the Outstanding Early Career Award from SPR in 2020, to serve as an Associate Editor for Psychotherapy Research from 2018 to 2023, and to contribute as a long-standing member of the journal's editorial board. Furthermore, I was privileged to co-edit a seminal book on the future of practice-oriented research with esteemed leaders Michael Barkham, Louis Castonguay, and Wolfgang Lutz.

(2) Leveraging artificial intelligence to enhance precision in the treatment of depression

Depression is a major cause of disability globally, with many affected individuals not receiving treatment. About half of the treated individuals show adequate improvement, necessitating the optimization of care for this debilitating condition. Recent breakthroughs in AI, particularly the emergence of large language models (LLMs), carry tremendous promise to significantly advance the creation of effective and personalized treatments. Yet, the use of LLM-based systems for mental-health purposes faces considerable challenges. To address these challenges, I partnered with Prof. Maria Liakata, a globally recognized expert in AI and natural language processing (NLP) from The Alan Turing Institute in London. Our shared commitment to leveraging AI for mental health, particularly in capturing temporal dynamics predictive of therapeutic progress, has resulted in several influential publications (e.g., 2, 3, 6, 7 in peer-reviewed STEM conferences). For example, in one study, we demonstrated the usefulness of LLMs in detecting suicidal risk among social media users (6). In another, we developed a novel method for creating clinically meaningful formulations of individuals' mental states from their consented social media timelines (7). Additionally, using UK Biobank data, we demonstrated AI-based models to predict depression risk in middle-aged adults without prior psychiatric history (7 in the since last promotion list). Together, Prof. Liakata and I co-chaired CLPsych, the International Workshop on Computational Linguistics and Clinical Psychology, in 2022 and have remained active members of its organizing committee. This productive collaboration led to my invitation to spend a year as an academic scholar at the Alan Turing Institute during my sabbatical in 2023, where we advanced our shared project on using AI to enhance mental health care. Central to our work is addressing the limitations of current AI models, rigorously evaluating their performance, and ensuring they are ethical, unbiased, and prioritize patients' well-being. In another close collaboration with Prof. Iryna Gurevych, an internationally renowned expert in AI and multimodal analysis from Darmstadt University, Germany. We utilized advanced AI to automatically recognize patients' emotions and therapists' interventions, as well as to identify patient-therapist interactional sequences associated with positive outcomes (e.g., publications 4, 5 in peer-reviewed STEM conferences; 17 in the since last promotion list). Building on this collaboration, our team was honored to receive funding to host a workshop at Dagstuhl, Germany, in 2025. This workshop will bring together internationally renowned experts in both AI and clinical psychology, fostering interdisciplinary dialogue and advancing this critical research area.

I have had the honor of serving as a guest editor for two special issues: one exploring the future of practice-oriented research (with Castonguay, De Jong, and Jeong Youn) and another examining the integration of novel technologies in psychotherapy (with Schwartz and Prinz). My expertise has also been recognized through invitations to contribute several book chapters, most notably a chapter on AI in psychological therapies for the forthcoming edition of the Bergin and Garfield Handbook of Behavior Change.

Next steps

The progress in these two interconnected lines of research lays the foundation for my overarching goal: to deepen understanding of what works for whom and when in psychotherapy and integrate these insights with cutting-edge multimodal AI to transform depression management. With the support of a recently submitted ERC Synergy grant (in collaboration with Liakata and Schuller) and partnerships with world-leading AI experts, I aim to further develop the MIND framework, which captures the dynamic, multifaceted nature of depression and provides a roadmap for personalized interventions. By combining a theory-driven approach with AI-powered, data-driven discoveries from a unique, large-scale psychotherapy dataset, I will enable the automatic identification of patient states and therapist-patient interactions that are predictive of positive therapeutic outcomes. These findings will inform the development of a first-of-its-kind, evidence-based personalized system for depression management, comprising therapist-augmentation and patient-augmentation modules. This system will seamlessly combine the clinical expertise and nuanced understanding of human therapists with the precision and scalability of AI technology, delivering tailored, real-time interventions that address patients' evolving needs. I believe that this integration of clinical science and advanced AI has the potential to significantly enhance the precision and effectiveness of depression treatment, ultimately improving mental health and well-being on a global scale.