ABCT ASSOCIATION for BEHAVIORAL and COGNITIVE THERAPIES

ISSN 0278-8403
VOLUME 44, NO. 7 • OCTOBER 2021

the Behavior Therapist

special issue

Neurocognitive Therapies, Translational Research, and Diversity, Equity, and Inclusion in 2021

Guest Editors: **Angela Fang**
Katherine S. Young

Angela Fang and Katherine S. Young
Introduction to the Special Issue: Neurocognitive Therapies, Translational Research, and Diversity, Equity, and Inclusion in 2021 • ***321***

Marlene V. Strege, Jacqueline B. Persons, Kerry J. Ressler, Rebecca A. Krawczak, Angela Fang, Philippe Goldin, Greg J. Siegle
Integrating Neuroscience Into Clinical Practice: Current Opinions and Dialogue Between Drs. Jacqueline Persons and Kerry Ressler • ***326***

Joel Sherrill and Alexander Talkovsky
Translational, Psychosocial Research: Prospects for Advancing Understanding of Mental Illness Trajectories and Facilitating Interventions Across the Lifespan • ***335***

Zoë E. Laky, Abigail Szkutak, Angela Fang
Toward a More Inclusive Neuroscience-Informed Treatment of OCD: A Clinical Case Example • ***340***

Mariah DeSerisy, Emily Hirsch, Jill Stadterman, Melanie Silverman, Amy K. Roy
Intolerance of Uncertainty and Risk for Anxiety: Neural Mechanisms and Cross-Cultural Implications • ***346***

Andrew D. Peckham
Why Don't Cognitive Training Programs Transfer to Real Life? Three Possible Explanations and Recommendations for Future Research • ***357***

Maria Kryza-Lacombe, Elizabeth Richards, Natasha Hansen, Philippe Goldin
Integrating Neuroeducation Into Psychotherapy Practice: Why and How to Talk to Patients About the Brain • ***361***

[Contents continued on p. 322]

INTRODUCTION to the SPECIAL ISSUE

Neurocognitive Therapies, Translational Research, and Diversity, Equity, and Inclusion in 2021

Angela Fang, *University of Washington*

Katherine S. Young, *Institute of Psychiatry, Psychology and Neuroscience, King's College London, and NIHR Maudsley Biomedical Research Centre, King's College London*

PSYCHOLOGY AND NEUROSCIENCE are complementary disciplines that share a common goal: to develop and test mechanistic models of thoughts and behavior. Clinical psychology and clinical neuroscience focus on mechanisms underlying psychological illness. Mechanisms are the key psychological, behavioral, and neural processes that are causally implicated in the development, maintenance, and treatment of psychological disorders/mental health problems. They are "not simply an intervening variable that explains the statistical relation between an intervention and an outcome—i.e., a mediator," but rather, mechanisms are "explanatory constructs" (Holmes et al., 2018). In this special issue, we showcase articles that demonstrate how synergy between clinical psychology and neuroscience can offer more explanatory power in understanding disorder and treatment change mechanisms.

[continued on p. 323]

the Behavior Therapist
Published by the Association for Behavioral and Cognitive Therapies
305 Seventh Avenue - 16th Floor
New York, NY 10001 | www.abct.org
(212) 647-1890 | Fax: (212) 647-1865

Subscription information: *tBT* is published in 8 issues per year. It is provided free to ABCT members. Nonmember subscriptions are available at $40.00 per year (+$32.00 airmail postage outside North America). ***Change of address:*** 6 to 8 weeks are required for address changes. Send both old and new addresses to the ABCT office.

— Contents continued —

Student Forum
Samantha Moshier
Interview Series: Clinical Psychology Careers "Off the Beaten Path": Part 2 • ***371***

Obituary
Gerald C. Davison
Obituary for Albert Bandura • ***373***

At ABCT
Call for Award Nominations • ***376***
Annual Convention in NYC: Call for Ticketed Sessions • ***379***

INSTRUCTIONS *for* AUTHORS

The Association for Behavioral and Cognitive Therapies publishes *the Behavior Therapist* as a service to its membership. Eight issues are published annually. The purpose is to provide a vehicle for the rapid dissemination of news, recent advances, and innovative applications in behavior therapy.

- Feature articles that are approximately 16 double-spaced manuscript pages may be submitted.
- Brief articles, approximately 6 to 12 double-spaced manuscript pages, are preferred.
- Feature articles and brief articles should be accompanied by a 75- to 100-word abstract.
- Letters to the Editor may be used to respond to articles published in *the Behavior Therapist* or to voice a professional opinion. Letters should be limited to approximately 3 double-spaced manuscript pages.

Submissions must be accompanied by a Copyright Transfer Form (which can be downloaded on our website: http://www.abct.org/Journals/?m=mJournal&fa=TBT): *submissions will not be reviewed without a copyright transfer form*. Prior to publication authors will be asked to submit a final electronic version of their manuscript. Authors submitting materials to *tBT* do so with the understanding that the copyright of the published materials shall be assigned exclusively to ABCT. Electronic submissions are preferred and should be directed to the editor, Richard LeBeau, Ph.D., at **rlebeau@ucla.edu.** Please include the phrase ***tBT submission*** and the author's last name (e.g., ***tBT Submission - Smith et al.***) in the subject line of your e-mail. Include the corresponding author's e-mail address on the cover page of the manuscript attachment. Please also include, as an attachment, the completed copyright transfer document.

Themes of This Special Issue

Mechanistic research has much to gain from translational approaches that aim to bridge the gap between the laboratory and the clinic. Translational research aims to "harness knowledge and methods from basic science to facilitate understanding of psychopathology, illness course, and ultimately to guide prevention and treatment" (Sherrill & Talkovsky, 2021, this issue). With a shared interest in key mechanisms underlying the development, maintenance, and treatment of psychological disorders, interdisciplinary collaboration among clinical psychologists, behavioral scientists, and neuroscientists, along with colleagues across a range of neighboring disciplines, offers the potential to build a more comprehensive 'mental health science'" (Holmes et al., 2014).

Critically, this translation needs to be bidirectional in nature. Not only can neuroscience help inform clinical research and practice, but clinical observation and research should be integral to the design of neuroscientific research to examine treatment-relevant mechanisms (Young & Craske, 2018). In an article discussing how the National Institute of Mental Health's (NIMH) research priorities relate to core principles of clinical psychological science and translational research, Sherrill and Talkovsky (2021, this issue) emphasize that "the focus is on not only testing whether interventions work, but also on interrogating the underlying disease mechanisms and therapeutic change mechanisms."

In this special issue, we aim to highlight examples of bidirectional translational research that demonstrate the potential for how an enhanced understanding of mechanisms can ultimately lead to more effective, efficient interventions that work for all. As representatives of the Neurocognitive Therapies and Translational Research Special Interest Group (NTTR SIG), we focus on examples that use neuroscientific methods to examine the biological basis of discrete psychological and behavioral processes. However, we wish to emphasize that translational research does not and should not rely solely on the use of biological approaches generally, nor neuroimaging methodologies specifically. Rather, translational research aims to incorporate measures from across multiple levels of analysis, including, but not limited to, cognitive, social, behavioral, psychophysiological, neuroendocrine, and neural assessments. We ascribe to the view that neuroscientific research can be incorporated as "one more tool" in psychologists' toolboxes to advance our understanding of mental health (see Craske, 2014).

Our special issue also highlights the importance of taking an antiracist and diversity science approach to the integration of neuroscience in clinical research by highlighting some cultural nuances of translational research. In light of ongoing racial violence on the heels of the brutal murders of George Floyd, Breonna Taylor, and many other Black Americans, as well as the COVID-19 pandemic, which has made salient longstanding health inequities around the world, issues of diversity, equity, and inclusion must be part of standard criteria in any effort to advance science. The fields of clinical psychology, psychiatry, and neuroscience are deeply rooted in "epistemic oppression" (or the systematic exclusion by people of certain communities and positionalities that results in deficiencies of social knowledge; Dotson, 2012). The practices upholding epistemic oppression can still be observed today in the structures and incentives that underlie how science is conducted, reported, reviewed, and disseminated (Buchanan et al., 2019). Psychological science still relies heavily on convenience samples of undergraduate students from WEIRD (Western, Educated, Industrial, Rich, and Democratic) communities, as well as quantitative methods that do not fully account for the sociocultural context and make "value-neutral" assumptions about data (Adams & Salter, 2019). Black, Indigenous, and People of Color (BIPOC) are still vastly underrepresented in higher positions of academia, as less than 20% of full-rank professors at degree-granting postsecondary institutions are Black, Asian/Pacific Islander, or American Indian/Alaskan Native (U.S. Department of Education, 2019), which contrasts with up to 42% of incoming graduate students in psychology and neuroscience who identify as Asian, Black/African American, Hispanic/Latinx, or Other (American Psychological Association, 2020). Too often, discussions of race, ethnicity, and cultural variation in psychological, brain, and treatment change processes are relegated to special issues of their own led by BIPOC scholars, which further perpetuates their "other-ness" as nonstandard considerations in advancing cutting-edge science.

We envision a field of translational clinical neuroscience that is as inclusive as possible and relevant for all. To achieve this, scientists and clinicians need to engage in ongoing development of cultural humility and competency (Fisher-Borne et al., 2015), as well as structural competency (Castillo et al., 2020). Respectively, these skills will foster understanding of individual- and group-level variation in brain and psychological processes as a function of the cultural context, as well as the systemic factors that contribute to health inequities. We have amassed several articles in this special issue that highlight ways to cultivate these two core competencies when conducting translational research.

Articles in This Special Issue

Highlighting the bi-directional translation between the lab and the clinic, articles in this special issue discuss different ways in which neuroscientific knowledge can play an important role in the clinic, and how clinical information can also inform neuroscience. For example, neuroscience applications in the clinic include neuroeducation in therapy to enhance patient understanding of the biological basis of their symptoms and neurocognitive training interventions to help target specific mechanisms. Clinically informed neuroscience also requires a deep understanding of the vast heterogeneity in symptom presentation within a single disorder category. Knowledge of neural circuits is only meaningful to the extent that this understanding can help patients untangle a learned functional association in a particular context. Toward culturally responsive translation, several articles in this special issue also highlight the importance of the sociocultural context in our measurement techniques. Articles also discuss the balance between leveraging the richness of individual-level information about brain and psychological functioning, and applying group-based models of culture-specific norms and disorder-specific neurocircuitry. This is a key balance to strike in advancing any science that has implications for health and well-being, such as translational clinical neuroscience, as it is our collective appreciation of heterogeneity within and across people that allows us to truly assess the boundary between "normative" and "pathological."

First, Strege and colleagues (2021, this issue) discuss findings of a survey of current ABCT members regarding views on how to integrate neuroscience into clinical practice, including reporting of a "dialogue" between a clinical practitioner (Dr. Jacqueline Persons) and a translational

neuroscientist (Dr. Kerry Ressler). This insightful article highlights that a high proportion of survey responders report some knowledge of neuroscience and that they use this knowledge in clinical practice, particularly as part of psychoeducation around the origins and key processes of certain psychological disorders. Notably, around half of survey respondents also reported that including a biological rationale in treatment helped to increase engagement in treatment and reduce stigma among patients.

Building on the theme of education, Kryza-Lacombe and colleagues (2021, this issue) discuss how to effectively incorporate neuroscientific knowledge into psychoeducation in the clinic. Noting barriers for implementing such knowledge, including a lack of familiarity or confidence when speaking about neuroscientific research, Kryza-Lacombe et al. provide language samples of how to incorporate biological explanations into psychoeducation. In this work, they highlight both that mental health problems can have biological origins, but importantly, that our interventions target and effect change in these very same systems. While acknowledging that biological explanations might not be appropriate or useful for everyone, and that a tailored, culturally informed case conceptualization is needed before engaging patients in neuroeducation, they note that for some, this approach can "offer profound benefits to our patients, among them reducing stigma, appreciating the spectrum of individual variability, and promoting an understanding for how treatments work, which can in turn spur improved motivation for change."

Focusing on the specific mechanism of emotion regulation, Laky and colleagues (2021, this issue) introduce a thoughtful case conceptualization considering important cultural and racial contextual factors within a neuroscience framework. Focusing on an example of a client of color with obsessive-compulsive disorder, Laky et al. detail how an individual's experiences of racial disrimination may interact with biological processes to exacerbate obsessive-compulsive symptoms and the importance of considering these factors when developing a treatment plan. They also provide a series of important practical recommendations for researchers and clinicians: how to enhance diversity and representation among minoritized groups in our research, and how to incorporate consideration of cultural and neuroscientific factors in our practice.

DeSerisy and colleagues (2021, this issue) highlight an example of translational research to target upstream risk factors, rather than symptoms of mental health conditions. They put forward a salience network model that links intolerance of uncertainty and anxiety, and discuss the limitations in our knowledge with regard to cross-cultural variation in this model. They note that although the widely used Intolerance of Uncertainty Scale has been well-studied in diverse populations in the U.S. and internationally, intolerance of uncertainty may interact with perceived discrimination and potential other "uncertainties" associated with racism to increase anxiety and exacerbate health inequities. Their review highlights intolerance of uncertainty as "a particularly salient vulnerability factor for mental health problems in diverse populations in the United States" and the need for more research to investigate it as a cross-culturally relevant treatment target for anxiety disorders to help reduce mental health disparities.

Next, Peckham (2021, this issue) discusses cognitive training interventions, a clear example of how mechanisms-based research can result in novel intervention strategies, deliverable in an automated, scalable manner. In this article, he discusses a key issue in translational research: why effects observed in the lab often fail to transfer to changes in real-world outcomes. Central to this discussion is the issue of specificity. It may prove critical to consider an individual's context, the specific nature of their symptoms and their neurocognitive capacity to benefit from training in order to improve outcomes. Furthermore, he highlights the lack of multiculturalism in cognitive training research, likely to be a particularly important barrier in achieving meaningful effects for many.

Finally, Sherill and Talkovsky (2021, this issue) contribute a commentary on where and how psychosocial translational research fits within the NIMH Strategic Plan, from their perspective as Deputy Director and Program Staff in the Division of Services and Interventions Research and the Division of Translational Research at NIMH, respectively. They note that clinical psychological scientists are particularly well-poised to work in transdisciplinary teams focused on neuroscience integration with psychosocial measures, and cite examples of conceptually integrative translational research that have been recently funded, including several that do not centrally rely on biologically based assessments.

Conclusion

Articles in this special issue describe some key examples of current efforts in translational research, but also demonstrate the gaps that still remain in our understanding. For example, future translational research will need to address how to further leverage advances in neuroscientific models into more effective interventions that are deliverable at scale and have meaningful real-world clinical impact. There is also an urgent need to improve standards within neuroscientific research to be more inclusive and representative of individuals from across all cultural and racial backgrounds. Finally, communication needs to be improved between the lab and the clinic, as well as the general public, to ensure that the mechanisms we study in the lab are informed by the pressing needs and rich contextual understanding of experiences in the clinic and in the greater community.

References

Adams, G., & Salter, P. S. (2019). They (color) blinded me with science: Counteracting coloniality of knowledge in hegemonic psychology. In K. Crenshaw (Ed), *Seeing Race Again: Countering Colorblindness Across the Disciplines* (pp. 271-292). University of California Press.

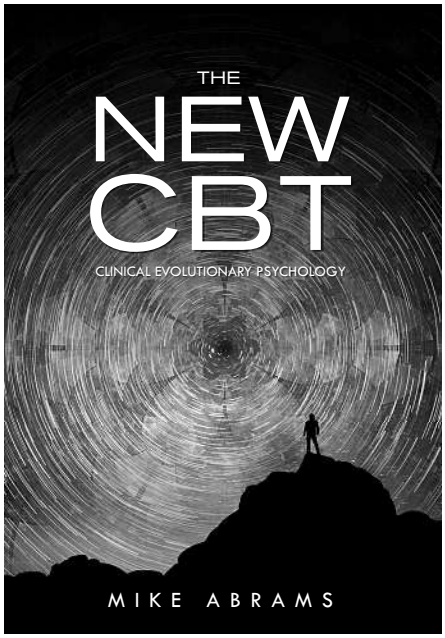
American Psychological Association. (2020). *Graduate study in psychology: Demographics of departments of psychology* [Interactive Data Tool]. Retrieved August 27, 2021, from: https://www.apa.org/education-career/grad/survey-data/demographics-data.

Buchanan, N. T., Perez, M., Prinstein, M. J., & Thurston, I. B. (2019). *Upending racism in psychological science: Strategies to change how science is conducted, reported, reviewed, and disseminated*. American Psychologist.

Castillo, E., Isom, J., DeBonis, K. L., Jordan, A., Braslow, J. T., & Rohrbaugh, R. (2020). Reconsidering systems-based practice: Advancing structural competency, health equity, and social responsibility in graduate medical education. *Academic Medicine, 95*, 1817-1822.

Craske, M. G. (2014). Introduction to special issue: How does neuroscience inform psychological treatment? *Behaviour Research and Therapy, 62*, 1-2.

DeSerisy, M., Hirsch, E., Stadterman, J., Silverman, M., & Roy, A. (2021). Intolerance of uncertainty and risk for anxiety: Neural mechanisms and cross-cultural implications. *the Behavior Therapist, 44*(7), 346-357.



"Simply put, it's the best book out there."
– David M. Buss

The first book to combine CBT with evolutionary psychology and behavioral genetics while providing treatment recommendations for all major disorders

The New CBT is an illuminating resource for contemporary mental health professionals, students, and researchers. It is the first book to make evolutionary psychology and behavioral genetics readily accessible to mental health clinicians and non-technical professionals. By explaining the role of heredity in all major DSM disorders, The New CBT can help readers reduce the stigma of psychological dysfunctions and help them better understand how the brain, the genome, and the body dynamically contribute to mental disorders.

Purchase on Amazon:
https://amzn.to/2OPaMsR
Purchase through Cognella Academic Publishing:
https://titles.cognella.com/the-new-cbt-9781516521623

The New CBT: Clinical Evolutionary Psychology

By Mike Abrams

©2021 | 502 pages | ISBN: 978-1-5165-2162-3
Published by Cognella Academic Publishing

"The New CBT is an absolutely terrific and ground-breaking book. It provides cutting-edge science about clinical evolutionary psychology, with profound implications for treatment. Incorporating an evolutionary perspective on psychological disorders gives readers, clients, students, and professionals a tremendously important lens for understanding and treatment. Simply put, it's the best book out there. Abrams has done a terrific job interweaving case studies with deep psychological understanding and the latest empirically-based evidence. I recommend this book in the highest terms and without reservation."
David M. Buss, Author of Evolutionary Psychology: The New Science of the Mind

"Cleverly integrating evolutionary psychology and behavioral genetics with basic principles of Cognitive Behavioral Therapy, Psychologist Mike Abrams provides us with new insights into how we might more effectively alleviate stress by changing the way people think and behave."
Elizabeth Loftus, Ph.D., Distinguished Professor, University of California, Irvine, Past President, Association for Psychological Science

"Mike Abrams has written an important book with an impressive range of coverage: evolution, emotion theory, cognition, the history of psychotherapy, and current status of therapeutic approaches to numerous disorders. This will be a valuable resource not just for therapists but also for scientists who want relate their work on brain and behavior to mental problems and their treatment."
Joseph LeDoux, Center for Neural Science, NYU, Emotional Brain Institute at NYU and Nathan Kline Institute

"This text provides an evolution of our thinking about the mental health problems faced by many people…Most CBT practitioners are not well informed on the sciences of evolutionary psychology and behavioral genetics, and Dr. Abrams makes a strong case that we should be…It will be a book that I will refer to frequently in the future."
Deborah Dobson, Ph.D., Private Practice and University of Calgary, Author of Evidence Based Practice of Cognitive Behavioral Therapy (2009; 2017) with K.S. Dobson

"Where was this magnificent volume when I first began my practice? Dr. Abrams has skillfully woven a brilliant understanding of genetic and evolutionary psychology into diagnostic and treatment interventions for the beginning and experienced clinician. Bravo!"
Barry Lubetkin, Ph.D., ABPP
Past President, American Board of Behavioral Psychology

Dotson, K. (2012). A cautionary tale: On limiting epistemic oppression. *Frontiers: A Journal of Women Studies, 33,* 24-47.

Fisher-Borne, M., Cain, J. M., & Martin, S. L. (2015). From mastery to accountability: Cultural humility as an alternative to cultural competence. *Social Work Education, 34*, 165-181.

Holmes, E. A., Craske, M. G., & Graybiel, A. M. (2014). Psychological treatments: A call for mental-health science. *Nature News, 511*(7509), 287.

Holmes, E. A., Ghaderi, A., Harmer, C. J., Ramchandani, P. G., Cuijpers, P., Morrison, A. P., Roiser, J., P., Bockting, C. L. H., O'Connor, R. C., Shafran, R., Moulds, M., L., & Craske, M. G. (2018). Psychological Treatments Research in Tomorrow's Science: Seeing Further. *The Lancet Psychiatry, 5*(3), 237-286.

Kryza-Lacombe, M., Richards, E., Hansen, N., & Goldin, P. (2021). Integrating neuroeducation into psychotherapy practice: Why and how to talk to patients about the brain. *the Behavior Therapist, 44*(7), 361-370.

Laky, Z., & Szkutak, A., & Fang, A. (2021). Toward a more inclusive neuroscience-informed treatment of OCD: A clinical case example. *the Behavior Therapist, 44*(7), 340-345.

National Center for Education Statistics (2019). Integrated Postsecondary Education Data System (IPEDS), IPEDS Spring 2019, Human Resources component. Retrieved August 27, 2021, from https://nces.ed.gov/programs/digest/d19/tables/dt19_315.20.asp.

Peckham, A. D. (2021). Why don't cognitive training programs transfer to real life? Three possible explanations and recommendations for future research. *the Behavior Therapist, 44*(7), 357-360.

Sherrill, J., & Talkovsky, A. (2021).Translational, psychosocial research: Prospects for advancing understanding of mental illness trajectories and facilitating interventions across the lifespan. *the Behavior Therapist, 44*(7), 335-340.

Strege, M., Persons, J., Ressler, K., Krawczak, R., Fang, A., Goldin, P., & Siegle. G. (2021). Integrating neuroscience into clinical practice: Current opinions and dialogue between Drs. Jacqueline Persons and Kerry Ressler. *the Behavior Therapist, 44*(7), 326-334.

Young, K. S., & Craske, M. G. (2018). The cognitive neuroscience of psychological treatment action in depression and anxiety. *Current Behavioral Neuroscience Reports, 5*(1), 13-25.

. . .

The authors have no conflicts of interest to disclose. AF receives research funding from the National Institute of Mental Health (K23109593). KSY is supported by MQ; Transforming Mental Health (MQF20/24) and the National Institute for Health Research (NIHR) Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and King's College London. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.

Address correspondence to Angela Fang, Ph.D., 3751 West Stevens Way NE, Seattle WA 98195; angfang@uw.edu

SPECIAL ISSUE ARTICLE

Integrating Neuroscience Into Clinical Practice: Current Opinions and Dialogue Between Drs. Jacqueline Persons and Kerry Ressler

Marlene V. Strege, *University of Pittsburgh School of Medicine*

Jacqueline B. Persons, *Oakland Cognitive Behavior Therapy Center and University of California at Berkeley*

Kerry J. Ressler, *McLean Hospital and Harvard Medical School*

Rebecca A. Krawczak, *University of Pittsburgh Medical Center*

Angela Fang, *University of Washington*

Philippe Goldin, *University of California Davis*

Greg J. Siegle, *University of Pittsburgh School of Medicine*

THERE IS A WIDESPREAD belief that neuroscience represents a "next frontier" for psychology, and also widespread reluctance to adopt neuroscience principles in treatment, leading to enthusiasm for this discipline with often little clinical translation (Arbuckle et al., 2017; Cooper et al., 2019). Consistent with this, psychiatry residency training directors have reported an increase in neuroscience content in residency curricula but also a perception of the relevance of neuroscience to clinical practice in the future, rather than in the present (Roffman et al., 2006). Here, we assess the nature of this gap and begin to create bridges across it by (a) surveying mental healthcare professionals' attitudes toward neuroscience and its clinical use and (b) describing a dialogue between a clinical practitioner and a translational neuroscientist as they consider the survey's results.

Why Neuroscience

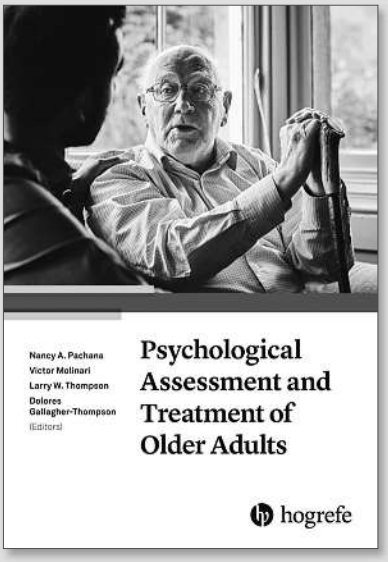
Advances in neuroscience have increased our understanding of neural correlates of mental illness and treatment, providing opportunities for integrating this knowledge into a biopsychosocial approach to clinical practice (De Raedt, 2020). Neuroscience can inform procedural aspects of existing interventions or indicate novel treatments. For example, neuroscience findings have led to optimized approaches to exposures for anxiety (Kircanski et al., 2012) as well as new interventions that directly target neural functioning, such as deep brain stimulation or transcranial magnetic stimulation (Lewis et al., 2016). Neuroscience knowledge can also inform a biopsychosocial integrated case formulation and psychoeducation for patients (Cooper et al., 2019; Lebowitz & Ahn, 2015; Ross et al., 2017). For example, for a patient with childhood trauma, a case formulation may include a prolonged stress response associated with dysregulation of related neurobiological circuits (e.g., hypothalamic-pituitary-adrenal axis) following early trauma (Ross et al., 2017).

Expert guidance on working psychologically with older adults

"An important and timely book with a stellar roster of contributors to address key topics regarding mental health practice with older adults."

Daniel L. Segal, PhD, Department of Psychology, University of Colorado at Colorado Springs, CO, USA

New



Nancy A. Pachana / Victor Molinari / Larry W. Thompson / Dolores Gallagher-Thompson (Eds.)

Psychological Assessment and Treatment of Older Adults

2021, xiv + 266 pp.
US $59.00
ISBN 978-0-88937-571-0
Also available as eBook

Mental health practitioners are encountering an ever-growing number of older adults and so an up-to-date and comprehensive text addressing the special considerations that arise in the psychological assessment and treatment of this population is vital.

This accessible handbook does just that by introducing the key topics that psychologists and other health professionals face when working with older adults. Each area is introduced and then the special considerations for older adults are explored, including specific ethical and healthcare system issues. The use of case examples brings the topics further to life. An important feature of the book is the interweaving of diversity issues (culture, race, sexuality, etc.) within the text to lend an inclusive, contemporary insight into these important practice components. The Pikes Peak Geropsychology Knowledge and Skill Assessment Tool is included in an appendix so readers can test their knowledge, which will be helpful for those aiming for board certification in geropsychology (ABGERO).

This an ideal text for mental health professionals transitioning to work with older clients, for those wanting to improve their knowledge for their regular practice, and for trainees or young clinicians just starting out.

www.hogrefe.com

hogrefe

Patient-provider discussions of etiology may include neural vulnerabilities, such as amygdala reactivity (Stevens et al., 2017), among other contributing factors. Discussions regarding therapy mechanisms may draw on neuroscience evidence of neural plasticity, changes in the brain as a result of psychosocial treatment, and may include functional changes of neural processes associated with cognitive control and regulation of negative emotions (Porto et al., 2009; Ross et al., 2017).

Why Reluctance

Although neuroscience knowledge has value in clinical practice and research, several obstacles impede its use by providers, including terminology differences among researchers and clinicians (Siegle et al., 2019), reported need for additional training in neuroscience (Fung et al., 2015), concern regarding patient beliefs that biological entities cannot change (Gershkovich et al., 2018), and concern regarding the validity and reliability of neuroscience observations (Dubois & Adolphs, 2016).

The Current Project

In an effort to reduce obstacles to integrating neuroscience into clinical practice, the project objective is to inform and encourage continued inter-stakeholder discussion. Interviews of neuroimaging and mental health stakeholders have identified differing perspectives regarding the clinical application of neuroscience (Anderson et al., 2013). In light of diverging stakeholder perspectives, additional empirical data as well as a discussion between stakeholders in a public format, to encourage a climate of transparency and reciprocity (Illes et al., 2010), may be beneficial. For the current project, we surveyed mental healthcare professionals' attitudes toward neuroscience and its clinical use and provided survey results to inform a dialogue between a translational neuroscientist and a clinical practitioner. The neuroscientist-practitioner dialogue provides bi-directional opportunities for continued progress toward translation, as neuroscience findings can inform clinical practice and clinical observations can inform clinically relevant neuroscience.

The project was specific to Association for Behavioral and Cognitive Therapies (ABCT) affiliates, as discussions regarding neuroscience's role in clinical practice and research have been ongoing within the organization, with diverse opinions represented. One salient example of ABCT's diversity of opinions was a public discourse on the topic spanning articles of *the Behavior Therapist.* A 2015 special issue of *the Behavior Therapist*, entitled "The Biomedical Model of Psychological Problems," included a series of articles that highlighted limitations and controversies with neurobiological research and its application to clinical practice and the larger clinical psychology discipline (Deacon & McKay, 2015). The Neurocognitive Therapies and Translational Research (NTTR) Special Interest Group (SIG) later provided a public response to the criticisms presented in that special issue and outlined opportunities for integrating neurobiology into psychological research and treatments (Price et al., 2015). The 2015 discourse on the integration of neuroscience into clinical research and practice is just one example among a number of other articles within *the Behavior Therapist* expressing critical or favorable views on the topic (Feldman, 2002; Hickey, 2014; Hsu, 2017; Ilardi, 2002; Kircanski, 2017; Pearson et al., 2017; Richards et al., 2011; Richey et al., 2013). To our knowledge, despite seemingly diverse opinions present within ABCT, no survey regarding the clinical application of neuroscience has been administered within the organization. Thus, the organization's landscape of opinions is unknown.

Survey

To obtain information about ABCT affiliates' knowledge of and attitudes regarding neuroscience, we administered an anonymous survey on neuroscience and its application to clinical practice. The survey contained demographic and multiple-choice questions pertaining to neuroscience research and its clinical translation, prior clinical experiences, and clinician identity. For developing the survey, NTTR SIG leadership generated a list of potential questions, and the discussants decided which questions would be included. Survey questions are listed in the online supplementary document (https://www.neurocognitive-therapies.com/the-behavior-therapist). Members of the NTTR SIG leadership later wrote multiple-choice options for the questions. For recruitment of survey responses, we sent emails to the ABCT list serve and ABCT's Dissemination and Implementation (DIS) SIG list serve. We included the DIS SIG list serve in recruitment because multiple survey questions asked opinions about implementation. The emails contained a brief study description and link to the anonymous survey. We also posted a study description and survey link to ABCT's Twitter and Facebook pages. The University of Pittsburgh's Institutional Review Board approved survey administration. We obtained survey responses from 109 mental healthcare professionals affiliated with ABCT. Figure 1 provides a summary of survey responses; author impressions of responses are presented alongside related sections of discussant dialogue. More detailed results are available in online materials (https://www.neurocognitive-therapies.com/the-behavior-therapist).

Survey results as well as discussant and author impressions of results should be considered in light of methodological limitations such as small sample size and potential for selection bias. The sample (N = 109) is a small subset of ABCT affiliates. For comparison, the ABCT social media platforms used in recruitment have between 9,000 to over 13,000 followers, suggesting the sample represents less than 1% of the population of interest. In addition to small sample size, survey responses may be subject to selection bias, as people who are interested in neuroscience may be more likely to participate in a survey about neuroscience, resulting in more favorable responses. In an effort to obtain more representative results, recruitment emails and posts included neutral language, with the purpose stated as "to understand mental healthcare professionals' attitudes toward neuroscience and neuroscience-informed clinical interventions." In addition, we chose recruitment sources we believed to be more neutral regarding the topic and did not recruit from the NTTR SIG's social media accounts or list serve. Despite methodological limitations, survey results provide a preliminary assessment of opinions among ABCT affiliates and an opportunity for continued inter-stakeholder dialogue.

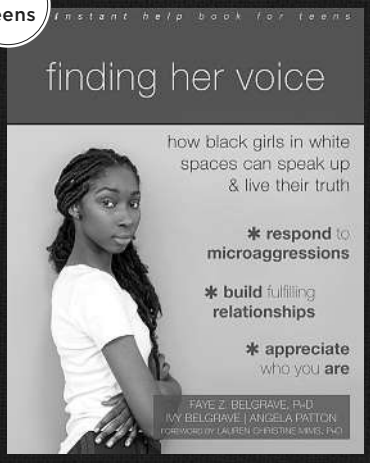
Discussants

Jacqueline B. Persons, Ph.D.

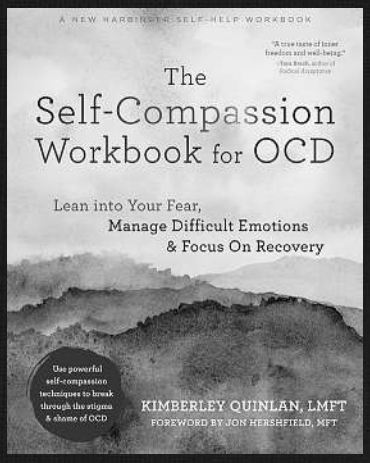
Dr. Jaqueline Persons is the founder and Director of the Oakland Cognitive Behavior Therapy Center and Clinical Professor in the Department of Psychology at the University of California at Berkeley. Dr. Persons is a private practitioner, clinical researcher, teacher, supervisor, consultant, and author. She specializes in CBT for anxiety and mood disorders, and provides training in CBT and consultation for clinicians. She conducts research studying the

Essential Resources
for Your Practice

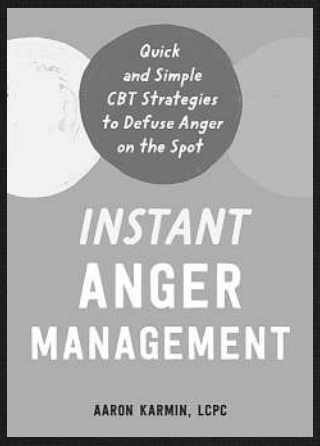
For Teens



ISBN: 978-1684037407 | US $16.95



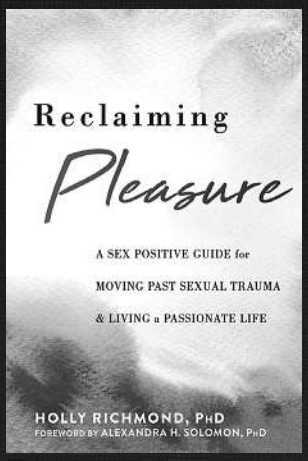
ISBN: 978-1684037766 | US $24.95



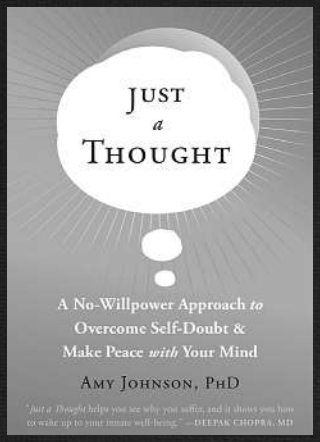
ISBN: 978-1684038398 | US $14.95

For Teens

ISBN: 978-1684037056 | US $16.95



ISBN: 978-1684038428 | US $18.95



ISBN: 978-1684038183 | US $15.95

newharbingerpublications

1-800-748-6273 | newharbinger.com

Learn more about evidence-based continuing education and training with PRAXIS **praxiscet.com**

Download a FREE e-book of our most popular tips: **newharbinger.com/quicktips**

change process and outcome of naturalistic CBT. She has authored three books on case formulation and CBT techniques more broadly. She is a past president of ABCT and the Society for a Science of Clinical Psychology.

Kerry J. Ressler, M.D., Ph.D.

Dr. Kerry Ressler is the Chief Scientific Officer and James and Patricia Poitras Chair in Psychiatry at McLean Hospital and a professor of psychiatry at Harvard Medical School. In his administrative roles, he oversees McLean Hospital's research enterprise and works toward increasing the hospital's integration of neurobiological research and clinical care. Dr. Ressler has published over 400 research manuscripts related to translational neuroscience, spanning molecular neurobiology, genetics, and neural functioning as it relates to fear processing and anxiety/stress disorders. He is a member of the National Academy of Medicine, is a past president of the Society for Biological Psychiatry, and is president-elect for the American College of Neuropsychopharmacology (ACNP).

Editing Process

MS edited the dialogue text to (1) organize it thematically, (2) remove text that was not relevant to primary themes, and (3) remove text around interjections from other attendees (GS, AF, MS). Summaries of survey results precede related sections of dialogue. Summary statements represent author (MS) impressions of descriptive estimates (valid percent). Summaries describe ABCT affiliates' knowledge of neuroscience and opinions regarding neuroscience research, clinician identity, prior clinical experiences, and practical considerations in neuroscience implementation.

Dialogue Between Drs. Persons and Ressler

First Impressions of Survey Results

Survey summary: *The majority of participants are knowledgeable of neuroscience, believe neuroscience is not outside the scope of mental health practice, and believe neuroscience aligns—at least moderately—with their clinician identity.*

Persons: It was encouraging to see people's openness and receptiveness to neuroscience on the whole, which sounds like a contrast to *the Behavior Therapist* article and opinions from some years ago. An initial thought I have is that the question of "Are we receptive to findings from neuroscience?" is actually a larger issue, which is, "Are we receptive to all of the information that is available? Or do we need to hide ourselves from some of it?" That whole approach is unappealing to me, and I'm surprised that it would be appealing to scientists more generally. So, this openness and receptiveness seems important, both to the content area of neuroscience but also to learning and development, case conceptualization and understanding our patients, and understanding psychopathology more generally. The more we understand it, and of course neuroscience can add to our understanding, the more ability we will have to treat psychopathology effectively.

Ressler: I, similarly, was pleasantly surprised by what I felt was a very positive overall response. It made me wonder if prior perspectives were specific to ABCT's history or represent the split from the psychodynamic versus biological psychiatry movement in the 60's and 70's. It is true that early in the biological psychiatry movement, we understood very little about neuroscience. A model in which the brain is a "bag of chemicals" and you "take an SSRI to correct a chemical imbalance" isn't accurate, nor is it a particularly useful model for understanding cognitive behavior therapy. But now that we have a much better understanding of neural circuits of emotion regulation, cognition, extinction, threat, and reward, we can start to have languages that are very similar across therapy and neuroscience approaches. There is the opportunity now for complementarity of fields that didn't exist—at least to this extent—20 years ago and certainly not 30 to 40 years ago.

Discussing Neuroscience Findings With Patients

Survey summary: *The majority of participants discuss neuroscience findings related to emotion regulation and psychiatric disorders with patients, and the primary observed benefits are increased patient understanding and application of skills and increased engagement in treatment. Opinions are mixed regarding its effect on patient stigma.*

Ressler: There is a lot of power in psychoeducation for patients, to say "This is why we use this approach, because this is the way people's brain and behavior work." We can talk at the surface level about data on threat learning and extinction. "This is conserved across all mammals, a thing that we've evolved to do to keep us safe. Anxiety is an example where it goes awry, and these are the kinds of circuit mechanisms underlying fear and anxiety." I think that gives a lot of validity for a patient to then have more buy-in to the therapeutic process because they can appreciate the broader picture.

Persons: It reminds me of one of my patients with a history of childhood sexual abuse. The amount of shame that she has about her symptoms is just kind of overwhelming. So, when I talk to her about neural pathways, and "your brain learned to do this, and so of course, it does do it, and your experience fits with what we know about what happens with children who are exposed to these types of events. What you're experiencing is, from that point of view, totally normal." That idea is so grounding to her, and it's so helpful and therapeutic. I wish I knew more and that I could tell her more than just that, but that's what I've got. It's very helpful to her.

Ressler: I think in the same way, for people who might be in treatment and not engaged, for example with diabetes or hypertension or other illnesses that we know result from environment and biological interactions, the patient and clinician often know that there are things they could do to help improve their health, such as diet, exercise, and medication. There doesn't have to be shame and guilt about it, it's like "this is a disease, and this is what we do for it." As we understand our psychiatric and psychological issues and the circuits involved in similar ways, I think that will also create more power for patients, as you said.

Persons: Yeah, and it's very anti-shaming. It's like "Oh, these are the mechanisms and they work like that, and that's just how it is."

Response to Insufficient Empirical Support as Communication Obstacle

Survey summary: *The primary obstacle to communicating neuroscience with patients is insufficient empirical support.*

Ressler: One of the areas of neuroscience we know the most about is neuroplasticity and synaptic change and axonal change. For example, with CBT and trauma, there is a lot of evidence from animals to humans, of both dynamic changes in synapses as well as long-term structural

changes regarding top-down regulatory circuits—the cortical areas that interact with and regulate the emotional areas. There's a lot of evidence about how trauma disrupts such circuits, and how addiction disrupts them, and how rebuilding those networks and neural processes through therapy actually changes some of that connectivity at a functional level, and even at a structural level. I think there's a number of papers that would be good for people to be able to know about, that show pre- and post-therapy neuroimaging both at a structural and functional level, for example. Just talk therapy rewires and changes the functional process of the brain. I think that could be a very powerful thing for people to be aware of and use in their communication with patients.

Persons: Absolutely. What I need as a clinician is more access to those papers because I don't read the neuroscience literature, so if there is some way where you all could write some review papers for *tBT* or post information about them on your SIG's website to highlight those articles, that could be so helpful for clinicians. I need that information and more access to it to be able to use it, but the kind of evidence that you are describing, Kerry, is just the information clinicians need!

Neuroscience Resources for Clinicians and Next Steps For Integration

Survey summary: Another commonly reported obstacle to communicating neuroscience with patients is uncertainty regarding how to provide information.

Ressler: In terms of next steps, identifying ways for bringing useful neuroscience training in bite-size packages to therapists is going to be important. The NNCI, the National Neuroscience Curriculum Initiative (nncionline.org), was put together by a number of psychiatrists focusing on the same problem that we're having in residency training. Even though residents and psychiatrists have medical training and have more of a biological training than most Ph.D. therapists, nobody can keep up with neuroscience unless one is a Ph.D. neuroscientist, and even we can't keep up with the literature because it's rapidly and exponentially growing. In trying to figure out how to better train residents, the NNCI program put together a lot of specific—both small and large—curricula, podcasts, and many things trying to bring together topics such as: "What's the big question?" "How would an expert in the field talk about it?" "What are some critical experiments so that one could get good knowledge and trustworthy knowledge in bite-sized packages that would be useful for therapists and patients?" I think that's one good model, and it would be great to think of ways to integrate that model into the therapy and psychology communities.

Persons: That sounds like a super useful thing. When I was first approached for this interview, I said, "Well, I'm not sure I'm the best person to interview, because I don't know anything about neuroscience!" Then Dr. Siegle told me I know as much as most therapists. But I just have little bits and pieces of knowledge, and I would like to have more. Maybe because I am interested in case conceptualization and the change process in treatment, I'm especially interested in change mechanisms. For example, if I am doing exposure-based treatment, and my goal is to accomplish expectancy violation, then what are the indices of

change in my patient that I'm looking for and what neuroscience mechanisms are underpinning that? Because, if I understand that, it's going to help me understand better the whole change process. The better the understanding I have of the change process, the more power I'm going to be having to notice when it's going awry, whether we are making good progress, whether the patient is learning the right thing.

Ressler: It sounds like it would be helpful having a resource that had relatively brief summaries of why it matters and then the full paper for people to read if they want. At least reporting that this is the literature that has been peer-reviewed, and it's robust, could help in telling these stories and having a better understanding of these processes. And then, there's other things like ketamine and other drugs that can enhance cognitive processing and enhance synaptic plasticity, which may allow enhancement of either the rapidity of exposure therapy, learning, or expectancy violation, or help conquer learning ties more fully. That is the theory behind combining ketamine with PTSD psychotherapy, that maybe it's actually enhancing plasticity and thus enhancing the therapeutic learning process.

Persons: Oh my goodness! See, now as soon as you tell me that, I have to get these papers. I am one of these people who's hungry for knowledge. I just need the information. It sounds like there's some other people who aren't sure they want the information or that it's helpful to them. Although, the survey results are encouraging in that regard.

Ressler: My guess is that hesitancy to combine neuroscience and therapy is less about active avoidance, but instead, more find it scary or they think they're not going to have time to learn this whole literature. "I don't want to know just enough of something that then can be dangerous by telling my patients the wrong thing." I think it's partly having the right resources that they can trust.

Evidence Needed for Neuroscience Integration

Survey summary: *For neuroscience integration, the most common reported type of sufficient evidence were multiple randomized controlled trials (RCTs) and endorsement by a psychological society for treatments; prediction in clinical samples and relationship with standard measures were most common for assessments.*

Persons: To me, some of the most compelling evidence is mechanism studies of the sort that Kerry is describing, that is, studies that show neural plasticity, and changes in brain mechanisms following cognitive and behavioral interventions. Those, to me, are especially compelling, and not the same as randomized trials, and far superior to endorsement by professional societies. I personally am very suspicious of endorsements. I'm exaggerating perhaps when I use the word "suspicious," but what I mean is, I'm not interested in proof by authority. I'm interested in the data. But I want some studies of mechanism change during treatment. That would be the kind of evidence that would be especially appealing to me, but it wasn't one of the response options on the survey.

Ressler: Yeah, and I wonder if we're conflating things in the way the question was interpreted as, "if there were a new treatment that was neuroscience-based, would you use it?" And then yes, I think it's the right answer—you want to have RCTs to support the new treatment approach. But I really think there's two conversations, or I guess three buckets, right? There's a bucket of, "if there's data that enhances one's understanding of mechanism of what you're currently doing for the therapists, would this help you in how you talk about it to the patient?" Separately, "would this kind of data help the patient for better understanding what's happening to them and maybe enhance their alliance?" And then, third, "will understanding lead to new treatments in which therapies, and other kinds of biological-somatic interventions, could be combined for new approaches?" I think all of those are useful, but they may have interpreted that question as a bit of all three of those. I guess the flipside would be, "do 91% of people believe that there must be an RCT of knowing if neuroscience information is useful or not before they talk to their patients about neuroscience, the prefrontal cortical-amygdala circuits, the top-down regulation and extinction of exposure therapy. So then what would the trial be?" I guess you could have a group of therapists that just talk about "general psychology" principles versus those who talk about neuroscience. You could do an RCT on that. Whether that's a fundable RCT or whether it's worthwhile, I'm not sure. But it seems like there should be a place for some sort of mechanistic understanding if it's supported in the right kind of mechanistic literature that could be helpful.

Different Empirical Standards: Neuro-Literacy vs. Neuroscience-Based Treatments

Survey summary: *"Multiple RCTs" is most commonly reported as the type of evidence sufficient for neuroscience integration into treatments. The question did not distinguish between neuro-literacy and neuroscience-based treatments.*

Persons: I think it's a helpful distinction, but I would flesh out the neuro-literacy notion to distinguish studies of change mechanisms in treatment, and studies of mechanisms driving symptoms of psychopathology, which are different things. Both types of evidence, but especially studies of change mechanisms in treatment, would be especially useful to me as a clinician. I would probably want randomized trials if I'm going to endorse or adopt a new treatment. But to have evidence or information about psychopathology and how it works, and treatments that I'm already using and how they work from a neuroscience point of view, I don't need randomized trials. It's hard to even think of what the randomized trial would be, as Kerry pointed out.

Ressler: Yeah, and I think another sort of nuance is there are going to be some areas for which science has made considerable advances, but others where we have much further to go. For example, you can point to a lot of the exact circuity behind the reflex in a panic attack that helps people understand why they have heavy breathing, why they are sweating, and why they are feeling like they have to run away and other panic/fear symptoms. Similarly, with addictive behavior—why the craving and the compulsion and how all of that works from a neuroscience perspective. From your earlier example, it can be very freeing to the patients who realize that this is the way my brain has become wired, as I've gotten stuck in these ruts. Again, the therapeutic mechanism of extinction may not be that downstream. It may be up-stream, top-down regulatory processes, but both of those could be very helpful. There are other kinds of disorders, schizophrenia, bipolar, and to some extent personality disorders, that we don't even know or have much neuroscience about, so we might have to be

more agnostic on those since the field just is not as far along yet with those disorders.

Concluding Statements

Persons: I think neuroscience has great potential for helping us do better clinical work. I'm happy to see this translational effort going forward. Getting information about neuroscience to clinicians can increase the help we give to our patients.

Ressler: I very much agree with that. For me, the concluding remark would be that while we absolutely have a long way to go—we certainly don't have an understanding of the neuroscience of all behavior, of all psychopathology and all treatments by any means—the field is in a very different place than we were even just a couple decades ago in terms of having useful, explanatory neuroscience models that are well-supported by data. I do think some of this knowledge would be helpful to both the therapy community and to patients, both in reducing stigma and self-blame and in increasing treatment alliance by understanding these processes. Not to mention that once this conversation starts, I think it will then leverage and excite a lot more translationally relevant collaborations that I think will then help the next generation of neuroscience. I am very optimistic.

Survey and Dialogue Takeaways

Findings from the survey and inter-stakeholder dialogue highlight important considerations and practical recommendations for integrating neuroscience into clinical practice. One project takeaway is the importance of neuroscience educational resources for both providers and patients. Many participants reported having at least some knowledge of neuroscience with openness toward learning more. Dr. Persons similarly expressed interest and receptivity toward clinically relevant neuroscience findings in an accessible format. In an effort to provide more accessible education/training materials, we provide online resources (clinician-oriented neuroscience article repository, link to NNCI trainings mentioned in the dialogue, and videos of neuroscientists talking of the clinical relevance of their work) for interested readers (https://www.neurocognitive-therapies.com/the-behavior-therapist). In addition, incorporating neuro-literacy in patient care stood out as one immediate opportunity for clinical translation. Dr. Ressler provided several specific examples for incorporating neural processes of psychopathology and treatment-related changes in patient psychoeducation. Similarly, the majority of participants stated that they had communicated neuroscience with patients in the past and had observed benefits. The survey and dialogue also emphasize the importance of bi-directional inter-stakeholder feedback in translation efforts. Dr. Ressler highlighted that advances in the neuroscience of clinical phenomena such as extinction, reward, and emotion regulation have provided new opportunities for a complementarity of fields via a shared language. To capitalize on new opportunities for inter-field communication, it is important to receive clinician feedback and work to understand and communicate neuroscience findings in a clinical science framework. Consistent with this, Dr. Persons expressed wanting to understand the neural processes of expectancy violation to inform her exposure work for patients with anxiety, and participants expressed interest in research of treatment-related neural changes. The dialogue on defining sufficient evidence for integrating neuroscience highlights important areas for continued inter-stakeholder discussion regarding what research is needed for clinician use and what "integrating neuroscience into clinical practice" encompasses.

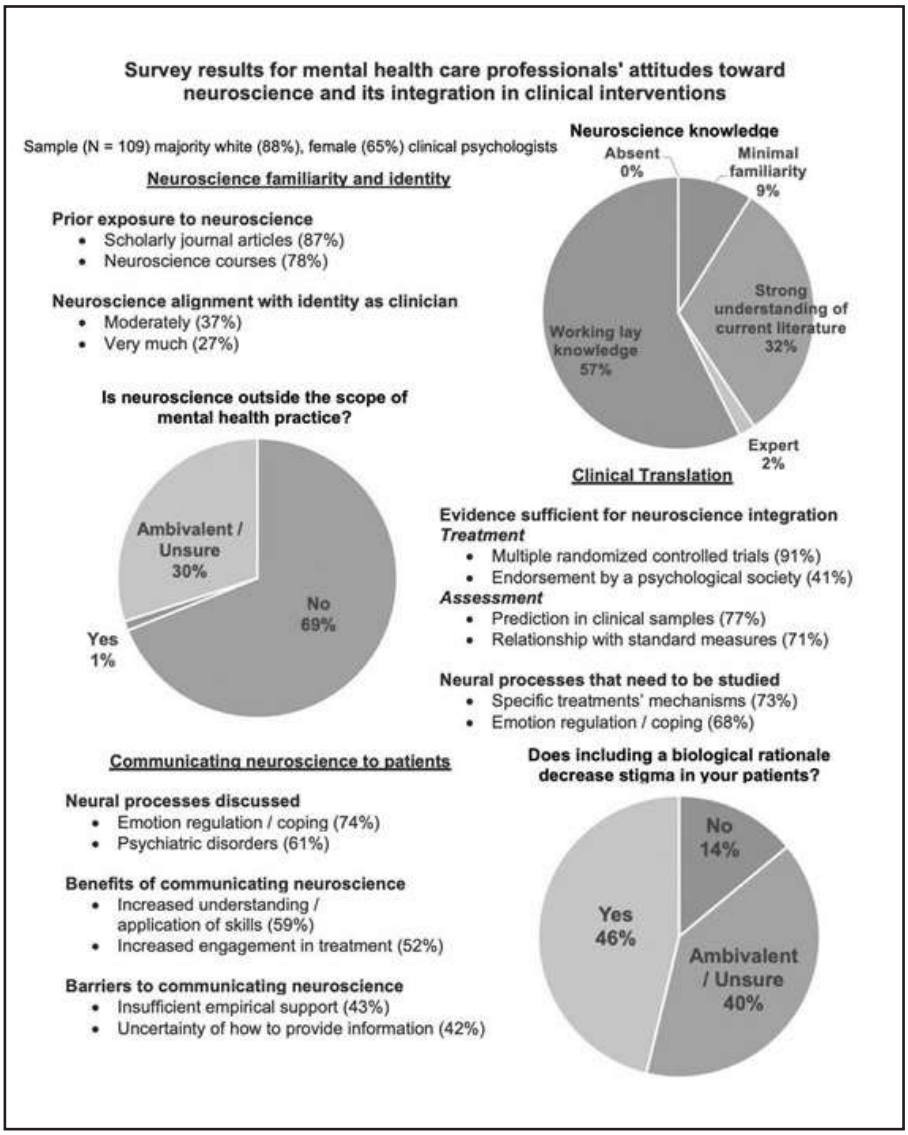


Figure 1. Summary of survey responses

References

Anderson, J. A., Mizgalewicz, A., & Illes, J. (2013). Triangulating perspectives on functional neuroimaging for disorders of mental health. *BMC Psychiatry, 13*, 208.

Arbuckle, M. R., Travis, M. J., & Ross, D. A. (2017). Integrating a Neuroscience Perspective Into Clinical Psychiatry Today. *JAMA Psychiatry , 74*(4), 313–314.

Cooper, J. J., Korb, A. S., & Akil, M. (2019). Bringing Neuroscience to the Bedside. *FOCUS, 17*(1), 2–7.

Deacon, B., & McKay, D. (Eds.). (2015). The biomedical model of psychological problems [Special issue]. *the Behavior Therapist, 38*(7), 169–243.

De Raedt, R. (2020). Contributions from neuroscience to the practice of Cognitive Behaviour Therapy: Translational psychological science in service of good practice. *Behaviour Research and Therapy, 125*, 103545.

Dubois, J., & Adolphs, R. (2016). Building a Science of Individual Differences from fMRI. *Trends in Cognitive Sciences, 20*(6), 425–443.

Feldman, D. B. (2002). Functionalism in Cognitive Neuroscience and Radical Behaviorism: Narrowing the Focus of Debate. *the Behavior Therapist, 25*(4), 73–78.

Fung, L. K., Akil, M., Widge, A., Roberts, L. W., & Etkin, A. (2015). Attitudes toward neuroscience education in psychiatry: a national multi-stakeholder survey. *Academic Psychiatry, 39*(2), 139–146.

Gershkovich, M., Deacon, B. J., & Wheaton, M. G. (2018). Biomedical causal attributions for obsessive-compulsive disorder: Associations with patient perceptions of prognosis and treatment expectancy. *Journal of Obsessive-Compulsive and Related Disorders, 18*, 81–85.

Hickey, P. (2014). Prescriptive authority and the medical model. *the Behavior Therapist, 37*(6), 158–162.

Hsu, K. (2017). The Role of Neuroscience in Psychological Interventions: Take-Aways from the 50th Annual Convention of ABCT. *the Behavior Therapist, 40*(1), 26-28.

Ilardi, S. S. (2002). The cognitive neuroscience framework and its implications for behavior therapy: Clarifying some important misconceptions. *the Behavior Therapist, 25*(4), 87–90.

Illes, J., Moser, M. A., McCormick, J. B., Racine, E., Blakeslee, S., Caplan, A., Hayden, E. C., Ingram, J., Lohwater, T., McKnight, P., Nicholson, C., Phillips, A., Sauvé, K. D., Snell, E., & Weiss, S. (2010). Neurotalk: improving the communication of neuroscience research. Nature Reviews. *Neuroscience, 11*(1), 61–69.

Kircanski, K. (2017). A conversation with Dr. Joshua Gordon, Director of NIMH. *the Behavior Therapist, 40*(2), 45-48.

Kircanski, K., Lieberman, M. D., & Craske, M. G. (2012). Feelings into words: Contributions of language to exposure therapy. *Psychological Science, 23*(10), 1086–1091.

Lebowitz, M. S., & Ahn, W.-K. (2015). Emphasizing Malleability in the biology of depression: Durable effects on perceived agency and prognostic pessimism. *Behaviour Research and Therapy, 71*, 125–130.

Lewis, P. M., Thomson, R. H., Rosenfeld, J. V., & Fitzgerald, P. B. (2016). Brain Neuromodulation Techniques: A Review. *The Neuroscientist, 22*(4), 406–421.

Pearson, R., Pisner, D., & Beevers, C. G. (2017). Translational research in mental health: Challenges and opportunities. *the Behavior Therapist, 40*(8), 302–312.

Porto, P. R., Oliveira, L., Mari, J., Volchan, E., Figueira, I., & Ventura, P. (2009). Does cognitive behavioral therapy change the brain? A systematic review of neuroimaging in anxiety disorders. *The Journal of Neuropsychiatry and Clinical Neurosciences, 21*(2), 114–125.

Price, R. B., Ellard, K. K., Weissman, A. S., Deckhersbach, T., Mohlman, J., De Raedt, R., & Siegle, G. J. (2015). Response to the special issue: Comment on The Biomedical Model of Psychological Problems. *the Behavior Therapist, 38*(8), 259–260.

Richards, J. M., Lee, M. R., & Daughters, S. B. (2011). Why should clinical researchers care about cognitive affective neuroscience? *the Behavior Therapist, 34*(7), 123–132.

Richey, J. A., Ellard, K. K., Siegle, G. J., Price, R. B., Mohlman, J., de Raedt, R., Browning, M., & As., W. (2013). Closing the gap between science and practice: Report from the Neurocognitive Therapies/ Translational Research (NT/TR) Special Interest Group. *the Behavior Therapist, 34*(7).

Roffman, J. L., Simon, A. B., Prasad, K. M., Truman, C. J., Morrison, J., & Ernst, C. L. (2006). Neuroscience in psychiatry training: how much do residents need to know? *American Journal of Psychiatry, 163*(5), 919–926.

Ross, D. A., Arbuckle, M. R., Travis, M. J., Dwyer, J. B., van Schalkwyk, G. I., & Ressler, K. J. (2017). An Integrated Neuroscience Perspective on Formulation and Treatment Planning for Posttraumatic Stress Disorder: An Educational Review. *JAMA Psychiatry , 74*(4), 407–415.

Siegle, G. J., Cramer, A. O. J., van Eck, N. J., Spinhoven, P., Hollon, S. D., Ormel, J., Strege, M., & Bockting, C. L. H. (2019). Where are the breaks in translation from theory to clinical practice (and back) in addressing depression? An empirical graph-theoretic approach. *Psychological Medicine, 49*(16), 2681–2691.

Stevens, J. S., Kim, Y. J., Galatzer-Levy, I. R., Reddy, R., Ely, T. D., Nemeroff, C. B., Hudak, L. A., Jovanovic, T., Rothbaum, B. O., & Ressler, K. J. (2017). Amygdala Reactivity and Anterior Cingulate Habituation Predict Posttraumatic Stress Disorder Symptom Maintenance After Acute Civilian Trauma. *Biological Psychiatry, 81*(12), 1023–1029.

. . .

The authors have no conflicts of interest or funding to disclose.

Correspondence to Marlene Strege, Ph.D., Western Psychiatric Institute and Clinic, 3811 O'Hara St., Pittsburgh, PA 15213-2593; stregem@upmc.edu

Translational, Psychosocial Research: Prospects for Advancing Understanding of Mental Illness Trajectories and Facilitating Interventions Across the Lifespan

Joel Sherrill and Alexander Talkovsky,
National Institute of Mental Health

IN ONE OF HIS EARLY Director's Messages, Dr. Joshua Gordon (2017), Director of the National Institute of Mental Health (NIMH), addressed NIMH priorities for psychosocial intervention research. Specifically, the post focused on applying an experimental therapeutics approach to psychosocial intervention development and testing. Dr. Gordon's Director's Message acknowledged gaps in our intervention armamentarium, emphasized the limited pipeline of emerging, novel interventions, and highlighted psychosocial interventions as a critical part of our toolset. The commentary also highlighted how NIMH's priorities for research focused on understanding psychopathology and intervention development testing are consistent with best practices that characterize clinical psychological science. For example, both perspectives share a mechanism-based approach to understanding risk, etiology, maintenance, and course of psychopathology in the service of identifying potentially mutable targets for intervening. Both approaches involve applying intervention strategies that map onto the putative targets to determine whether manipulation of the targets leads to clinical improvement. And in both approaches, the focus is on not only testing whether interventions work, but also on interrogating the underlying disease mechanisms and therapeutic change mechanisms.

The current commentary expands on how clinical psychological science perspectives and translational research approaches are relevant to NIMH's research priorities, as summarized in the NIMH Strategic Plan (2021; https://www.nimh.nih.gov/about/strategic-planning-reports). The sections that follow highlight selected examples of NIMH-supported research involving psychosocial type I translational research across the spectrum of research spanning pre-intervention research focused on risk, etiology, maintenance, biomarkers and course of psychopathology, through intervention development, refinement and testing. It should be noted that, given the translational nature of the research programs described below, many of these efforts involve transdisciplinary collaborations and "team science" approaches that bring together complementary perspectives and collaborators with diverse training and expertise. Researchers trained in clinical psychological science are often well poised to pursue interdisciplinary research and collaborations, given opportunities for cross-training and collaborations in various subdisciplines of psychology within academic departments (e.g., cognitive-, developmental-, social- psychology as well as neuroscience) and within neighboring departments in colleges of arts and science and in a broad range of departments and disciplines that comprise schools of medicine. The examples that follow are not meant to be exhaustive. Rather, these examples illustrate how best practices, including translational approaches and innovative transdisciplinary collaborations, that characterize contemporary clinical psychological science are aligned with NIMH's priorities related to research focused on understanding mental illness trajectories across the lifespan and to research on intervention development and testing in the pursuit of prevention and cures, as highlighted in Goal 2 and Goal 3 of the NIMH Strategic Plan, respectively.

Understanding Psychopathology and Mental Illness Trajectories Across the Lifespan

Goal 2 ("Examine Mental Illness Trajectories Across the Lifespan") of the NIMH Strategic Plan recognizes that examining multiple risk and etiological factors across development through late life adds important depth to our understanding of mental illness. Objective 2.1 highlights priorities related to modeling neurocognitive and neurobehavioral trajectories of development. Objective 2.2 focuses on the identification and understanding of risk for, and markers and indicators of mental illness, to inform future improvements to clinical assessment and intervention. The following examples of NIMH-funded research use innovative methods for assessing neurodevelopmental and psychological trajectories across populations. These examples leverage multiple levels of analysis to contribute to understanding of brain-behavior relationships. NIMH highlights its interest in multimodal assessment through the Research Domain Criteria Initiative (RDoC). RDoC encompasses a wide range of constructs and levels of information. Notably, it is a research strategy and not a diagnostic, comprehensive, or prescriptive system. Rather, RDoC represents NIMH's interest in understanding the full range of neurological, biological, behavior, and psychological functioning across the lifespan. RDoC also encourages the use of multiple levels of analysis and team-based science to measure constructs of interest from multiple perspectives. Consistent with this spirit, NIMH welcomes grant applications from investigators who take dimensional approaches to psychopathology as many ABCT members do in their research, practice, and training. This approach to assessment spans areas of expertise making them accessible to a wide range of mental health researchers, and encouraging interprofessional collaboration.

Characterizing Neural, Cognitive, and Behavioral Trajectories Across the Lifespan

Multiple Levels of Behavioral Assessment Across the Lifespan

As described in Objective 2.1 of the Strategic Plan, NIMH encourages research aiming to improve understanding of trajectories of neurobehavioral and neuropsychological development. The focus of this objective is on characterizing risk for and resilience to mental illness across the entire lifespan. In a relevant NIMH-supported project (R21-MH-119823), Gibb and colleagues evaluate the effects of environment and development on socioemotional functioning during a sensitive period of infant development, with the ultimate goal of improving understanding of how maternal depression impacts socioemotional func-

tioning and risk of future depression in the child. They study attention biases in infants of depressed mothers or mothers with no lifetime history of depression using coded mother-infant interaction and computerized tasks. They also relate infant arousal to attentional avoidance of sad faces, and examine potential bidirectional interactions between mother and infant. This study offers an example of the use of objective measures without heavy reliance on imaging. Assessment methods such as psychophysiology and behavioral coding are accessible methods for a range of researchers. Further, perinatal mental health is a high priority area for NIMH to address needs in both adult and pediatric populations. For example, see a recent concept presented at the January 2020 meeting of the NIMH National Mental Health Advisory Council focused on "Prevention of Perinatal Depression: Improving Intervention Delivery for at-Risk Individuals" (NIMH, 2020b). Dyadic interactions are also understudied across NIMH (see NIH's Basic Behavioral and Social Science Opportunity Network for more information: https://oppnet.nih.gov/funding). This study is in line with NIMH's stated emphasis on the importance of studying psychopathology across the lifespan.

Novel Use of Technology in Integrative Behavioral Assessment of Psychopathology

Objective 2 of the NIMH Strategic Plan focuses on modeling mental illness across the lifespan. A study from Auerbach and colleagues (R01-MH-119771) uses multiple measures of potential risk factors to develop models predicting the course of remitted depression in adolescents. They use behavioral measures and event related potentials (ERP) to assess socioemotional processing, evaluate the relationship between socioemotional processing and remitted depression, and collect smartphone data to measure externally valid social behaviors. This is a novel and significant approach to prediction of risk for adolescent depression, recognizing that the course of depression extends beyond remission. Follow-up out to 1 year is uncommon but stands to provide important information about the course of remission often missed in clinical studies with shorter follow-up periods. This research elaborates on processes important to the development of adolescent depression and examines their effects beyond the acute and treatment stages to better understand course. Importantly, their methodology bridges the study of psychosocial development and neurobehavioral indicators. Studies of remitted depression are uncommon among funded NIMH research projects but could provide important information about recovery and trajectories given high relapse rates.

Understanding Risk Factors, Biomarkers, and Predictors of Mental Illness and Recovery

Evaluating Neurobehavioral Markers as Potential Treatment Targets

Consistent with Objective 2.2 of NIMH's Strategic Plan, a project led by Timpano and Worden (R21-MH-116131) evaluates a behavioral marker of an impairing mental illness and its potential moderators to inform translational models and identify potential targets for precision intervention. This research seeks to improve understanding of dysfunction related to a neurobehavioral deficit using multiple levels of analysis. This study of a sample of participants diagnosed with hoarding disorder examines the effects of value-based decision making, the impact of emotion in decision making, and explores predictors of the effects of distress and potential moderators of decision making. The research team achieves this using behavioral tasks and measures of psychophysiology as their key indicators of relevant constructs. This is another example of a study using objective measurement without reliance on neuroimaging, highlighting more methods available and accessible to many members of ABCT. Research such as this project has clear roots in experimental psychopathology and leverages related methodological strengths. Understanding processes underlying behavior has implications for future research into treatment, so grants like this are highly relevant to NIMH scientific priorities. Finally, this is a good example of the utility of the R21 exploratory/developmental grant mechanism for initiating a line of research and providing data to support a future large-scale grant.

Establishing Mechanisms of Psychopathology Using an Epidemiological Dataset

NIMH has interest in understanding the experiences of sexual and gender minorities and supports research to reduce health disparities (see "Funding Opportunities for Research on Disparities and Workforce Diversity"; NIMH, 2020c). Consistent with NIMH's priorities expressed in Goal 2 of the Strategic Plan, a study led by Pachankis and colleagues (R01-MH-118245) leverages a large epidemiological dataset and rigorous methods to improve understanding of mechanisms of mental illness in a vulnerable population. Specifically, the investigators leverage this dataset to explore potentially modifiable mechanisms of internalizing disorders during a critical stage of identity development in sexual minority young adults. Using self-report, behavioral (e.g., attention bias, avoidance), and dried blood spot measures collected from a large epidemiological cohort, this grant evaluates biopsychosocial mechanisms towards better understanding of disparities in psychopathology and how stigma-related stressors contribute. This study takes a transdiagnostic approach focusing on internalizing psychopathology, allowing a focus on cross-cutting processes in accordance with NIMH's Research Domain Criteria framework (NIMH, 2020d). This integrative and multimodal assessment offers an opportunity to develop a sophisticated model of transdiagnostic mental illness in this population.

Bridging Psychosocial and Neurocognitive Assessment of Psychopathology

Research by Eisenberger and Hornstein synthesizes social and neurobehavioral processes seeking to remediate shortcomings in a gold-standard treatment. This study (R21-MH-125274) tests a novel multimodal method to attenuate risk for psychopathology, falling within the interests NIMH specified in Goal 2 of the Strategic Plan. Integrating psychosocial and neuropsychological processes underlying mental illness risk and resilience, this grant examines the psychosocial factor of social support as a potential moderator of fear extinction and fear acquisition in participants with social anxiety disorder (SAD) in comparison to healthy controls. This study uses behavioral tasks to study a construct often measured neurally, illustrating how researchers of multiple backgrounds can engage in such research. Although this is a study of SAD, fear conditioning is a broadly applicable and widely studied concept; as such, studying fear conditioning and extinction has implications for multiple diagnostic categories. This is an appropriate use of the R21 mechanism; if successful, this research could enhance exposure therapies, which are often unsuccessful in fear disorders.

Intervention Development, Optimization, and Testing in the Pursuit of Prevention and Cures

Goal 3 ("Strive for Prevention and Cures") of the NIMH Strategic Plan acknowledges the need for both new interventions and for strategies that can be used to optimize and deploy both new and existing approaches to address heterogeneity in outcomes. Objective 3.1 highlights priorities related to translating advances in basic behavior, social, and neuroscience research into novel interventions, including psychosocial approaches. Objectives 3.2 and 3.3 address opportunities for tailoring, combining, and sequencing interventions to meet individual needs and for optimizing intervention effectiveness for delivery in community practice settings. The examples that follow highlight selected NIMH-supported projects grounded in psychosocial research programs that leverage translational approaches to inform the selection and assessment of intervention targets and strategies. These examples cover a spectrum of intervention science spanning novel intervention development, intervention optimization to boost overall effectiveness, augment approaches to address factors associated with diminished response, and strategies for combining and sequencing interventions for more targeted, personalized interventions. Support for Clinical Trials at NIMH (https://www.nimh.nih.gov/funding/opportunities-announcements/clinical-trials-foas) is primarily through a set of dedicated funding opportunity announcements (FOAs) that employ a mechanism-based, experimental therapeutics approach to novel intervention development, confirmatory efficacy testing, and effectiveness testing of preventive, therapeutic, and services interventions. (It should be noted that the initial intervention development activities in the descriptions of the Kofler, Harvey, and Medalia research programs were supported via an R34 funding mechanism that pre-dated the current set of clinical trials FOAs. Under the current set of NIMH clinical trials FOAs, initial intervention development activities that involve translating basic science into novel intervention targets or novel strategies are supported via a phased R61/R33 funding mechanism specifically focused on psychosocial intervention strategies).

Developing and Refining Interventions That Selectively Address Novel or Complementary Intervention Targets

Objective 3.1 of the NIMH Strategic Plan focuses on developing and optimizing interventions based on discovery and understanding from basic science. A series of studies from Kofler and colleagues illustrates a translationally informed, mechanism-based approach to refining strategies that selectively target fundamental cognitive functioning deficits in ADHD that are not explicitly addressed by traditional pharmacological and psychosocial interventions. Various cognitive training approaches have been proposed to address neuropsychological functioning deficits common among children with ADHD; however, meta-analyses suggest these interventions are not consistently associated with benefit (Rapport et al., 2013). Based on systematic reviews of the neurocognitive literature regarding specific working memory deficits most substantially associated with ADHD symptoms and impairment, in a series of NIMH-supported studies (R34-MH-102499; R01-MH-115048), Kofler and colleagues have developed and tested a translationally informed, computerized central executive training (CET) intervention that targets specific neurocognitive subcomponents of executive function. Results of a pilot trial comparing CET to behavioral parent training (BPT) provide promising evidence suggesting CET was superior to BPT for improving multiple facets of working memory, as measured by performance on untrained task-based measure. Moreover, CET was superior in terms of selected assessments using actigraphy-measured hyperactivity, and improvements in working memory correlated with reductions in objectively assessed ADHD symptoms (Kofler et al., 2018). Ongoing work is focused on a more definitive test of CET and comparisons to cognitive training that targets alternative neuropsychological deficits (e.g., inhibitory control; Kofler et al., 2020).

Potentiating the Efficacy of Research Supported Therapies

Even for our best available interventions, response is often incomplete for many individuals. Improving the effectiveness of research-supported interventions is a major focus of NIMH Strategic Plan Objective 3. Predicated on the notion that enhancing the salience of session content represents a potential strategy for boosting the effectiveness of evidence-based psychotherapy, in a series of studies (R34-MH-094535; R01-MH-108657), Harvey and colleagues have pursued the use of translationally informed memory support strategies to enhance memory for session content in the delivery of cognitive therapy (CT) for adults with major depression. Drawing from the basic and applied cognitive science and education literatures, Harvey and colleagues developed candidate memory support strategies and identified task-based assessments for assessing changes in memory (Zieve et al., 2019). The utility of the memory support approach was then explored in a series of trials that compared standard CT delivery to CT plus memory support. Results of an early pilot test provided preliminary evidence to support the notion that the memory support intervention can be used to improve memory for session content and potentially to improve treatment outcomes (Harvey et al., 2016). Subsequent research has focused on exploring whether the number or amount of memory support interventions delivered impact memory for session content, and in turn, treatment-related changes in depression and global functioning (Dong et al., 2017), and on conducting a fully powered trial to provide a more definitive test of whether, how, and for whom memory support strategies can be used to improve overall outcomes.

Augmenting Interventions to Target Mechanisms Associated With Nonresponse and Extend Benefit to Nonresponders

Objectives 3.2 and 3.3 of the Strategic Plan emphasize personalized intervention strategies, with a focus on investigating heterogeneity in response to intervention and to guide more targeted approaches for subgroups who are less likely to benefit from existing evidence-based interventions. A pair of projects from Manasse (R34-MH-118353) and Peterson (R34-MH-115897) illustrate mechanism-based approaches to developing and testing augmentations that target mechanisms associated with poor response to evidence-based treatments for eating disorders. In both cases, the augmentation targets and the approaches for assessing target engagement are grounded in translational science. And in both cases, consistent with Objective 3.3 of the Strategic Plan, projects involve pilot effectiveness trials that take a stakeholder-informed, deployment-focused approach (Weisz et al., 2015) to

intervention optimization and testing, to anticipate translation into practice.

A body of research, including evidence from studies employing translationally informed, multilevel assessment approaches, including but not limited to neuropsychological assessment, and behavioral observation, suggests that deficits in inhibitory control are associated with the etiology and maintenance, and response to treatment for binge eating disorder and bulimia nervosa (e.g., Manasse et al., 2015). In an NIMH-supported pilot effectiveness trial (R34-MH-118353; Manasse et al., 2020), Manasse and colleagues are refining and testing a treatment augmentation approach that targets deficits in response inhibition that may be insufficiently addressed in standard CBT, particularly among those individuals with baseline deficits in inhibitory control. The augmentation is informed by existing, translationally informed, computerized inhibitory control training (ICT) paradigms. Neuropsychological and observationally based assessments provide a multilevel, translational approach for examining whether ICT leads to changes in inhibitory control (i.e., target engagement) and conduct a preliminary examination of whether associated improvements in inhibitory control are associated with reductions in binge eating (i.e., preliminary target validation).

A second project by Peterson and colleagues (R34-MH-115897) seeks to extend benefit to adolescents with anorexia nervosa (AN) who are less likely to respond to Family Focused Treatment (FFT). Elevated levels of expressed emotion (EE) among families, characterized by hostility, critical comments, and emotional overinvolvement, and conversely, low levels of parental warmth, have been associated with impaired response to FFT (Allan et al, 2018). This pilot effectiveness study explores whether an Emotion Coaching augmentation can be used to improve response, specifically among families with high levels of EE at baseline. Consistent with an experimental therapeutics approach, the study is designed to explicitly examine whether the Emotion Coaching augmentations leads to changes in EE (i.e., engagement of the empirically-suggested moderator of response), and whether changes in EE are associated with improvements in clinical outcomes. Thus, this project illustrates an empirical approach to identifying a social-interpersonal process (family climate and communication patterns) as a potential augmentation target to improve response among a subgroup less likely to benefit from FFT. Moreover, interpersonal processes such as EE are amenable to multilevel, translational assessment, via youth- and parent-self-report and via validated behavioral observational paradigms (e.g., the Five Minute Speech Sample; Leeb et al., 1991).

Combining and Sequencing Interventions for More Targeted, Personalized Approaches

Strategic Plan Objectives 3.2 and 3.3 emphasize the use of combined or sequenced interventions and the use of innovative, adaptive designs to develop algorithms for more targeted, personalized intervention. In a currently funded pilot sequential multiple assignment randomized trial (SMART; R34-MH-123601), Sauer-Zavala and Langer are refining a strategy for more targeted delivery of a multicomponent intervention based on participant characteristics and initial response. Transdiagnostic, modular intervention strategies offer a potentially more generalizable and flexible alternative to disorder-specific treatments (Chorpita et al., 2005). Such approaches commonly involve multiple components, each with corresponding targets. This R34 pilot effectiveness trial is predicated on the notion that measurement-based personalized medicine strategies for matching treatment components to individual patients' patterns of underlying deficits could enhance both overall effectiveness and the efficiency of therapy. The project involves developing and pilot testing approaches for identifying scalable, translationally informed approaches for assessing ideographic patterns of core processes that underlie the maintenance of an individual's symptoms, and strategies for assigning and sequencing treatment components that target corresponding underlying core processes. Using a pilot SMART design, the study compares alternative approaches for assigning and sequencing components to standard delivery of the transdiagnostic intervention among participants with anxiety disorders and comorbid conditions, including depression. Translationally informed assessment of targeted core processes will be used to evaluate target engagement and examine whether core-process engagement can serve as an indicator for guiding the selection of intervention components and as an indicator of early response.

In another series of NIMH-supported trials, Medalia and colleagues (R34-MH-100317; R01-MH-123561) are exploring strategies for personalizing cognitive remediation to address cognitive processes that are known to be impaired among individuals with schizophrenia and related disorders (e.g., auditory processing, attention, memory, executive functioning, social cognition). Using a tone matching task (TMT) as a neurobehavioral marker of baseline auditory processing ability, Medalia et al. are exploring whether targeted training that begins with fundamental early auditory processing training can be used to optimize outcomes among individuals with impaired early auditory processing (EAP) at baseline. Results of the pilot R34 trial supported the feasibility of using TMT as a tailoring variable for stratifying participants and provided preliminary evidence suggesting differential benefit of early auditory processing training among EAP-impaired participants (Medalia et al., 2019). The investigators are replicating and extending these results in a currently funded trial in which individuals with schizophrenia spectrum disorders are stratified based on EAP status and then randomized to EAP-enhanced CR, standard CR, or treatment as usual (R01-MH-123561). The study employs additional translationally informed assessments to explore predictors and potential mechanisms of response, including mobile EEG to examine neurophysiological markers of need for and response to EAP training.

Conclusions

As noted earlier, the previous examples of NIMH-supported studies are meant to be illustrative and are not meant to be exhaustive. They represent projects and programs of research that primarily involve Type I translational research that harnesses knowledge and methods from basic science to facilitate understanding of psychopathology, illness course, and ultimately to guide prevention and treatment. While beyond the scope of this commentary, it should also be noted that clinical psychological science is equally relevant to research that is focused on translating research into practice to ensure evidence-based approaches to assessment, prevention, and treatment are adopted and implemented correctly. Early distinctions referred to this latter translation as Type 2 (T2) translation, while subsequent models further differentiate phases of this downstream translation (Woolf, 2009; Westfall et al., 2007; Rubio, et al, 2010). Relatedly, investigators with expertise in clinical psychological science, in general, and in mechanism-based behavior change, specifically,

are well poised to address NIMH research priorities highlighted in Goal 4 of the NIMH Strategic Plan: "Strengthen the public health impact of NIMH-supported research." Goal 4 focuses primarily on services research that involves identifying mutable targets and corresponding strategies for consumer-, provider-, and system-level interventions for improving access, engagement, quality, equity, and outcomes of mental health services.

In summary, the selected examples of NIMH-funded research described here, and additional examples of NIMH-funded research found on the NIH RePORTER (https://reporter.nih.gov/), illustrate how translationally informed psychosocial research can advance understanding of psychopathology and illness course and, in turn, facilitate the identification of potential intervention targets and the development, optimization, and ultimate delivery of preventive and therapeutic interventions. In addition, the translational research approaches in these examples, and many other NIMH-supported projects summarized on the NIH RePORTER, illustrate how today's ABCT membership, with its full complement of expertise in basic behavioral and social science and neuroscience, paired with clinical and behavior-change expertise, is poised to contribute to the full spectrum of T1 and T2 translational research, consistent with NIMH priorities as summarized in the NIMH Strategic Plan (2021).

References

Allan, E., Le Grange, D., Sawyer, S.M., McLean, L.A., & Hughes E.K. (2018). Parental expressed emotion during two forms of family-based treatment for adolescent anorexia nervosa. *European Eating Disorder Review, 26*(1), 46-52.

Auerbach, R., Shankman, S., & Murphy, E. (n.d.). *Social Processing Deficits in Remitted Adolescent Depression*. (Project number 5R01MH119771-02). (R01-MH-119771). Retrieved from https://reporter.nih.gov/search/9efmWae5IkOj6hnUpJj-grg/project-details/10064641

Chorpita, B.F., Daleiden, E.L., & Weisz, J.R. (2005). Modularity in the design and application of therapeutic interventions. *Applied and Preventive Psychology, 11*(3), 141–156. https://doi.org/10.1016/j.appsy.2005.05.002

Dong, L., Lee, J.Y., & Harvey, A.G. (2017). Memory support strategies: a pathway to improving cognitive therapy for depression? *Journal of Consulting and Clinical Psychology, 85*(3), 187–199.

Eisenberger, N., & Hornstein, E. (n.d.). *Can social support figures enhance fear extinction in patients with social anxiety?* (Project Number1R21MH125274-01). (R21-MH-125274). Retrieved from https://reporter.nih.gov/search/kxR9KmVdGUWO97MThZ0VNw/project-details/10111250

Gibb, B. (n.d.). *Attentional Biases for Affective Cues in Infants of Depressed Mothers* (Project Number 5R21MH119823-02). Retrieved from https://reporter.nih.gov/search/HWIEk7sxQkO8qv3_lOlqUA/project-details/9959503

Gordon, J. (2017). *An experimental therapeutic approach to psychosocial interventions*. Retrieved from https://www.nimh.nih.gov/about/director/messages/2017/an-experimental-therapeutic-approach-to-psychosocial-interventions

Harvey, A.G., Lee, J., Smith, R.L., Gumport, N.B., Hollon, S.D., Rabe-Hesketh, S., Hein, K., Dolsen, M.R., Haman, K.L., Kanady, J.C., Thompson, M.A., & Abrons, D. (2016). Improving outcomes for mental disorders by enhancing memory for treatment. *Behaviour Research and Therapy, 81*, 35-46.

Harvey, A. (n.d.). *Improving depression outcome by enhancing memory for cognitive therapy.* (Project Number 5R34MH094535-03). Retrieved from https://reporter.nih.gov/search/7ywNtrRVz0i7F8dXbM4zHg/project-details/8605930

Harvey, A. (n.d.). *Improving depression outcome by enhancing memory for cognitive therapy* (Project Number 5R01MH108657-04). Retrieved from https://reporter.nih.gov/search/q4QC8t-Eh0qwEmfAmWkuNA/project-details/9688605

Kofler, M. (n.d.). *Evaluating the efficacy of central executive training (CET) for ADHD* (Project Number 5R01MH115048-04). (R01-MH-115048). Retrieved from https://reporter.nih.gov/search/HpUbOGcyOE2xwYI5Oei6Wg/project-details/10056225

Kofler, M. (n.d.). *Evaluating the feasibility of central executive training for children with ADHD*. (Project Number 5R34MH102499-03). (R34-MH-102499) Retrieved from https://reporter.nih.gov/search/JwFmOPrJ_kqLz-1tju_DxA/project-details/9118387

Kofler, M. J., Sarver, D. E., Austin, K. E., Schaefer, H. S., Holland, E., Aduen, P. A., Wells, E. L., Soto, E. F., Irwin, L. N., Schatschneider, C., & Lonigan, C. J. (2018). Can working memory training work for ADHD? Development of central executive training and comparison with behavioral parent training. *Journal of Consulting and Clinical Psychology, 86*, 964 –979.

Kofler, M. J., Wells, E. L., Singh, L. J., Soto, E. F., Irwin, L. N., Groves, N. B., Chan, E. S. M., Miller, C. E., Richmond, K. P., Schatschneider, C., & Lonigan, C. J. (2020). A randomized controlled trial of central executive training (CET) versus inhibitory control training (ICT) for ADHD. *Journal of Consulting and Clinical Psychology, 88*(8), 738-756. http://dx.doi.org/10.1037/ccp0000550

Leeb, B., Hahlweg, K., Goldstein M.J., et al. (1991). Cross-national reliability, concurrent validity, and stability of a brief method for assessing expressed emotion. *Psychiatry Research, 39*(1), 25-31.

Manasse, S. (n.d.). *Augmenting cognitive behavioral therapy with inhibitory control training* (Project Number 5R34MH 118353-03). (R34-MH-118353) Retrieved from https://reporter.nih.gov/search/VqQhAhfYdUatnc_kbE-f1A/project-details/10169523

Manasse, S.M., Forman, E.M., Ruocco, A.C., et al. (2015). Do executive functioning deficits underpin binge eating disorder? A comparison of overweight women with and without binge eating pathology. *International Journal of Eating Disorders, 48*(6), 677-683.

Manasse, S.M., Lampe, E.W., Gillikin, L., Payne-Reichert, A., Zhang, F., Juarascio, A. S., & Forman, E. M. (2020). The project REBOOT protocol: Evaluating a personalized inhibitory control training as an adjunct to cognitive behavioral therapy for bulimia nervosa and binge-eating disorder. *International Journal of Eating Disorders, 53*, 1007-1013.

Medalia, A. (n.d.). *Personalized and Scalable Cognitive Remediation Approaches* (Project Number 5R34MH100317-03). [R34-MH-100317]. Retrieved from https://reporter.nih.gov/search/s9VGy-PCSUa7bXBNt3SBgQ/project-details/8904720

Medalia, A. (n.d.). *Efficacy of Personalizing Cognitive Remediation for Schizophrenia by Targeting Impairments in Early Auditory Processing* (Project Number 1R01MH123561-01). [R01-MH-123561]. Retrieved from https://reporter.nih.gov/search/X15iu59M9k6jANN-jQozGg/project-details/10037979

Medalia, A., Saperstein, A.M., Qian, M., & Javitt, D.C. (2019). Impact of baseline early auditory processing on response to cognitive remediation for schizophrenia. *Schizophrenia Research, 208*, 397-405.

National Institute of Mental Health. (2020b). *Prevention of perinatal depression: Improving intervention delivery for at-risk individuals*. Retrieved from https://www.nimh.nih.gov/funding/grant-writing-and-application-process/concept-clearances/2020/prevention-of-

perinatal-depression-improving-intervention-delivery-for-at-risk-individuals

National Institute of Mental Health. (2020c). *Funding Opportunities for Research on Disparities and Workforce Diversity.* Retrieved from https://www.nimh.nih.gov/about/organization/od/odwd/funding-opportunities-for-research-on-disparities-and-workforce-diversity

National Institute of Mental Health. (2020d). *Research Domain Criteria (RDoC).* Retrieved from https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc

National Institute of Mental Health. (2021). *Strategic plan.* Retrieved from https://www.nimh.nih.gov/sites/default/files/documents/about/strategic-planning-reports/NIMH-Strategic-Plan-for-Research-2021-Update.pdf

Pachankis, J., Hatzenbuehler, M., Branstrom, R., et al. (n.d.). *Biopsychosocial mechanisms underlying internalizing psychopathology in a prospective, population-based cohort of sexual minority young adults.* (Project Number 5R01MH118245-03). (R01-MH-118245). Retrieved from https://reporter.nih.gov/search/Cqs__OUG9ECXoNKUAkjvCA/project-details/10072080

Peterson, C. (n.d.). *Emotion coaching skills as an augmentation to family based therapy for adolescents with anorexia nervosa: A pilot study* (Project Number 5R34MH115897-03). (R34-MH-115897) Retrieved from https://reporter.nih.gov/search/8W8zmbr-5EeW7TE-fl6-Kg/project-details/10133473

Rapport, M.D., Orban, S.A., Kofler, M.J., & Friedman, L.M. (2013). Do programs designed to train working memory, other executive functions, and attention benefit children with ADHD: A meta-analytic review of cognitive, academic, and behavioral outcomes. *Clinical Psychology Review, 33*, 1237-1252.

Sauer-Zavala, S., & Langer, D. (n.d.). Increasing Treatment Efficiency Using SMART Methods for Personalizing Care (Project Number 1R34MH123601-01). (R34-MH-123601). Retrieved from https://reporter.nih.gov/search/0fSl68GMVEWBLcBafVm-2w/project-details/10039382

Weisz, J.R., Krumholz, L.S., Santucci, L., Thomassin, K, & Ng, M.Y. (2015). Shrinking the gap between research and practice: tailoring and testing youth psychotherapies in clinical care contexts. *Annual Review of Clinical Psychology, 11*(1), 139-163.

Zieve, G.G., Dong, L., & Harvey, A.G. (2019). Patient memory for psychological treatment contents: assessment, intervention, and future directions for a novel transdiagnostic mechanism of change. *Behaviour Change*, 1–11.

. . .

The views expressed in this commentary do not necessarily represent the views of the National Institutes of Health, the Department of Health and Human Services, or the United States Government. Dr. Sherrill and Dr. Talkovsky are both full-time federal employees of the National Institute of Mental Health/National Institutes of Health and have no financial disclosures or conflicts of interest to report.

Correspondence to Joel Sherrill, Ph.D., National Institute of Mental Health, 6001 Executive Blvd., MSC 9663, Bethesda, MD 20892-9663; email: jsherril@mail.nih.gov

SPECIAL ISSUE ARTICLE

Toward a More Inclusive Neuroscience-Informed Treatment of OCD: A Clinical Case Example

Zoë E. Laky * and Abigail Szkutak,* *Massachusetts General Hospital/ Harvard Medical School*

Angela Fang, *University of Washington*

The Case of Isaac

Isaac is a cisgender, heterosexual, 34-year-old Black man walking down the street in the early evening after meeting some friends for dinner. He sees a young, White woman walking toward him a few blocks away; however, when she gets closer, she crosses the street. A litany of thoughts begins flooding into his head. In this scenario, there are a multitude of ways in which Isaac could interpret the actions and motives of the woman walking down the street. In the emotion regulation literature, "appraisals" refer to one's interpretations of ambiguous situations or stimuli in the environment. In Isaac's circumstance, he could appraise this encounter positively (e.g., the woman saw a friend across the street and was eager to greet them), neutrally (e.g., the woman did not see him and needed to cross the street to get to her apartment), or negatively (e.g., the woman saw him and purposefully crossed the street because she saw him as a threat). Isaac presents to treatment a week after this incident, which he describes as a racial microaggression and believes that it has also acutely triggered an increase in symptoms of obsessive-compulsive disorder.

Isaac was formally diagnosed with obsessive-compulsive disorder (OCD) and comorbid major depressive disorder (MDD) 3 years ago by a therapist in the community, although he has had unwanted aggressive and sexual obsessions since he was a young child. When he was as young as 7 years old, he had intrusive thoughts about accidentally harming his family by leaving the oven on and fleeting images related to sexual encounters with strangers. Isaac grew up in a low-income neighborhood in Brooklyn, New York, and spent much of his childhood caring for his two younger siblings, while his parents worked multiple jobs to support his educational aspirations. In public school, Isaac was a conscientious student who loved learning about math and science and made friends with similar interests. Throughout his childhood and adolescence, Isaac witnessed racial injustice first-hand in his community, as many of his Black peers would be arrested for petty crimes and he would be frequently stopped and questioned by law enforcement officers. In addition, he was constantly bombarded with images and news stories that depicted Black men in his community as violent criminals incapable of thwarting their negative emotions and violent behaviors. Consequently, when he started experiencing aggressive obsessions, he interpreted this to

*Contributed equally to this article.

mean that he could be innately dangerous, and that harboring such violent thoughts about others made him exactly the kind of Black criminal depicted in the news. He spent most of his young adulthood developing and implementing strategies (e.g., compulsions) to neutralize and suppress his intrusive thoughts and images out of fear that he could act on these thoughts or be outed for having these thoughts, despite the fact that these thoughts were in direct opposition to how he truly viewed himself as a kind and caring individual. When he accepted his first post-undergraduate job as a mid-level consultant for a technology startup in Boston, which required a major move from New York, he noticed a significant increase in the frequency of his obsessive thoughts and compulsions as well as intensity of negative emotions that followed (e.g., shame, guilt, disgust). He partly attributed these thoughts to being surrounded by more White men and women in his new role. Soon after, he started experiencing symptoms of depressed mood and lack of interest, which he greatly attributed to a worsening of his OCD symptoms.

Currently, Isaac spends over 5 hours per day plagued by intrusive thoughts about being dangerous to others and by images of stabbing close female friends and family members. To reduce the anxiety he experiences from these violent thoughts and images, he engages in time-consuming compulsive behaviors, such as checking his surroundings for women and researching crime news or characteristics of violent criminals. In addition, he avoids social interactions, such as dating (especially White women, despite his desire to engage with them), out of fear that he will find himself alone with a White woman, act on his intrusive thoughts, and end up in jail for hurting her. Over time, through repeated reliance on his compulsions to manage his distressing obsessions, Isaac ultimately developed and reinforced a rigid belief that his unwanted thoughts and negative emotions were inherently dangerous and worse, unchangeable.

Integrating Affective Neuroscience Into Isaac's Case Conceptualization

Based on Isaac's encounter with the White woman in the scenario described above, a negative appraisal could reflect Isaac's deep irrational fear of being capable of harming others (an OCD-driven fear), or a rational belief that he is perceived as a threat (driven by his repeated experiences of racism and microaggressions), or a combination of both. A culturally informed cognitive behavioral case conceptualization of Isaac's symptoms would incorporate both the OCD-relevant cognitive distortions and compulsions, as well as his experiences of repeated racial trauma, in understanding how his OCD symptoms have developed and been maintained. Here, racial trauma can be formulated as a major source of psychosocial stress that interacts with psychological diatheses to lead to the development of OCD. Based on this case conceptualization, treating Isaac's race-based negative appraisals as *misappraisals* that need to be restructured during treatment is harmful, as it may invalidate the heightened threat of danger that he experiences frequently because of his race.

From an affective neuroscience perspective, this case conceptualization can be made richer by incorporating *biological* correlates and diatheses that have been proposed in neurocognitive theories of OCD to contribute to Isaac's symptoms. Clients who ascribe to biopsychosocial models of OCD may be particularly interested to learn how their behavior and biology interact with the environment in a dynamic manner to cause symptom worsening, as this may help provide the key to manipulating those patterns toward recovery. In this article, we propose that racism, like any source of psychosocial stress, would be expected to interact with biological mechanisms underlying a psychiatric disorder. We will describe the advantages of addressing treatment for a case like Isaac from a cultural humility-informed cognitive behavioral framework that integrates neuroscience principles. We will also discuss important considerations in providing clinical care within this context, and provide practical suggestions for implementing actionable steps.

The Neuroscience of OCD, Emotion Regulation, and Race

OCD is a disorder characterized by unwanted thoughts, images, or impulses (i.e., obsessions)—that are perceived as particularly disturbing, important, and meaningful—and repetitive physical and/or mental behaviors (i.e., compulsions) that an individual feels compelled to perform in response to obsessions. There is strong evidence supporting a biopsychosocial model of OCD, which purports that biological substrates, psychological phenomena, and the social context contribute to the development and maintenance of obsessions and compulsions. While no research has analyzed the intersection of race, neuroscience, and OCD specifically, it has been hypothesized that traumatic race-based experiences may hasten the development of OC symptoms, among those predisposed to OCD (Williams & John, 2017). Furthermore, individuals with OCD who identify as Black often experience greater impairment in multiple domains and have been shown to be less likely to achieve symptom remission (Himle et al., 2008).

Biologically, dysfunction of the cortico-striatal-thalamo-cortical circuits, as well as regions associated with disruptions in habitual behaviors, are believed to underlie OCD symptoms (Gillan et al., 2015; Milad & Rauch, 2012; van den Heuvel et al., 2016). The neuroanatomical circuitry underlying OCD may interact with the environment through learning experiences that lead to negative feedback loops. For instance, in Isaac's case, each time he experienced an unwanted aggressive or sexual obsession, he automatically viewed it as evidence and confirmation that he truly was dangerous. Clients may benefit from some basic neuroeducation about both the neurobiology of OCD as well as learning-dependent plasticity—the brain's ability to form new and/or reorganize already existing neural connections as a result of learning and experience—as it can provide validation as to why a negative feedback loop was created in the first place (e.g., to avoid a negative, fearful, or harmful outcome, to prevent obsessions, or race-based discrimination; Masten et al., 2011; Miller, 2016). In fact, some findings show that neuroeducation related to mental illness can promote self-efficacy and optimism in disorder prognosis (Farrell et al., 2015; Lebowitz et al., 2014).

There is also extensive research on the neuroscience of explicit emotion regulation processes (e.g., appraisal), which supports a dual-process model (Gyurak et al., 2011) involving complex interactions between higher-level cortical systems and more primitive subcortical or limbic systems (Buhle et al., 2014; Ochsner & Gross, 2005; Ochsner et al., 2012). Emotion regulation is achieved through top-down control of subcortical, limbic structures by engaging higher-level cortical systems. For example, higher-level cortical regions associated with attentional control and working memory (e.g., the dorsolateral prefrontal cortex [DLPFC], inferior parietal cortex, anterior cingulate cortex [ACC]) are recruited when implementing both adaptive and maladaptive emotion regula-

tion strategies (e.g., reappraisal, but also conscious avoidance; Ochsner et al., 2002). Other cortical regions, such as the ventrolateral prefrontal cortex (VLPFC) and dorsomedial prefrontal cortex, foster the selection of goal-appropriate responses and interpretation of emotional states of oneself or others (Ochsner & Gross, 2005). Higher-level cortical areas (e.g., the DLPFC) then project to ventromedial prefrontal midline structures (e.g., orbitofrontal cortex, ventromedial prefrontal cortex [VMPFC]), which inhibit limbic structures like the amygdala (Siegle et al., 2007). Among individuals with emotion regulation difficulties, there is thought to be a deficit in the flexible recruitment of higher-level cortical areas like the DLPFC, which leads to a difficulty in regulating emotional responses and causes these individuals to favor negative appraisals (Hofmann et al., 2012).

Exposure and Response Prevention (ERP), the gold standard and most empirically supported psychological treatment for OCD, may enhance flexibility in psychological and neural processes (Thorsen et al., 2015). As clients learn to differentially recruit and mobilize regulatory brain regions to support more adaptive functioning (e.g., through reappraisals) during ERP, improvements in brain connectivity ensue (Buhle et al., 2014). The biological processes that implement adaptive emotion regulation (e.g., greater activation in higher-level cortical areas like the DLPFC; Buhle et al., 2014) may be reshaped with reappraisal skills, indicating the malleability and sensitivity of the brain during new learning experiences. In addition, studies have demonstrated changes in brain activation and connectivity in response to CBT exposure techniques as critical components of treatment for OCD (e.g., Fullana et al., 2014; O'Neill et al., 2013). Providing examples of how ERP promotes adaptive learning-dependent plasticity and teaching more adaptive emotion regulation skills during treatment may equip clients with a powerful and robust toolkit for interpreting and responding to a wide variety of emotionally evocative situations.

In contrast to the neuroscience of OCD and emotion regulation literature, research investigating the neural correlates of race-based discrimination and racial stress remains more limited. Existing literature on this topic, however, has uncovered various brain regions implicated in experiences of perceived racial discrimination, perceived exclusion because of race, face perception based on racial group representations, and racial stress (e.g., amygdala, fusiform face area, ACC, insula, DLPFC, VMPFC, and VLPFC; Kubota et al., 2012; Masten et al., 2011). It is not surprising that this network of brain regions includes those associated with emotion processing, face processing, conflict between prepotent and intentional response tendencies, salience detection, and top-down executive control (Berger & Sarnyai, 2014; Han et al., 2020; Masten et al., 2011; Wright et al., 2020). Together with evidence that all forms of environmental stressors can impact the brain via allodynamic processes (McEwen & Gianaros, 2011), it is likely that—in cases like that of Isaac—experiences of racial stress and race-based discrimination interact with emotion regulation neurocircuitry and vice versa.

A major caveat of the literature introduced above is that neuroscience research has developed mostly independently from research on culture, racial stress, ethnicity, and OCD. For instance, while past research suggests that racial experiences have an individual and cumulative effect on the neural pathways of the brain (Berger & Sarnyai, 2014; Masten et al., 2011; Wright et al., 2020), no studies to date have investigated the neural representations of these experiences in people with OCD specifically or how they may modulate the circuitries that give rise to or maintain OCD symptoms, as may be the case for someone like Isaac. Another limitation of the available literature is that the vast majority of empirical studies in this area have been conducted on primarily small, White samples (Henrich et al., 2010), and therefore not representative of the rest of the population. A recent study showed that sample composition significantly impacted age-related variation in brain structure (LeWinn et al., 2017), and highlights the problem of selection bias in small, racially homogeneous studies, typically the norm in neuroscience and clinical psychology research. Indeed, there is evidence of systematic exclusion of Black research participants in studies employing other methods such as electroencephalogram (e.g., Etienne et al., 2020), psychophysiological measurement of skin conductance (e.g., Kredlow et al., 2017), and genome-wide association studies (Weinberger et al., 2020). Within an antiracist framework, the broader implicit assumption caused by the lack of inclusivity in the neuroscience of OCD and emotion regulation literatures is that sociocultural factors such as racism and discrimination do not influence brain functioning and development, which is not only false but also harmful in a clinical care context. Critical race perspectives propose that this type of systematic exclusion of marginalized communities in clinical neuroscience research serves to uphold White supremacist ideology in science and maintains the status quo (e.g., large racial disparities in access to treatment).

Important Considerations for Making Neuroscience-Grounded and Culturally Informed Case Conceptualizations

Cultural humility is an approach to treatment, in contrast to cultural competence, that fosters engagement of diverse clients in therapy by actively addressing inequities through personal accountability and self-reflection (Fisher-Borne et al., 2015). From a cultural humility lens, therapy could begin with a careful assessment of the client's self-identified social positions and views on biological, psychological, and social contributions to their illness. This would include understanding the ways in which racial identity, discrimination, and traumas may or may not interplay with a client's symptoms or worldviews about their illness. A therapist should consider cases when involving spiritual, religious, or cultural leaders in treatment is necessary to support and validate their beliefs, attitudes toward healing, and psychological worldview, as well as build a strong therapeutic alliance, as has been more commonly done in treating clients with scrupulosity concerns in OCD (Huppert & Siev, 2010). Once these vital considerations are examined, an individually tailored case conceptualization can be developed that incorporates neuroeducation to the extent that a client is ready and willing to explore this approach (Miller, 2016). When including neuroeducation, it is important to recognize that CBT comes from a primarily Western, Eurocentric perspective of treatment with explicit assumptions about empiricism and psychological change that are not universally accepted (Sookman et al., 2021).

In Isaac's case, it is particularly important to consider the role of racism in the development of his OCD symptoms, and how the structural inequities associated with anti-Black prejudice and discrimination have contributed to his fear of fulfilling the stereotype of the aggressive and over-sexualized Black man, which Isaac has to some degree internalized. Accordingly, while some of his beliefs may be distorted (e.g., "I'm a dangerous man capable of

hurting loved ones"), others may be accurate (e.g., "White women are more likely to perceive me as dangerous"). Avoidance of White women may very well be adaptive to cope with racial stress. A therapist might begin therapy with Isaac by providing a safe environment to examine his beliefs more closely and assess the learning experiences that have played a role in the development of his obsessive beliefs. If appropriate, referencing the neuroscience literature to offer education on the adaptability and flexibility of his beliefs and behaviors may be helpful. For example, a neurocognitive explanation could be described to Isaac as one way that his compulsions and avoidance behaviors could have developed initially to serve his survival as an adaptive coping strategy, but then became overgeneralized to situations in which they are no longer helpful. Given the very realistic threat that some of the situations Isaac fears pose to him as a Black man (e.g., walking alone late at night behind a White woman), Isaac may need to gain even more flexibility in regulatory brain areas (e.g., DLPFC) than someone with a different learning history to help discern cues that are functionally tied to his OCD versus a realistic race-based concern (or both). This can be achieved by conducting detailed functional assessments of situations that trigger his anxiety to help him learn when OCD-relevant interventions versus coping interventions for reducing racial harm are most needed. Such discrimination training is likely to yield more cognitive flexibility, which could be potentially represented in changes in DLPFC functioning. Although certain neurocognitive interventions have been shown to target the DLPFC more directly (e.g., Cognitive Control Training, Transcranial Magnetic Stimulation; Grassi et al., 2018; Siegle et al., 2007), more research is needed to examine the effect of such interventions on clients of color. The emphasis on brain plasticity in response to the learning from the environment could be greatly beneficial in restructuring Isaac's incorrect belief that his thoughts and emotion regulation strategies are fixed. Ultimately, integrating a neurocognitive perspective in treatment may provide Isaac with a better understanding of how and why he has developed obsessive thoughts and compulsions and provide him with a sense of agency in his ability to change these basic emotional regulatory processes.

In addition to psychoeducation, when tailoring in-vivo exposures, extra caution must be paid to ensure that Isaac is never placed in actual physical or emotional harm due to potential for racism (e.g., running behind a White woman late at night, breaking even minor laws while driving). Racial microaggressions have been reported as a common occurrence in clients of color and treatment should actively address microaggressions to both manage the client's experience of racial stress and trauma, as well as enhance the client's sense of coping and well-being (Sue et al., 2019). More effective in-vivo exposures are values-driven and might include having Isaac attend a friend's afternoon birthday party, making an effort to introduce himself to at least two White women or going on a date with a White woman (to the extent that he is interested in meeting and dating them), talking to women out in public, or writing the word "knife" or "stabbing" multiple times on paper while a White woman is in the room. It bears noting that in-vivo exposures should always be driven by the client's values, such that confronting feared situations or stimuli allows the client to re-engage in personally meaningful activities that might have been avoided previously.

Practical Suggestions for Integrating Neuroscience- and Culturally Informed Care

Providing culturally informed treatment for OCD that includes appropriate references to the neuroscientific literature may foster a deeper understanding of the "learning" and "unlearning" of OCD mechanisms through cognitive behavioral interventions; however, there are substantial gaps in the current clinical psychology and neuroscience literature that limit its integration within clinical practice. A more inclusive clinical neuroscience must be the minimum standard upon which our evidence base for treatment is built. Toward this goal, we provide the following research and clinical recommendations to advance literature on emotion regulation, racial stress, and other treatment-related psychological mechanisms in both clinical psychological science and neuroscience; recommended readings from the reference list are noted with an asterisk (*). We would like to note that these recommendations are by no means comprehensive and may be extended to broaden inclusivity of groups additionally marginalized based on factors beyond race, such as age, sex, gender, physical disability, religion, and class.

Research Recommendations

1. Examine the neural representations of racialized social experiences and how they may modulate the circuitries involved in emotion regulation, habit formation, or other cognitive and behavioral mechanisms that underlie the development or maintenance of OCD and related psychiatric symptoms.

2. Consistently report race and ethnicity variables in empirical articles investigating emotion regulation and OCD to characterize the study sample, highlight limitations to the generalizability of study findings, and acknowledge that the variable of interest is not race, but rather racism and the impact of racial stress and trauma, which are likely to impact neural circuitry.

3. Clearly define the target sample and consistently report sampling and recruitment methodology, especially for smaller studies where representative sampling is not feasible (Falk et al., 2013; LeWinn et al., 2017).

4. Carefully assess community needs to understand meanings given or not given to scientific knowledge, principles such as consent and confidentiality, and research participation by meeting with community leaders and members, and developing an ethically-informed and co-created approach to the study question itself (Brief & Illes, 2010).

5. Create study procedures that equitably support the recruitment and retention of diverse participants to ensure that individuals are not systematically excluded. Modifications for study recruitment may be necessary, such as providing means for transportation, being more flexible with the timing and/or administration of MRI scans, providing translated study materials or enabling interpreter services, modifying existing study measures, or moving study procedures to a safer/more accessible part of town wherever possible. Compare the demographic characteristics of participants who were screened and enrolled, in order to assess systematic factors associated with attrition and outlier detection (with regard to MRI-related motion confounds, other noise variables, and primary outcome variables).

Clinical Recommendations

1. For clients who ascribe to biopsychosocial explanations of OCD, it may be helpful to provide some basic neuroeducation about the neurobiology of OCD as well as learning-dependent plasticity as it

relates to disorder development and treatment.

2. Increase clinical training and education surrounding treatment of Black, Indigenous, and People of Color (BIPOC) with OCD and related disorders specifically.

3. Consider broader sources of variability in adaptive emotion regulation, being careful to not pathologize emotional regulation strategies in every context; consider contextual factors (e.g., situations involving racial microaggressions) that impact emotion regulation processes and carefully assess the function of your client's responses in individual situations.

4. Be mindful of the pitfalls of existing OCD measures used to capture clients' symptoms. For example, traditional clinician-rated symptom measures (e.g., the Y-BOCS) may not capture changes adequately when certain compulsions or avoidance strategies are adaptive in the context of racial stress and trauma. Additionally, some self-report measures (e.g., the Padua Inventory) may not capture cultural differences (Williams et al., 2017). In these circumstances, one might consider supplementing these existing measures with qualitative assessments as needed.

5. Include spiritual/religious or cultural leaders, if applicable, in treatment to develop a culturally informed approach to treatment and strengthen the therapeutic alliance (Huppert & Siev, 2010; Williams & Jahn, 2017).

References

Berger, M., & Sarnyai, Z. (2015). "More than skin deep": Stress neurobiology and mental health consequences of racial discrimination. I*nternational Journal on the Biology of Stress, 18*(1), 1–10. https://doi.org/10.3109/10253890.2014.989204

*Brief, E., & Illes, J. (2010). Tangles of neurogenetics, neuroethics, and culture. *Neuron, 68*(2), 174-177.

Buhle, J. T., Silvers, J. A., Wager, T. D., Lopez, R., Onyemekwu, C., Kober, H., Weber, J., & Ochsner, K. N. (2014). Cognitive reappraisal of emotion: A meta-analysis of human neuroimaging studies. *Cerebral Cortex, 24*(11), 2981-2990. https://doi.org/10.1093/cercor/bht154

Etienne, A., Laroia, T., Weigle, H., Afelin, A., Kelly, S. K., Krishnan, A., & Grover, P. (2020). *Novel Electrodes for Reliable EEG Recordings on Coarse and Curly Hair*. Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual International Conference, 2020, 6151–6154. https://doi.org/10.1109/EMBC44109.2020.9176067

Falk, E. B., Hyde, L. W., Mitchell, C., Faul, J., Gonzalez, R., Heitzeg, M. M., Keating, D. P., Langa, K. M., Martz, M. E., Maslowsky, J., Morrison, F. J., Noll, D. C., Patrick, M. E., Pfeffer, F. T., Reuter-Lorenz, P. A., Thomason, M. E., Davis-Kean, P., Monk, C. S., & Schulenberg, J. (2013). What is a representative brain? Neuroscience meets population science. *Proceedings of the National Academy of Sciences of the United States of America, 110*(44), 17615–17622. https://doi.org/10.1073/pnas.1310134110

Farrell, N. R., Lee, A. A., & Deacon, B. J. (2015). Biological or psychological? Effects of eating disorder psychoeducation on self-blame and recovery expectations among symptomatic individuals. *Behaviour Research and Therapy, 74*, 32–37. https://doi.org/10.1016/j.brat.2015.08.011

*Fisher-Borne, M., Cain, J. M., & Martin, S. L. (2015). From mastery to accountability: Cultural humility as an alternative to cultural competence. S*ocial Work Education, 34*, 165-181. https://doi.org/10.1080/02615479.2014.977244

Fullana, M. A., Cardoner, N., Alonso, P., Subirà, M., López-Solà, C., Pujol, J., Segalàs, C., Real, E., Bossa, M., Zacur, E., Martínez-Zalacaín, I., Bulbena, A., Menchón, J. M., Olmos, S., & Soriano-Mas, C. (2014). Brain regions related to fear extinction in obsessive-compulsive disorder and its relation to exposure therapy outcome: A morphometric study. *Psychological Medicine, 44*(4), 845–856. https://doi.org/10.1017/S0033291713001128

Gillan, C. M., Apergis-Schoute, A. M., Morein-Zamir, S., Urcelay, G. P., Sule, A., Fineberg, N. A., Shakian, B. J., Robbins, T. W. (2015). Functional neuroimaging of avoidance habits in obsessive compulsive disorder. *American Journal of Psychiatry, 172*(3), 284-293.

Gyurak, A., Gross, J. J., & Etkin, A. (2011). Explicit and implicit emotion regulation: a dual-process framework. *Cognition & Emotion, 25*(3), 400–412. https://doi.org/10.1080/02699931.2010.544160

Grassi, G., Pacini, S., Cecchelli, C., & Pallanti, S. (2018). Enhancing cognitive-behavioral therapy for obsessive-compulsive disorder with transcranial magnetic stimulation: A proof of concept. *European Neuropsychopharmacology, 28*(6), 766-767.

Han, S. D., Lamar, M., Fleischman, D., Kim, N., Bennett, D. A., Lewis, T. T., Arfanakis, K., & Barnes, L. L. (2020). Self-reported experiences of discrimination in older black adults are associated with insula functional connectivity. *Brain Imaging and Behavior*. Advance online publication. https://doi.org/10.1007/s11682-020-00365-9

Hansen, N. S., & Siegle, G. (2015). Paving the road to the neurocognitive clinic of tomorrow: Appealing to standards. In J. Mohlmann, T. Deckersbach, & A. Weissman (Eds.), *From symptom to synapse: A neurocognitive perspective on clinical psychology* (pp. 350-370). Routledge.

*Henrich, J., Heine, S., and Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences. 33*, 61–83. https://doi.org/10.1017/S0140525X0999152XHimle, J. A., Muroff, J. R., Taylor, R. J., Baser, R. E., Abelson, J. M., Hanna, G. L., Abelson, J. L., & Jackson, J. S. (2008). Obsessive-compulsive disorder among African Americans and blacks of Caribbean descent: Results from the National Survey of American Life. *Depression and Anxiety, 25*(12), 993–1005. https://doi.org/10.1002/da.20434

*Hofmann, S. G., Ellard, K. K., & Siegle, G. J. (2012). Neurobiological correlates of cognitions in fear and anxiety: a cognitive-neurobiological information-processing model. *Cognition & Emotion, 26*(2), 282–299. https://doi.org/10.1080/02699931.2011.579414

Huppert, J.D. & Siev, J. (2010). Treating scrupulosity in religious individuals using cognitive-behavioral therapy. *Cognitive and Behavioral Practice, 17*, 382-392. https://doi.org/10.1016/j.cbpra.2009.07.003

Johanson, A., Risberg, J., Tucker, D. M., & Gustafson, L. (2006). Changes in frontal lobe activity with cognitive therapy for spider phobia. *Applied Neuropsychology, 13*(1), 34–41. https://doi.org/10.1207/s15324826an1301_5

Kredlow, M. A., Pineles, S. L., Inslicht, S. S., Marin, M., Milad, M. R., Otto, M. W., & Orr, S. P. (2017). Assessment of skin conductance in African American and non-African American participants in studies of conditioned fear. *Psychophysiology, 54*(11), 1741-1754. https://doi.org/10.1111/psyp.12909

*Kubota, J., Banaji, M. & Phelps, E. (2012). The neuroscience of race. *Nature Neuroscience, 15*, 940–948. https://doi.org/10.1038/nn.3136

Lebowitz, M. S., Pyun, J. J., & Ahn, W. K. (2014). Biological explanations of generalized anxiety disorder: effects on beliefs about prognosis and responsibility. *Psychiatric Services, 65*(4), 498–503. https://doi.org/10.1176/appi.ps.201300011

LeWinn, K. Z., Sheridan, M. A., Keyes, K. M., Hamilton, A., & McLaughlin, K. A. (2017). Sample composition alters associations between age and brain structure. *Nature Communications, 8*(1), 874.

https://doi.org/10.1038/s41467-017-00908-7

Masten, C. L., Telzer, E. H., & Eisenberger, N. I. (2011). An fMRI investigation of attributing negative social treatment to racial discrimination. *Journal of Cognitive Neuroscience, 23*(5), 1042-1051. https://doi.org/10.1162/jocn.2010.21520

McEwen, B. S. & Gianaros, P. J. (2011). Stress- and allostasis-induced brain plasticity. *Annual Review of Medicine, 62*, 431-445. https://doi.org/10.1146/annurev-med-052209-100430

Milad, M. R., & Rauch, S. L. (2012). Obsessive-compulsive disorder: Beyond segregated cortico-striatal pathways. *Trends in Cognitive Sciences, 16*(1), 43–51. https://doi.org/10.1016/j.tics.2011.11.003

*Miller, R. (2016). Neuroeducation: Integrating brain-based psychoeducation into clinical practice. *Journal of Mental Health Counseling, 38*(2), 103-115. https://doi.org/10.17744/mehc.38.2.02

Ochsner, K. N., Bunge, S. A., Gross, J. J., & Gabrieli, J. D. (2002). Rethinking feelings: An FMRI study of the cognitive regulation of emotion. *Journal of Cognitive Neuroscience, 14*(8), 1215–1229. https://doi.org/10.1162/089892902760807212

Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences, 9*(5), 242-249. https://doi.org/10.1016/j.tics.2005.03.010

Ochsner, K. N., Silvers, J. A., & Buhle, J. T. (2012). Functional imaging studies of emotion regulation: A synthetic review and evolving model of the cognitive control of emotion. *Annals of the New York Academy of Sciences, 1251*, E1–E24. https://doi.org/10.1111/j.1749-6632.2012.06751.x

O'Neill, J., Gorbis, E., Feusner, J. D., Yip, J. C., Chang, S., Maidment, K. M., Levitt, J. G., Salamon, N., Ringman, J. M., & Saxena, S. (2013). Effects of intensive cognitive-behavioral therapy on cingulate neurochemistry in obsessive-compulsive disorder. *Journal of Psychiatric Research, 47*(4), 494–504. https://doi.org/10.1016/j.jpsychires.2012.11.010

Siegle, G. J., Ghinassi, F., & Thase, M. E. (2007). Neurobehavioral therapies in the 21st century: Summary of an emerging field and an extended example of cognitive control training for depression. *Cognitive Therapy and Research, 31*, 235-262.

Siegle, G. J., Thompson, W., Carter, C. S., Steinhauer, S. R., & Thase, M. E. (2007). Increased amygdala and decreased dorsolateral prefrontal BOLD responses in unipolar depression: Related and independent features. *Biological Psychiatry, 61*(2), 198–209. https://doi.org/10.1016/j.biopsych.2006.05.048

Sookman, D., Phillips, K. A., Mataix-Cols, D., & Veale, D. (2021). Introduction to knowledge and competency standards for specialized treatments for obsessive-compulsive disorder throughout the lifespan: Phase two series by the International Accreditation Task Force of the Canadian Institute for Obsessive Compulsive Disorders (CIOCD, www.ciocd.ca). *Psychiatry Research, 298*, 113753. https://doi.org/10.1016/j.psychres.2021.113753

Sue, D. W., Alsaidi, S., Awad, M. N., Glaeser, E., Calle, C. Z., & Mendez, N. (2019). Disarming racial microaggressions: Microintervention strategies for targets, White allies, and bystanders. *American Psychologist, 74*(1), 128–142. https://doi.org/10.1037/amp0000296

Thorsen, A. L., van den Heuvel, O. A., Hansen, B., & Kvale, G. (2015). Neuroimaging of psychotherapy for obsessive-compulsive disorder: A systematic review. *Psychiatry Research, 233*(3), 306–313. https://doi.org/10.1016/j.pscychresns.2015.05.004

van den Heuvel, O. A., van Wingen, G., Soriano-Mas, C., Alonso, P., Chamberlain, S. R., Nakamae, T., Denys, D., Goudriaan, A. E., & Veltman, D. J. (2016). Brain circuitry of compulsivity. *European Neuropsychopharmacology, 26*(5), 810–827. https://doi.org/10.1016/j.euroneuro.2015.12.005

Weinberger, D. R., Dzirasa, K., & Crumpton-Young, L. L. (2020). Missing in Action: African Ancestry Brain Research. *Neuron, 107*(3), 407–411. https://doi.org/10.1016/j.neuron.2020.07.008

*Williams, M. T., & Jahn, M. E. (2017). Obsessive–compulsive disorder in African American children and adolescents: Risks, resiliency, and barriers to treatment. *American Journal of Orthopsychiatry, 87*(3), 291–303. https://doi-org.ezproxy.bu.edu/10.1037/ort0000188

Wright, K. D., Jack, A. I., Friedman, J. P., Jones, L. M., Sattar, A., Fresco, D. M., & Moore, S. M. (2020). Neural Processing and Perceived Discrimination Stress in African Americans. *Nursing Research, 69*(5), 331–338. https://doi.org/10.1097/NNR.0000000000000441

. . .

The authors have no conflicts of interest to disclose. Dr. Fang receives research funding from the NIMH (K23109593-06).

Correspondence to Zoë Laky, 185 Cambridge Street, Suite 2000, Boston, MA 02114; zlaky@mgh.harvard.edu

Find a CBT Therapist

ABCT's **Find a CBT Therapist** directory is a compilation of practitioners schooled in cognitive and behavioral techniques. In addition to standard search capabilities (name, location, and area of expertise), ABCT's Find a CBT Therapist offers a range of advanced search capabilities, enabling the user to take a Symptom Checklist, review specialties, link to self-help books, and search for therapists based on insurance accepted.

We urge you to sign up for the Expanded Find a CBT Therapist (an extra $50 per year). With this addition, potential clients will see what insurance you accept, your practice philosophy, your website, and other practice particulars. The expanded Find a Therapist listing will have a unique style and come first in any searches that capture the member's listing.

➔ *To sign up for the Expanded Find a CBT Therapist, visit* **abct.org/membership**
For further questions, contact the ABCT central office at 212-647-1890 or membership@abct.org

Intolerance of Uncertainty and Risk for Anxiety: Neural Mechanisms and Cross-Cultural Implications

Mariah DeSerisy, Emily Hirsch, Jill Stadterman, Melanie Silverman, Amy K. Roy, *Fordham University*

TARGETING UPSTREAM, stable risk factors for disease is an approach often taken by public health officials to reduce health disparities, improve prevention and treatment efforts, and reduce the impact of disease burden on individuals, families, and societies (Braveman et al., 2011; Gehlert et al., 2008; Patel et al., 2010; Williams et al., 2008). A similar approach can be taken at the individual level to determine stable, trait-level characteristics that increase risk for disorder development. In psychiatry, a growing emphasis is being placed on understanding these stable, trait-level characteristics as the field moves away from diagnostic categorizations and towards a more dimensional, systems-level understanding of mental health disorders (Insel et al., 2010). Examinations of risk factors that are generally stable but responsive to treatment can offer important insights into both etiological and treatment models.

Intolerance of uncertainty (IU) is one trait-level risk factor that meets these criteria: it is relatively stable over time without intervention (Bottesi et al., 2019; Buhr & Dugas, 2002, 2006) but also responsive to treatment (e.g., Bomyea et al., 2015; Dugas & Ladouceur, 2000). IU is defined as a bias towards perceiving uncertainty as dangerous, troubling, or problematic, accompanied by difficulty tolerating the discomfort that arises when presented with insufficient information (Carleton, 2016a, 2016b; Dugas, Buhr, et al., 2004; Freeston et al., 1994). The goal of the current paper is to provide a rationale for the relevance of treating IU rather than, or in addition to, anxiety symptoms. We review research showing that IU is a cognitive risk factor for anxiety disorders, discuss its cross-cultural stability, and present a model for the underlying neural mechanism of the association between IU and anxiety. We then outline how this work supports our ability to apply these treatments across anxious populations, ultimately opening the door for better targeted treatments and improved treatment response.

Intolerance of Uncertainty as a Cognitive Risk Factor for Anxiety

Anxiety disorders affect as many as 31% of individuals across the lifespan (Kessler et al., 2009) and are associated with considerable impairment, including increased risk for suicide (Nock et al., 2010), early mortality and increased risk of cardiac complications (Roest et al., 2010), decreased occupational participation, performance, and productivity (Erickson et al., 2009; OECD, 2015), and decreased quality of life (Mendlowicz & Stein, 2000; Olatunji et al., 2007). Anxiety disorders are also among the earliest onset (Kessler et al., 2005) and most frequently diagnosed mental health conditions in youth (Franz et al., 2013; Merikangas et al., 2011; Salum et al., 2013).

Anxiety is a universal human experience and occasional anxiety, or the feeling of discomfort or distress in the face of threat, serves both motivating and protective roles in everyday life (Klein, 2009; Murray et al., 2009; Simpson et al., 2010). This poses a challenge for the current diagnostic nosology as patients rarely exhibit symptoms of only one anxiety disorder (Goldstein-Piekarski et al., 2016). Those with anxiety disorders typically display a combination of emotional distress, fear, worries, cognitive distortions, irritability, and physical symptoms (e.g., stomach aches, headaches, body aches). While some symptoms may be specific to a disorder, such as fears of negative evaluation in an individual with social anxiety disorder, the same individual may also worry about broader issues like the weather. Therefore, targeting a constellation of symptoms characteristic of a given anxiety disorder (e.g., separation fears for separation anxiety or social fears for social anxiety) is unlikely to ameliorate all anxiety symptoms. This may help to explain why cognitive behavioral treatments are not fully effective for all individuals (Hofmann, Asnaani, et al., 2012; Newby et al., 2015). Further, diagnostic stability of anxiety disorders, even within the same individual, is low (Hovenkamp-Hermelink et al., 2016), and the constellation of anxiety symptoms an individual experiences at a given time can vary as a function of development and personality factors as well as environment and social learning, including ethnocultural background, parenting practices, and acculturative experiences (Gordon & Teachman, 2008; McLaughlin et al., 2007; Varela et al., 2004). In fact, longitudinal studies of anxiety suggest that anxiety presentation changes across the lifespan, and so treating anxiety symptoms within the context of an individual disorder is unlikely to address the underlying etiology or prevent long-term changes in anxiety presentation (Hovenkamp-Hermelink et al., 2016). Thus, examining broader etiological factors for anxiety that may underlie such variable presentations and targeting these in treatment is likely to be more effective (Barlow et al., 2004; Boswell et al., 2013; Gordon & Teachman, 2008).

There are numerous behavioral and cognitive models of anxiety that serve as the basis of cognitive-behavioral interventions. For example, behavioral models posit that anxiety is maintained when avoidance of feared stimuli is negatively reinforced by feelings of relief (Krypotos et al., 2015). As a result, individuals are more likely to avoid such feared stimuli in the future and never learn that such stimuli are not dangerous. Exposure-based interventions aim to address this negative reinforcement cycle (Barlow, 1988). Alternatively, cognitive theories of anxiety suggest that individuals with anxiety disorders tend to overestimate the danger associated with the threat as well as demonstrate attentional biases towards or away from threat, which can further exacerbate anxious distress (Zinbarg et al., 1992). As a result, cognitive treatments aim to modify such cognitions and recent cognitive training interventions have been developed to shift attention away from threat to minimize such biases (Beck et al., 1974; Chambless & Gillis, 1993). For a more comprehensive review of neurocognitive, cognitive, and behavioral models of anxiety, please see Sylvester et al. (2012), Zinbarg et al. (1992), and Hofmann, Sawyer, et al. (2012).

IU models of anxiety disorders incorporate both cognitive and behavioral theories to explain the development and maintenance of anxiety symptoms (Carleton, 2012; Dugas, Buhr, et al., 2004). Specifically, theorists posit that IU is the cognitive schema through which individuals perceive uncertainty in the environment,

while anxiety or worry is the subsequent mental reaction or coping response to the perceived uncertainty (Dugas, Buhr, et al., 2004; Lee et al., 2010). As such, IU is associated with both cognitive (appraisal) biases and avoidance behaviors. Appraisal biases associated with IU reflect the tendency of individuals with high IU to demonstrate global, stable, and intrinsic attributions for uncertain (and therefore negatively perceived) events, as well as specific, unstable, and extrinsic attributions for more certain (and therefore positively perceived) events (Abramson et al., 1978; Freeston et al., 1994; Jacoby, 2020; Koerner & Dugas, 2007; Malivoire et al., 2019; Oglesby et al., 2019; Van Lancker Sidtis et al., 2006). Thus, those with high IU are more likely to be hypervigilant to uncertainty, demonstrating visual attention and recall processing biases toward uncertain stimuli (Fergus et al., 2013; Fergus & Carleton, 2016; Morriss et al., 2018; Van Lancker Sidtis et al., 2006) and detecting ambiguity when levels of uncertainty are relatively low or nonexistent (Buhr & Dugas, 2006; Dugas et al., 2001; Dugas & Robichaud, 2007; Freeston et al., 1994; Ladouceur et al., 1997). Additionally, those with high IU tend to overestimate both the cost and probability of uncertain negative outcomes (Bredemeier & Berenbaum, 2008; Nelson et al., 2016; Nelson et al., 2014) and inappropriately weigh small, immediately available, certain rewards, over uncertain positive outcomes occurring further in the future (Luhmann et al., 2011; Macatee et al., 2015; Radell et al., 2016). When uncertainty is detected, those with high IU tend to seek out more information in an effort to minimize or avoid it (Dugas, Buhr, et al., 2004; Dugas, Schwartz, et al., 2004; Koerner & Dugas, 2007), resulting in slower response styles and poorer behavioral performance on everyday tasks, such as typing (Thibodeau et al., 2013) and probability prediction (Hezel et al., 2019; Ladouceur et al., 1997). Attempts to minimize uncertainty also contribute to a rigid cognitive style among those with high IU as well as decreased access to cognitive flexibility and adaptive coping mechanisms (Boelen & Lenferink, 2018; Doruk et al., 2015).

IU can be subdivided into prospective IU, or the desire for predictability and the tendency for uncertainty to result in apprehensive anxiety prior to feared events, and inhibitory IU, or the tendency for uncertainty to cause behavioral inhibition or paralysis (Carleton et al., 2007). This subdivision further highlights the importance of both cognition and behavior in the IU model of anxiety. Indeed, there is evidence to suggest that these two facets of IU uniquely contribute to the development of worry and anxiety. Prospective IU has been theoretically implicated in the development of worry due to its relationship with future-oriented apprehension (Carleton et al., 2007; Dugas et al., 1997), while inhibitory IU is theorized to predict behavioral paralysis or a "freeze" response in the presence of uncertainty. However, experimental work has implicated prospective IU in emotion modulation (MacNamara, 2018) and inflexible avoidance (Flores et al., 2018), while inhibitory IU has been associated with increased rumination, worry, and procrastination (Boelen & Lenferink, 2018; Fourtounas & Thomas, 2016; Hong & Lee, 2015). Further, when compared to prospective IU, inhibitory IU has been associated with higher levels of distress and greater impairment, indicating that inhibitory IU may be the more debilitating component of IU (Boelen & Lenferink, 2018; Hong & Lee, 2015). There is mixed support for the unique contributions of prospective and inhibitory IU in the literature (Hale et al., 2016), suggesting that there may not be a clear distinction between them. Nevertheless, IU as a single construct has been consistently linked to both cognitive and behavioral components that contribute to the development and maintenance of worry and anxiety (Carleton, 2012; Dugas, Buhr, et al., 2004).

Early studies highlighted the role of IU in generalized anxiety disorder (GAD; e.g., Boelen & Carleton, 2012; Buhr & Dugas, 2006; Dugas et al., 1998; Mahoney & McEvoy, 2012; McEvoy & Mahoney, 2012) and demonstrated that changes in levels of IU predict and precede changes in worry in both clinical (Dugas & Ladouceur, 2000; Dugas & Koerner, 2005) and nonclinical (Ladouceur et al., 2000) samples. Since then, IU has been identified as a contributor to other anxiety-related disorders and problems such as social anxiety (e.g. Boelen & Carleton, 2012; Carleton, Collimore, et al., 2010; McEvoy & Mahoney, 2012), obsessive-compulsive disorder (e.g. Boelen & Carleton, 2012; Mahoney & McEvoy, 2012; McEvoy & Mahoney, 2012; Tolin et al., 2003), panic disorder (Carleton et al., 2014; Mahoney & McEvoy, 2012; McEvoy & Mahoney, 2012) and health anxiety (e.g. Boelen & Carleton, 2012; Deacon & Abramowitz, 2008; Fergus & Valentiner, 2011). In fact, inducing IU in nonclinical adults leads to an increase in compulsive behaviors, such as increased health monitoring and reassurance seeking, that are common in these anxious populations (Faleer et al., 2017; Mosca et al., 2016; Rosen et al., 2007). As such, it is now conceptualized as a transdiagnostic risk factor (Carleton, 2012).

Of note, IU may represent a particularly salient vulnerability factor for mental health problems in diverse populations in the United States. For example, IU appears to mediate the relationship between symptoms of posttraumatic stress disorder and depression among African American veterans (Hollingsworth et al., 2018) and to exacerbate trauma symptom severity among trauma-exposed Latina college students (Arbona et al., 2021). Studies of Black college students have found that IU mediates the relationship between perceived racial stress and worry (Rucker et al., 2010) as well as exacerbates the relationship between perceived microaggressions and anxiety symptoms (Liao et al., 2016). Further, heightened IU has been associated with increased willingness to seek mental health treatment among Black college students with low perceived discrimination but not those with high perceived discrimination (Dean et al., 2018). According to this model, among Black students with low perceived discrimination, high IU contributes to increased anxiety symptom severity and drives them to seek treatment. Thus, targeting IU in treatment is of particular importance to alleviate their distress. However, in ambiguous situations, such as those occurring prior to scheduling a mental health appointment, high IU may heighten perceived discrimination among Black students with already elevated perceived discrimination and reduce help-seeking (Dean et al., 2018). This study and others have demonstrated positive associations between elevated perceived discrimination and cultural mistrust, suggesting that those with elevated perceived discrimination may experience greater cultural mistrust and therefore be less willing to seek treatment or disclose difficulties once involved in treatment (Casagrande et al., 2007; Dean et al., 2018; Jackson et al., 1996; Whaley, 2001). Perceived discrimination and cultural mistrust may further interact with IU to decrease willingness to seek mental health treatment (Casagrande et al., 2007; Dean et al., 2018), increase premature termination (Casagrande et al., 2007; Whaley, 2001), and contribute to disproportionate outpatient mental health service usage among Black individuals (Cheung & Snowden, 1990; Snowden, 1999). These findings highlight the interaction between

IU and salient cross-cultural factors, and how they together may contribute to treatment adherence and treatment outcomes (Griner & Smith, 2006; Schraufnagel et al., 2006). Additional research in this area is necessary to better understand the associations between racial stress, IU, and psychopathology among ethnically diverse populations.

The Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) is the most widely used measure of IU. This 27-item scale was developed to assess 5 factors of IU that contribute to a single latent score: (1) uncertainty is unacceptable and should be avoided, (2) being uncertain reflects badly on an individual, (3) uncertainty is frustrating, (4) uncertainty causes stress, and (5) uncertainty prevents action (Freeston et al., 1994). Later factor analytic models argued for a shortened version of this scale to reduce item redundancy and unrelatedness (Carleton et al., 2007; Norton, 2005). The shortened version of the IUS consists of 12 items measuring both inhibitory IU and prospective IU (Carleton et al., 2007). The 12-item IUS has also been modified for use with children as self-report and parent-report measures (Comer et al., 2009; Cornacchio et al., 2018).

Both versions of the IUS (i.e., the full length and shortened versions) have been examined and validated in healthy and clinical populations (e.g. Birrell et al., 2011; Buhr & Dugas, 2002; Carleton, Gosselin, et al., 2010; Carleton et al., 2012; Carleton et al., 2007; Fergus & Wu, 2013; Renjan et al., 2016; Sexton & Dugas, 2009; Wilson et al., 2020) and have been translated into numerous languages, including Dutch (de Bruin et al., 2006; Helsen et al., 2013), French (Freeston et al., 1994), Chinese (Chen et al., 2018; Li et al., 2020; Yang, 2013; Yao et al., 2021), Turkish (Pak et al., 2021; Sarıçam et al., 2014), Brazilian Portuguese (Kretzmann & Gauer, 2020), and Persian (Zemestani et al., 2021). This has allowed for the examination of IU across cultures, which has generally shown stability across individuals from different countries, races, and ethnic backgrounds. Additionally, within the United States, researchers found that college students from diverse racial and ethnic groups performed similarly on the IUS, and the overall construct of IU showed strong reliability and validity across these groups (Fergus & Wu, 2013; Norton, 2005). However, there is also some evidence to suggest that individual items on the long form of the IUS function differently across ethnoracial groups, resulting in poor factor interpretability, despite high convergent validity and internal consistency across groups (Norton, 2005). While more research is needed to understand the reason for this difference, this work suggests that leveraging the abbreviated IUS or examining only a single IU factor may increase validity when utilizing the IUS cross-culturally (Hale et al., 2016; Norton, 2005).

The Salience Network Links Intolerance of Uncertainty and Anxiety

Despite significant improvements in the efficacy of psychosocial and pharmacological interventions for anxiety, these treatments remain only moderately effective for most patients (Hofmann, Asnaani, et al., 2012; Hofmann & Smits, 2008; Newby et al., 2015). As such, we need to leverage alternative avenues beyond traditional clinical research trials for understanding how normal anxiety becomes pathological (etiology), the factors and symptoms that maintain anxiety disorders (pathophysiology), and the factors that contribute to recovery (plasticity) to bridge the remaining gaps in treatment recovery outcomes. Advances in neuroimaging technology offer unique opportunities for improving currently available clinical interventions and aiding in the development of holistic, multimodal treatments for comprehensive mental health care by offering insight into anxiety etiology, pathophysiology, and plasticity (Wojtalik et al., 2018).

To demonstrate how neural mechanisms underlie IU and anxiety, we must first understand how uncertainty and anxious distress is typically processed in the brain. The brain is comprised of multiple functional networks that have been reliably observed (Braga & Buckner, 2017; Laumann et al., 2015; Power et al., 2011; Yeo et al., 2011). The salience network, which includes the insula and dorsal anterior cingulate cortex (dACC), is important for processing decision making, ambiguity, and novelty, and thus, is implicated in IU (Uddin, 2017). For example, the salience network responds to increased uncertainty with heightened insula activation (Paulus et al., 2001; Sarinopoulos et al., 2010; Simmons et al., 2008; Somerville et al., 2013; Volz et al., 2003; Volz et al., 2004; White et al., 2014), which is consistent with data suggesting that the salience network is implicated in identifying ambiguity and assigning emotional interpretations (i.e., subjective interpretations of confidence in one's own decision making) in the context of uncertainty (Schick et al., 2015; White et al., 2014). Greater uncertainty is also associated with increased activation in the dACC (Krain, Hefton, et al., 2006; Krain, Wilson, et al., 2006; Sarinopoulos et al., 2010; White et al., 2014), though these findings are somewhat less consistent (White et al., 2014). As such, these two regions within the salience network likely work together to identify, assess, and respond to uncertainty when it arises. This is supported by neural models of emotion regulation indicating that the anterior cingulate cortex downregulates activity in the insula when individuals try to regulate their emotions, such as when using cognitive restructuring or reappraisal (Etkin et al., 2015).

Once uncertainty has been identified, the salience network then communicates this uncertainty to primary emotion centers and brain regions important for muscle movement to direct behavior to address potential threat and generate emotional and motivational responses (Uddin, 2017). For example, theorists posit that emotional discomfort associated with uncertainty occurs through the salience network's downstream connections with regions in the limbic system, such as the amygdala and the orbitofrontal cortex (Menon, 2011; Uddin, 2015, 2017). This is supported by work that has found increasing uncertainty level in choice options to be related to activation in both the insula and in emotional processing regions such as the amygdala (Hsu et al., 2005; Sarinopoulos et al., 2010; Somerville et al., 2013) and orbitofrontal cortex (Hsu et al., 2005). Taken together, this evidence suggests that increases in activation in the insula and dACC occur in response to low perceived confidence and certainty. Subsequently, downstream co-activation between the salience network and amygdala drive emotional responding to uncertain situations.

There is increasing evidence implicating the salience network in both those with high anxiety and those with high IU. Increased insula activation is associated with anxiety cues during cognitive tasks in individuals with social anxiety (Boehme et al., 2015; Choi et al., 2016; Heitmann et al., 2017; Kim et al., 2018; Klumpp et al., 2012; Klumpp et al., 2013), panic disorder (Schwarzmeier et al., 2019), and dental anxiety (Lin et al., 2015) when compared to healthy controls. Further, work in healthy adults with high levels of anxiety suggests similar heightened activation in the insula in response to emotional faces (Ball et al., 2012; Killgore et al., 2011; Kim et al., 2018; Klumpp et al., 2013; Stein et al., 2007), neg-

ative images (Simmons et al., 2006), social risk (Tang et al., 2011), interoceptive processing (Tan et al., 2018), and anticipation of both positive (Simmons et al., 2011) and negative images (Carlson et al., 2011; Simmons et al., 2011). Behaviorally, disruptions in salience network activation during task performance may underlie anxious individuals' responses to uncertainty and emotion regulation strategies. For example, heightened insula activity has been associated with an increased likelihood of rejecting risky choices during a risky decision-making task (Engelmann et al., 2015). Studies also demonstrate attenuated insula activation in response to aversive stimuli in anxious individuals who use cognitive reappraisal strategies to cope with anxious distress (Carlson & Mujica-Parodi, 2010). If insula activation is increased in response to threat and decreased in response to effective coping, then it might be predicted that heightened insular activity blocks anxious individuals' access to adaptive coping strategies that may reduce their distress.

Among those with high IU, heightened insula activation has been observed during an affective ambiguity task (Simmons et al., 2008). Although other work has failed to observe this relationship between high self-reported IU scores and bilateral insula activation to uncertainty in healthy individuals, this relationship has been observed in patients with GAD (Oathes et al., 2015). Heightened IU has also been positively correlated with increases in right insula activity associated with anticipation of unpredictable aversive images (Shankman et al., 2014) and bilateral insula activity associated with uncertain reward (Gorka et al., 2016).

The dACC is thought to downregulate insula activity in response to threatening stimuli, allowing individuals to then access healthy coping mechanisms, such as cognitive reappraisal or problem solving (Menon, 2011). This notion is supported by work suggesting that compared to nonanxious controls, anxious individuals demonstrate reduced task-based co-activation (activation in both regions when one or the other is activated) between the insula and the dACC (Barker et al., 2018; Gimenez et al., 2012; Gorka et al., 2015; Heitmann et al., 2017; Klumpp et al., 2012; Klumpp et al., 2016; Klumpp et al., 2013; Krug & Carter, 2010; Tang et al., 2011) and work indicating that anxious individuals do not recruit the dACC during emotionally laden learning paradigms (Forster et al., 2015; Klumpp et al., 2013; Krug & Carter, 2010; Piray et al., 2019; Xu et al., 2013). Of note, there are some task-based studies in patients with social anxiety disorder that do not support this relationship between the dACC and insula (Boehme et al., 2015; Ziv et al., 2013). These conflicting findings may result from variability in tasks used or populations studied, which are known challenges to task-based neuroimaging work (Gonzalez-Castillo & Bandettini, 2018). Only one adult study has evaluated functional connectivity at rest and found salience network correlates of anxiety. Specifically, reduced connectivity at rest between salience network regions was observed in 99 healthy adults who were high in harm avoidance, a personality trait marked by excessive worry and avoidant behaviors (Huggins et al., 2018). Taken together, this evidence suggests that heightened insula and dACC activity as well as less co-activation between these two regions is associated with increased anxiety, reduced cognitive flexibility, and less access to adaptive coping strategies.

Despite the clear role of the dACC in processing uncertainty, studies examining activation in relation to IU have shown mixed results. For example, one study found that heightened IU was negatively associated with uncertainty-related activity in the dACC, dorsolateral prefrontal cortex, and the posterior frontomedial cortex (Schienle et al., 2010), while another study failed to find a relationship between dACC activation and IU in adults (Krain, Hefton, et al., 2006). Further, there is evidence of developmental shifts in the association between IU and dACC activation from studies of adolescents with and without anxiety disorders that show positive associations between dACC activity and IU in adolescents that are not observed in adults (Krain et al., 2008; Krain, Hefton, et al., 2006). This evidence indicates that the dACC plays a role in uncertainty processing, and IU elevations may alter the functioning in this region. However, additional research is necessary to fully understand the role of the dACC as it is associated with IU.

Taken together, there is considerable evidence supporting the role of the salience network in anxiety and preliminary evidence supporting its role in IU (Grupe & Nitschke, 2013; Tanovic et al., 2018; Xu et al., 2018). Given that IU is theorized to precede the onset of anxiety (Buhr & Dugas, 2006; Dugas, Buhr, et al., 2004), it is hypothesized that these alterations in brain functioning are associated with increased attention toward uncertainty and therefore contribute to increases in subjective feelings of uncertainty, low confidence, and greater anxiety symptoms even in the face of adequate evidence. Additional research is needed to clarify mixed findings in salience network functioning associated with IU and to improve our understanding of neural functioning underlying an IU model of anxiety development and maintenance.

Further support for the role of the salience network in IU and anxiety comes from investigations that find transcranial magnetic stimulation (TMS) of the dorsolateral prefrontal cortex normalizes brain function in the dACC and insula, improves anxiety symptoms, and recovers task performance in patients with GAD (Assaf et al., 2018). For example, in a study comparing patients with GAD to healthy participants, Assaf et al. (2018) found that using TMS on the dorsolateral prefrontal cortex in patients "normalized" function among salience network regions (e.g., decreased activation in the dACC), improved behavioral performance during uncertain tasks, and reduced worry symptoms. Specifically, prior to TMS treatment, functional connectivity within the ACC and between the dACC and the right anterior insula were positively correlated with IU. Following TMS treatment, patients receiving TMS demonstrated decreased functional connectivity within the ACC and reduced worry symptoms (Assaf et al., 2018). This study also found small, nonsignificant reductions in IU associated with TMS treatment; however, further research is needed to clarify these associations. The results of this preliminary study suggest that the salience network may be functioning abnormally in individuals with anxiety disorders when compared to their healthy peers and that by "resetting" it, there may be improvement in tolerance of uncertainty and anxiety symptoms.

Treatment Implications

Evidence suggests that although anxiety phenotypes may present differently across individuals, there is reason to believe that the underlying etiological and pathophysiological mechanisms are similar. Further, changes in IU are known to predict and precede changes in anxiety symptoms at both the behavioral (Buhr & Dugas, 2006; Dugas, Buhr, et al., 2004; Dugas et al., 2012) and neural level (Assaf et al., 2018). Thus, targeting changes in uncertainty tolerance represents an important mechanism for treating anxiety disorders. For example, emerging evidence suggests that transdiag-

nostic interventions for internalizing psychopathology, such as the Unified Protocol (Barlow et al., 2011; Boswell et al., 2013), that target mindful awareness and uncertainty tolerance, rather than anxiety symptoms, are as effective with less treatment dropout as disorder-specific treatments for anxiety (Barlow et al., 2017). This is important because anxiety symptoms, and therefore diagnoses, are not often stable across time (Hovenkamp-Hermelink et al., 2016) and so treating upstream, etiological factors associated with the development and maintenance of anxiety disorders, such as IU, is likely to improve treatment effectiveness and long-term outcomes.

Treatments targeting IU typically address both distorted cognitions and avoidance behavior by emphasizing catastrophic beliefs about uncertainty and behavioral experiments (Barlow et al., 2011; Hebert & Dugas, 2019). For example, Hebert and Dugas suggest addressing distorted cognitions related to the negative implications of uncertainty and beliefs that uncertainty is unfair and spoils everything. Behavioral experiments designed to improve uncertainty tolerance include those that expose individuals to uncertain situations and then prevent safety behaviors (e.g., checking, seeking out additional information) designed to alleviate uncertainty and related distress (Barlow et al., 2011; Hebert & Dugas). Following these exercises, clients are encouraged to reflect on the change in their distress over time as well as the objective experimental results (i.e., uncertainty did not result in feared outcomes) to consolidate new learning (Barlow et al., 2011; Hebert & Dugas). In addition to reductions in IU, these treatments have been found to improve cognitive flexibility and general psychological health (Stevens et al. 2018).

Given the ubiquity of IU across cultures and diverse groups, the next step is to validate these highly effective treatments in community settings to reach a wider range of patients who are not currently receiving adequate care (Wang et al., 2005). Importantly, when provided with high-quality, culturally sensitive, mental health care services, treatment outcome for diverse populations is comparable to White individuals (Griner & Smith, 2006; Schraufnagel et al., 2006). Thus, given that transdiagnostic treatments improve IU more than disorder-specific treatments with greater acceptability and treatment retention (Barlow et al., 2017) and that traditionally underserved populations make significant gains when provided with culturally sensitive, high-quality treatment (Griner & Smith, 2006; Schraufnagel et al., 2006), future studies translating treatments that target IU for use with traditionally underserved populations will likely demonstrate greater treatment efficacy, lower rates of dropout, and greater acceptability than treatments currently available for anxiety disorders. Such findings would demonstrate an important early step in addressing the disproportionate burden of mental health disorders and considerable unmet need for quality mental health services among traditionally underserved populations (Cassiello-Robbins et al., 2020; Hwang et al., 2008; Patel et al., 2010).

Conclusions

Although anxiety phenotypes may present differently across individuals, they likely share underlying neurocognitive biases such as IU and related salience network dysfunction. As a result, uncertainty tolerance represents an important clinical mechanism for addressing transdiagnostic anxiety (Boswell et al., 2013; Hebert & Dugas, 2019), which is supported by evidence that treatment-related changes in IU predict changes in anxiety symptoms at both the behavioral (Buhr & Dugas, 2006; Dugas, Buhr, et al., 2004; Dugas et al., 2012) and neural (Assaf et al., 2018; Diefenbach et al., 2016) levels. This is of particular importance among diverse populations because elevated IU may contribute to underutilization and lower willingness to seek treatment among some groups through its associations with perceived discrimination and cultural mistrust (Dean et al., 2018; Whaley, 2001). Given the considerable unmet need for highly effective, culturally sensitive treatments among traditionally underserved populations (Wang et al., 2005), IU could be leveraged as a cross-culturally relevant treatment target for anxiety disorders to address this gap and reduce disparate mental health burden. Future research is needed to better understand the etiology of IU as it relates to anxiety and its associations with sociocultural factors influencing willingness to seek treatment, to improve existing treatments and increase access among underserved populations.

References

Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87*(1), 49-74. https://doi.org/10.1037/0021-843X.87.1.49

Arbona, C., Rodriguez, L., Dragomir-Davis, M., Olvera, N., de Dios, M. A., & Cano, M. A. (2021). Intolerance of uncertainty and DSM-5 PTSD symptom severity among trauma exposed Latina college women. *Journal of Aggression, Maltreatment & Trauma*, 1-19. https://doi.org/10.1080/10926771.2020.1866132

Assaf, M., Rabany, L., Zertuche, L., Bragdon, L., Tolin, D., Goethe, J., & Diefenbach, G. (2018). Neural functional architecture and modulation during decision making under uncertainty in individuals with generalized anxiety disorder. *Brain and Behavior, 8*(8), e01015. https://doi.org/10.1002/brb3.1015

Ball, T. M., Sullivan, S., Flagan, T., Hitchcock, C. A., Simmons, A., Paulus, M. P., & Stein, M. B. (2012). Selective effects of social anxiety, anxiety sensitivity, and negative affectivity on the neural bases of emotional face processing. *Neuroimage, 59*(2), 1879-1887. https://doi.org/10.1016/j.neuroimage.2011.08.074

Barker, H., Munro, J., Orlov, N., Morgenroth, E., Moser, J., Eysenck, M. W., & Allen, P. (2018). Worry is associated with inefficient functional activity and connectivity in prefrontal and cingulate cortices during emotional interference. *Brain and Behavior, 8*(12), e01137. https://doi.org/10.1002/brb3.1137

Barlow, D. H. (1988). *Anxiety and its disorders: The nature and treatment of anxiety and panic.* Guilford Press.

Barlow, D. H., Allen, L. B., & Choate, M. L. (2004). Toward a unified treatment for emotional disorders. *Behavior Therapy, 35*(2), 205-230. https://doi.org/10.1016/s0005-7894(04)80036-4

Barlow, D. H., Farchione, T. J., Bullis, J. R., Gallagher, M. W., Murray-Latin, H., Sauer-Zavala, S., Bentley, K. H., Thompson-Hollands, J., Conklin, L. R., Boswell, J. F., Ametaj, A., Carl, J. R., Boettcher, H. T., & Cassiello-Robbins, C. (2017). The unified protocol for transdiagnostic treatment of emotional disorders compared with diagnosis-specific protocols for anxiety disorders: A randomized clinical trial. *JAMA Psychiatry, 74*(9), 875-884. https://doi.org/10.1001/jamapsychiatry.2017.2164

Barlow, D. H., Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Allen, L. B., & May, J. T. E. (2011). *Unified protocol for transdiagnostic treatment of emotional disorders: Therapist guide.* Oxford University Press.

Beck, A. T., Laude, R., & Bohnert, M. (1974). Ideational components of anxiety neurosis. *Archives of General Psychiatry, 31*(3), 319-325.

https://doi.org/10.1001/archpsyc.1974.01760150035005

Birrell, J., Meares, K., Wilkinson, A., & Freeston, M. (2011). Toward a definition of intolerance of uncertainty: A review of factor analytical studies of the Intolerance of Uncertainty Scale. *Clinical Psychology Review, 31*(7), 1198-1208. https://doi.org/10.1016/j.cpr.2011.07.009

Boehme, S., Ritter, V., Tefikow, S., Stangier, U., Strauss, B., Miltner, W. H., & Straube, T. (2015). Neural correlates of emotional interference in social anxiety disorder. *PloS One, 10*(6), e0128608. https://doi.org/10.1371/journal.pone.0128608

Boelen, P. A., & Carleton, R. N. (2012). Intolerance of uncertainty, hypochondriacal concerns, obsessive-compulsive symptoms, and worry. *Journal of Nervous and Mental Disease, 200*(3), 208-213. https://doi.org/10.1097/NMD.0b013e318247cb17

Boelen, P. A., & Lenferink, L. I. M. (2018). Latent class analysis of indicators of intolerance of uncertainty. S*candinavian Journal of Psychology, 59*(3), 243-251. https://doi.org/10.1111/sjop.12440

Bomyea, J., Ramsawh, H., Ball, T. M., Taylor, C. T., Paulus, M. P., Lang, A. J., & Stein, M. B. (2015). Intolerance of uncertainty as a mediator of reductions in worry in a cognitive behavioral treatment program for generalized anxiety disorder. *Journal of Anxiety Disorders, 33,* 90-94. https://doi.org/10.1016/j.janxdis.2015.05.004

Boswell, J. F., Thompson-Hollands, J., Farchione, T. J., & Barlow, D. H. (2013). Intolerance of uncertainty: A common factor in the treatment of emotional disorders. *Journal of Clinical Psychology, 69*(6), 630-645. https://doi.org/10.1002/jclp.21965

Bottesi, G., Noventa, S., Freeston, M. H., & Ghisi, M. (2019). Seeking certainty about Intolerance of Uncertainty: Addressing old and new issues through the Intolerance of Uncertainty Scale-Revised. *PloS One, 14*(2), e0211929. https://doi.org/10.1371/journal.pone.0211929

Braga, R. M., & Buckner, R. L. (2017). Parallel interdigitated distributed networks within the individual estimated by intrinsic functional connectivity. *Neuron, 95*(2), 457-471 e455. https://doi.org/10.1016/j.neuron.2017.06.038

Braveman, P., Egerter, S., & Williams, D. R. (2011). The social determinants of health: Coming of age. *Annual Review of Public Health, 32,* 381-398. https://doi.org/10.1146/annurev-publhealth-031210-101218

Bredemeier, K., & Berenbaum, H. (2008). Intolerance of uncertainty and perceived threat. *Behaviour Research and Therapy*, *46*(1), 28-38. https://doi.org/10.1016/j.brat.2007.09.006

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*(8), 931-945. https://doi.org/10.1016/s0005-7967(01)00092-4

Buhr, K., & Dugas, M. J. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders, 20*(2), 222-236. https://doi.org/10.1016/j.janxdis.2004.12.004

Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical perspectives. *Expert Review of Neurotherapeutics, 12*(8), 937-947. https://doi.org/10.1586/ern.12.82

Carleton, R. N. (2016a). Fear of the unknown: One fear to rule them all? *Journal of Anxiety Disorders, 41*(Supplement C), 5-21. https://doi.org/10.1016/j.janxdis.2016.03.011

Carleton, R. N. (2016b). Into the unknown: A review and synthesis of contemporary models involving uncertainty. *Journal of Anxiety Disorders, 39*(Supplement C), 30-43. https://doi.org/10.1016/j.janxdis.2016.02.007

Carleton, R. N., Collimore, K. C., & Asmundson, G. J. (2010). "It's not just the judgements--It's that I don't know": Intolerance of uncertainty as a predictor of social anxiety. *Journal of Anxiety Disorders, 24*(2), 189-195. https://doi.org/10.1016/j.janxdis.2009.10.007

Carleton, R. N., Duranceau, S., Freeston, M. H., Boelen, P. A., McCabe, R. E., & Antony, M. M. (2014). "But it might be a heart attack": Intolerance of uncertainty and panic disorder symptoms. *Journal of Anxiety Disorders, 28*(5), 463-470. https://doi.org/10.1016/j.janxdis.2014.04.006

Carleton, R. N., Gosselin, P., & Asmundson, G. J. (2010). The intolerance of uncertainty index: Replication and extension with an English sample. *Psychological Assessment, 22*(2), 396-406. https://doi.org/10.1037/a0019230

Carleton, R. N., Mulvogue, M. K., Thibodeau, M. A., McCabe, R. E., Antony, M. M., & Asmundson, G. J. (2012). Increasingly certain about uncertainty: Intolerance of uncertainty across anxiety and depression. *Journal of Anxiety Disorders, 26*(3), 468-479. https://doi.org/10.1016/j.janxdis.2012.01.011

Carleton, R. N., Norton, M. A., & Asmundson, G. J. (2007). Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders, 21*(1), 105-117. https://doi.org/10.1016/j.janxdis.2006.03.014

Carlson, J. M., Greenberg, T., Rubin, D., & Mujica-Parodi, L. R. (2011). Feeling anxious: Anticipatory amygdalo-insular response predicts the feeling of anxious anticipation. *Social Cognitive and Affective Neuroscience, 6*(1), 74-81. https://doi.org/10.1093/scan/nsq017

Carlson, J. M., & Mujica-Parodi, L. R. (2010). A disposition to reappraise decreases anterior insula reactivity during anxious anticipation. *Biological Psychology, 85*(3), 383-385. https://doi.org/10.1016/j.biopsycho.2010.08.010

Casagrande, S. S., Gary, T. L., LaVeist, T. A., Gaskin, D. J., & Cooper, L. A. (2007). Perceived discrimination and adherence to medical care in a racially integrated community. *Journal of General Internal Medicine, 22*(3), 389-395. https://doi.org/10.1007/s11606-006-0057-4

Cassiello-Robbins, C., Southward, M. W., Tirpak, J. W., & Sauer-Zavala, S. (2020). A systematic review of Unified Protocol applications with adult populations: Facilitating widespread dissemination via adaptability. *Clinical Psychology Review, 78*, 101852. https://doi.org/10.1016/j.cpr.2020.101852

Chambless, D. L., & Gillis, M. M. (1993). Cognitive therapy of anxiety disorders. *Journal of Consulting and Clinical Psychology, 61*(2), 248-60. https://doi.org/10.1037//0022-006x.61.2.248. 248.

Chen, S., Yao, N., & Qian, M. (2018). The influence of uncertainty and intolerance of uncertainty on anxiety. *Journal of Behavior Therapy and Experimental Psychiatry, 61*, 60-65. https://doi.org/10.1016/j.jbtep.2018.06.005

Cheung, F. K., & Snowden, L. R. (1990). Community mental health and ethnic minority populations. *Community Mental Health Journal, 26*(3), 277-291. https://doi.org/10.1007/BF00752778

Choi, S. H., Shin, J. E., Ku, J., & Kim, J. J. (2016). Looking at the self in front of others: Neural correlates of attentional bias in social anxiety. *Journal of Psychiatric Research, 75*, 31-40. https://doi.org/10.1016/j.jpsychires.2016.01.001

Comer, J. S., Roy, A. K., Furr, J. M., Gotimer, K., Beidas, R. S., Dugas, M. J., & Kendall, P. C. (2009). The intolerance of uncertainty scale for children: A psychometric evaluation. *Psychological Assessment, 21*(3), 402-411. https://doi.org/10.1037/a0016719

Cornacchio, D., Sanchez, A. L., Coxe, S., Roy, A., Pincus, D. B., Read, K. L., Holaway, R. M., Kendall, P. C., & Comer, J. S. (2018). Factor structure of the intolerance of uncertainty scale for children.

Journal of Anxiety Disorders, 53, 100-107. https://doi.org/10.1016/j.janxdis.2017.07.003

de Bruin, G. O., Rassin, E., van der Heiden, C., & Muris, P. (2006). Psychometric properties of a Dutch version of the Intolerance of Uncertainty Scale. *Netherlands Journal of Psychology, 62*(2), 87. https://doi.org/10.1007/bf03061055

Deacon, B., & Abramowitz, J. S. (2008) Is hypochondriasis related to obsessive-compulsive disorder, panic disorder, or both? An empirical evaluation. *Journal of Cognitive Psychotherapy 22*(2), 115-127. https://doi.org/10.1891/0889-8391.22.2.115

Dean, K. E., Long, A. C. J., Matthews, R. A., & Buckner, J. D. (2018). Willingness to seek treatment among black students with anxiety or depression: The synergistic effect of sociocultural factors with symptom severity and intolerance of uncertainty. *Behavior Therapy, 49*(5), 691-701. https://doi.org/10.1016/j.beth.2017.12.008

Diefenbach, G. J., Bragdon, L. B., Zertuche, L., Hyatt, C. J., Hallion, L. S., Tolin, D. F., Goethe, J. W., & Assaf, M. (2016). Repetitive transcranial magnetic stimulation for generalised anxiety disorder: A pilot randomised, double-blind, sham-controlled trial. *British Journal of Psychiatry, 209*(3), 222-228. https://doi.org/10.1192/bjp.bp.115.168203

Doruk, A., Dugenci, M., Ersoz, F., & Oznur, T. (2015). Intolerance of uncertainty and coping mechanisms in non-clinical young subjects. *Noropsikiyatri Arsivi 52*(4), 400-405. https://doi.org/10.5152/npa.2015.8779

Dugas, M. J., Buhr, K., & Ladouceur, R. (2004). The role of intolerance of uncertainty in etiology and maintenance. In R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (pp. 143-163). Guilford Press.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*(6), 593-606. https://doi.org/10.1023/a:1021890322153

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226. https://doi.org/10.1016/S0005-7967(97)00070-3

Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a non-clinical sample. *Cognitive Therapy and Research, 25*(5), 551-558. https://doi.org/10.1023/a:1005553414688

Dugas, M. J., & Ladouceur, R. (2000). Treatment of GAD. Targeting intolerance of uncertainty in two types of worry. *Behavior Modification, 24*(5), 635-657. https://doi.org/10.1177/01454455002450 02

Dugas, M. J., Laugesen, N., & Bukowski, W. M. (2012). Intolerance of uncertainty, fear of anxiety, and adolescent worry. *Journal of Abnormal Child Psychology, 40*(6), 863-870. https://doi.org/10.1007/s10802-012-9611-1

Dugas, M. J., & Robichaud, M. (2007). *Cognitive-behavioral treatment for generalized anxiety disorder: From science to practice*. Taylor & Francis.

Dugas, M. J., Schwartz, A., & Francis, K. (2004). Brief report: Intolerance of uncertainty, worry, and depression. *Cognitive Therapy and Research, 28*(6), 835-842. https://doi.org/10.1007/s10608-004-0669-0

Engelmann, J. B., Meyer, F., Fehr, E., & Ruff, C. C. (2015). Anticipatory anxiety disrupts neural valuation during risky choice. *Journal of Neuroscience, 35*(7), 3085-3099. https://doi.org/10.1523/JNEUROSCI.2880-14.2015

Erickson, S. R., Guthrie, S., Vanetten-Lee, M., Himle, J., Hoffman, J., Santos, S. F., Janeck, A. S., Zivin, K., & Abelson, J. L. (2009). Severity of anxiety and work-related outcomes of patients with anxiety disorders. *Depression and Anxiety, 26*(12), 1165-1171. https://doi.org/10.1002/da.20624

Etkin, A., Buchel, C., & Gross, J. J. (2015). The neural bases of emotion regulation. *Nature Reviews: Neuroscience, 16*(11), 693-700. https://doi.org/10.1038/nrn4044

Faleer, H. E., Fergus, T. A., Bailey, B. E., & Wu, K. D. (2017). Examination of an experimental manipulation of intolerance of uncertainty on obsessive-compulsive outcomes. *Journal of Obsessive-Compulsive and Related Disorders, 15*, 64-73. https://doi.org/10.1016/j.jocrd.2017.07.002

Fergus, T. A., Bardeen, J., & Wu, K. (2013). Intolerance of uncertainty and uncertainty-related attentional biases: Evidence of facilitated engagement or disengagement difficulty? *Cognitive Therapy and Research, 37*(4), 735-741. https://doi.org/10.1007/s10608-012-9509-9

Fergus, T. A., & Carleton, R. N. (2016). Intolerance of uncertainty and attentional networks: Unique associations with alerting. *Journal of Anxiety Disorders, 41*(Supplement C), 59-64. https://doi.org/10.1016/j.janxdis.2016.03.010

Fergus, T. A., & Valentiner, D. P. (2011). Intolerance of uncertainty moderates the relationship between catastrophic health appraisals and health anxiety. *Cognitive Therapy and Research, 35*(6), 560-565. https://doi.org/10.1007/s10608-011-9392-9

Fergus, T. A., & Wu, K. D. (2013). The intolerance of uncertainty scale: Measurement invariance, population heterogeneity, and its relation with worry among self-identifying White and Black respondents. *Assessment, 20*(5), 555-564. https://doi.org/10.1177/1073191112460272

Flores, A., Lopez, F. J., Vervliet, B., & Cobos, P. L. (2018). Intolerance of uncertainty as a vulnerability factor for excessive and inflexible avoidance behavior. *Behaviour Research and Therapy, 104,* 34-43. https://doi.org/10.1016/j.brat.2018.02.008

Forster, S., Nunez Elizalde, A. O., Castle, E., & Bishop, S. J. (2015). Unraveling the anxious mind: Anxiety, worry, and frontal engagement in sustained attention versus off-task processing. *Cerebral Cortex, 25*(3), 609-618. https://doi.org/10.1093/cercor/bht248

Fourtounas, A., & Thomas, S. J. (2016). Cognitive factors predicting checking, procrastination and other maladaptive behaviours: Prospective versus inhibitory intolerance of uncertainty. *Journal of Obsessive-Compulsive and Related Disorders, 9*, 30-35. https://doi.org/10.1016/j.jocrd.2016.02.003

Franz, L., Angold, A., Copeland, W., Costello, E. J., Towe-Goodman, N., & Egger, H. (2013). Preschool anxiety disorders in pediatric primary care: Prevalence and comorbidity. *Journal of the American Academy of Child and Adolescent Psychiatry, 52*(12), 1294-1303. https://doi.org/10.1016/j.jaac.2013.09.008

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802. https://doi.org/10.1016/0191-8869(94)90048-5

Gehlert, S., Sohmer, D., Sacks, T., Mininger, C., McClintock, M., & Olopade, O. (2008). Targeting health disparities: A model linking upstream determinants to downstream interventions. *Health Affairs (Project Hope), 27*(2), 339-349. https://doi.org/10.1377/hlthaff.27.2.339

Gimenez, M., Pujol, J., Ortiz, H., Soriano-Mas, C., Lopez-Sola, M., Farre, M., Deus, J., Merlo-Pich, E., & Martin-Santos, R. (2012). Altered brain functional connectivity in relation to perception of scrutiny in social anxiety disorder. *Psychiatry Research, 202*(3), 214-223. https://doi.org/10.1016/j.pscychresns.2011.10.008

Goldstein-Piekarski, A. N., Williams, L. M., & Humphreys, K. (2016). A trans-diagnostic review of anxiety disorder comorbidity and the impact of multiple exclusion criteria on studying clinical outcomes in anxiety disorders. *Translational Psychiatry, 6*(6), e847-e847. https://doi.org/10.1038/tp.2016.108

Gonzalez-Castillo, J., & Bandettini, P. A. (2018, Oct 15). Task-based dynamic functional connectivity: Recent findings and open questions. *Neuroimage, 180*(Pt B), 526-533. https://doi.org/10.1016/j.neuroimage.2017.08.006

Gordon, T. L., & Teachman, B. A. (2008). Ethnic group differences in affective, behavioral, and cognitive markers of anxiety. *Journal of Cross-Cultural Psychology, 39*(4), 424-446. https://doi.org/10.1177/0022022108318224

Gorka, S. M., Fitzgerald, D. A., Labuschagne, I., Hosanagar, A., Wood, A. G., Nathan, P. J., & Phan, K. L. (2015). Oxytocin modulation of amygdala functional connectivity to fearful faces in generalized social anxiety disorder. *Neuropsychopharmacology, 40*(2), 278-286. https://doi.org/10.1038/npp.2014.168

Gorka, S. M., Nelson, B. D., Phan, K. L., & Shankman, S. A. (2016). Intolerance of uncertainty and insula activation during uncertain reward. *Cognitive, Affective & Behavioral Neuroscience, 16*(5), 929-939. https://doi.org/10.3758/s13415-016-0443-2

Griner, D., & Smith, T. B. (2006). Culturally adapted mental health intervention: A meta-analytic review. *Psychotherapy: Theory, Research, Practice, Training, 43*(4), 531-548. https://doi.org/10.1037/0033-3204.43.4.531

Grupe, D. W., & Nitschke, J. B. (2013). Uncertainty and anticipation in anxiety: An integrated neurobiological and psychological perspective. *Nature Reviews: Neuroscience, 14*(7), 488-501. https://doi.org/10.1038/nrn3524

Hale, W., Richmond, M., Bennett, J., Berzins, T., Fields, A., Weber, D., Beck, M., & Osman, A. (2016). Resolving uncertainty about the Intolerance of Uncertainty Scale-12: Application of modern psychometric strategies. *Journal of Personality Assessment, 98*(2), 200-208. https://doi.org/10.1080/00223891.2015.1070355

Hebert, E. A., & Dugas, M. J. (2019). Behavioral experiments for intolerance of uncertainty: Challenging the unknown in the treatment of generalized anxiety disorder. *Cognitive and Behavioral Practice, 26*(2), 421-436. https://doi.org/10.1016/j.cbpra.2018.07.007

Heitmann, C. Y., Feldker, K., Neumeister, P., Brinkmann, L., Schrammen, E., Zwitserlood, P., & Straube, T. (2017). *Brain activation to task-irrelevant disorder-related threat in social anxiety disorder: The impact of symptom severity. NeuroImage: Clinical, 14*, 323-333. https://doi.org/10.1016/j.nicl.2017.01.020

Helsen, K., Van den Bussche, E., Vlaeyen, J. W. S., & Goubert, L. (2013). Confirmatory factor analysis of the Dutch Intolerance of Uncertainty Scale: Comparison of the full and short version. *Journal of Behavior Therapy and Experimental Psychiatry, 44*(1), 21-29. https://doi.org/10.1016/j.jbtep.2012.07.004

Hezel, D. M., Stewart, S. E., Riemann, B. C., & McNally, R. J. (2019). Standard of proof and intolerance of uncertainty in obsessive-compulsive disorder and social anxiety disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 64*, 36-44. https://doi.org/10.1016/j.jbtep.2019.02.002

Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research, 36*(5), 427-440. https://doi.org/10.1007/s10608-012-9476-1

Hofmann, S. G., Sawyer, A. T., Fang, A., & Asnaani, A. (2012). Emotion dysregulation model of mood and anxiety disorders. *Depression and Anxiety, 29*(5), 409-416. https://doi.org/ 10.1002/da.21888

Hofmann, S. G., & Smits, J. A. (2008). Cognitive-behavioral therapy for adult anxiety disorders: A meta-analysis of randomized placebo-controlled trials. *Journal of Clinical Psychiatry, 69*(4), 621-632. https://www.ncbi.nlm.nih.gov/pubmed/18363421

Hollingsworth, D. W., Gauthier, J. M., McGuire, A. P., Peck, K. R., Hahn, K. S., & Connolly, K. M. (2018). Intolerance of uncertainty mediates symptoms of PTSD and depression in African American veterans with comorbid PTSD and substance use disorders. *Journal of Black Psychology, 44*(7), 667-688. https://doi.org/10.1177/0095798418809201

Hong, R. Y., & Lee, S. S. (2015). Further clarifying prospective and inhibitory intolerance of uncertainty: Factorial and construct validity of test scores from the Intolerance of Uncertainty Scale. *Psychological Assessment, 27*(2), 605-620. https://doi.org/10.1037/pas0000074

Hovenkamp-Hermelink, J. H. M., Riese, H., van der Veen, D. C., Batelaan, N. M., Penninx, B. W. J. H., & Schoevers, R. A. (2016). Low stability of diagnostic classifications of anxiety disorders over time: A six-year follow-up of the NESDA study. *Journal of Affective Disorders, 190*, 310-315. https://doi.org/10.1016/j.jad.2015.10.035

Hsu, M., Bhatt, M., Adolphs, R., Tranel, D., & Camerer, C. F. (2005). Neural systems responding to degrees of uncertainty in human decision-making. *Science, 310*(5754), 1680-1683. https://doi.org/10.1126/science.1115327

Huggins, A. A., Belleau, E. L., Miskovich, T. A., Pedersen, W. S., & Larson, C. L. (2018). Moderating effects of harm avoidance on resting-state functional connectivity of the anterior insula. *Frontiers in Human Neuroscience, 12*(447), 1-9. https://doi.org/10.3389/fnhum.2018.00447

Hwang, W. C., Myers, H. F., Abe-Kim, J., & Ting, J. Y. (2008). A conceptual paradigm for understanding culture's impact on mental health: The cultural influences on mental health (CIMH) model. *Clinical Psychology Review, 28*(2), 211-227. https://doi.org/10.1016/j.cpr.2007.05.001

Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., Sanislow, C., & Wang, P. (2010). Research domain criteria (RDoC): Toward a new classification framework for research on mental disorders. *American Journal of Psychiatry, 167*(7), 748-751. https://doi.org/10.1176/appi.ajp.2010.09091379

Jackson, J. S., Brown, T. N., Williams, D. R., Torres, M., Sellers, S. L., & Brown, K. (1996). Racism and the physical and mental health status of African Americans: A thirteen year national panel study. *Ethnicity and Disease, 6*(1-2), 132-147.

Jacoby, R. J. (2020). Intolerance of uncertainty. In *Clinical handbook of fear and anxiety: Maintenance processes and treatment mechanisms* (pp. 45-63). American Psychological Association. https://doi.org/10.1037/0000150-003

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Archives of General Psychiatry, 62(6), 593-602. https://doi.org/10.1001/archpsyc.62.6.593

Kessler, R. C., Ruscio, A. M., Shear, K., & Wittchen, H.-U. (2009). Epidemiology of anxiety disorders. In M. M. Antony & M. B. Stein (Eds.), *Oxford Handbook of Anxiety and Related Disorders.* Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195307030.013.0002

Killgore, W. D., Britton, J. C., Price, L. M., Gold, A. L., Deckersbach, T., & Rauch, S. L. (2011). Neural correlates of anxiety sensitivity during masked presentation of affective faces. *Depression and Anxiety, 28*(3), 243-249. https://doi.org/10.1002/da.20788

Kim, S. Y., Shin, J. E., Lee, Y. I., Kim, H., Jo, H. J., & Choi, S. H. (2018). Neural evidence for persistent attentional bias to threats in patients with social anxiety disorder. *Social Cognitive and Affective Neuroscience, 13*(12), 1327-1336. https://doi.org/10.1093/scan/nsy101

Klein, R. G. (2009). Anxiety disorders. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 50*(1-2), 153-162. https://doi.org/10.1111/j.1469-7610.2008.02061.x

Klumpp, H., Angstadt, M., & Phan, K. L. (2012). Insula reactivity and connectivity to anterior cingulate cortex when processing threat in generalized social anxiety disorder. *Biological Psychology, 89*(1), 273-276. https://doi.org/10.1016/j.biopsycho.2011.10.010

Klumpp, H., Fitzgerald, D. A., Piejko, K., Roberts, J., Kennedy, A. E., & Phan, K. L. (2016). Prefrontal control and predictors of cognitive behavioral therapy response in social anxiety disorder. *Social Cognitive and Affective Neuroscience, 11*(4), 630-640. https://doi.org/10.1093/scan/nsv146

Klumpp, H., Post, D., Angstadt, M., Fitzgerald, D. A., & Phan, K. L. (2013). Anterior cingulate cortex and insula response during indirect and direct processing of emotional faces in generalized social anxiety disorder. *Biology of Mood & Anxiety Disorders, 3*(1), 1-9. https://doi.org/10.1186/2045-5380-3-7

Koerner, N., & Dugas, M. J. (2007). An investigation of appraisals in individuals vulnerable to excessive worry: The role of intolerance of uncertainty. *Cognitive Therapy and Research, 32*(5), 619-638. https://doi.org/10.1007/s10608-007-9125-2

Krain, A. L., Gotimer, K., Hefton, S., Ernst, M., Castellanos, F. X., Pine, D. S., & Milham, M. P. (2008). A functional magnetic resonance imaging investigation of uncertainty in adolescents with anxiety disorders. *Biological Psychiatry, 63*(6), 563-568. https://doi.org/10.1016/j.biopsych.2007.06.011

Krain, A. L., Hefton, S., Pine, D. S., Ernst, M., Castellanos, F. X., Klein, R. G., & Milham, M. P. (2006). An fMRI examination of developmental differences in the neural correlates of uncertainty and decision-making. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 47*(10), 1023-1030. https://doi.org/10.1111/j.1469-7610.2006.01677.x

Krain, A. L., Wilson, A. M., Arbuckle, R., Castellanos, F. X., & Milham, M. P. (2006). Distinct neural mechanisms of risk and ambiguity: A meta-analysis of decision-making. *Neuroimage, 32*(1), 477-484. https://doi.org/10.1016/j.neuroimage.2006.02.047

Kretzmann, R. P., & Gauer, G. (2020). Psychometric properties of the Brazilian Intolerance of Uncertainty Scale - Short Version (IUS-12). *Trends in Psychiatry and Psychotherapy, 42*(2), 129-137. https://doi.org/10.1590/2237-6089-2018-0087

Krug, M. K., & Carter, C. S. (2010). Adding fear to conflict: A general purpose cognitive control network is modulated by trait anxiety. *Cognitive, Affective & Behavioral Neuroscience, 10*(3), 357-371. https://doi.org/10.3758/CABN.10.3.357

Krypotos, A.-M., Effting, M., Kindt, M., & Beckers, T. (2015). Avoidance learning: A review of theoretical models and recent developments. *Frontiers in Behavioral Neuroscience, 9*(189). https://doi.org/10.3389/fnbeh.2015.00189

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: a study of a theoretical model of worry. *Behaviour Research and Therapy, 38*(9), 933-941. https://doi.org/https://doi.org/10.1016/S0005-7967(99)00133-3

Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. Experimental findings. *Behavior Modification, 21*(3), 355-371. https://doi.org/10.1177/01454455970213006

Laumann, T. O., Gordon, E. M., Adeyemo, B., Snyder, A. Z., Joo, S. J., Chen, M. Y., Gilmore, A. W., McDermott, K. B., Nelson, S. M., Dosenbach, N. U., Schlaggar, B. L., Mumford, J. A., Poldrack, R. A., & Petersen, S. E. (2015). Functional system and areal organization of a highly sampled individual human brain. *Neuron, 87*(3), 657-670. https://doi.org/10.1016/j.neuron.2015.06.037

Lee, J. K., Orsillo, S. M., Roemer, L., & Allen, L. B. (2010). Distress and avoidance in generalized anxiety disorder: Exploring the relationships with intolerance of uncertainty and worry. *Cognitive Behaviour Therapy, 39*(2), 126-136. https://doi.org/10.1080/16506070902966918

Li, S., Yang, F., Li, P., Wang, X., Dai, J., & Deng, Y. (2020). Psychometric properties of the chinese version of the intolerance of uncertainty inventory in Chinese college students. *Neuropsychiatric Disease and Treatment, 16*, 2579-2589. https://doi.org/10.2147/NDT.S268313

Liao, K. Y.-H., Weng, C.-Y., & West, L. M. (2016). Social connectedness and intolerance of uncertainty as moderators between racial microaggressions and anxiety among Black individuals. *Journal of Counseling Psychology, 63*(2), 240–246. https://doi.org/10.1037/cou0000123

Lin, C. S., Wu, S. Y., & Wu, L. T. (2015). The anterior insula and anterior cingulate cortex are associated with avoidance of dental treatment based on prior experience of treatment in healthy adults. *BMC Neuroscience, 16*(88), 1-11. https://doi.org/10.1186/s12868-015-0224-9

Luhmann, C. C., Ishida, K., & Hajcak, G. (2011). Intolerance of uncertainty and decisions about delayed, probabilistic rewards. *Behavior Therapy, 42*(3), 378-386. https://doi.org/10.1016/j.beth.2010.09.002

Macatee, R. J., Sarawgi, S., Norr, A. M., Oglesby, M. E., Lejuez, C. W., & Cougle, J. R. (2015). Behavioral assessment of risk-taking under uncertain threat: Associations with affect and pain tolerance. *Personality and Individual Differences, 87*, 256-260. https://doi.org/10.1016/j.paid.2015.08.019

MacNamara, A. (2018). In the mind's eye: The late positive potential to negative and neutral mental imagery and intolerance of uncertainty. *Psychophysiology, 55*(5), e13024. https://doi.org/10.1111/psyp.13024

Mahoney, A. E., & McEvoy, P. M. (2012). A transdiagnostic examination of intolerance of uncertainty across anxiety and depressive disorders. *Cognitive Behaviour Therapy, 41*(3), 212-222. https://doi.org/10.1080/16506073.2011.622130

Malivoire, B. L., Marcos, M., Pawluk, E. J., Tallon, K., Kusec, A., & Koerner, N. (2019). Look before you leap: the role of negative urgency in appraisals of ambiguous and unambiguous scenarios in individuals high in generalized anxiety disorder symptoms. *Cognitive Behaviour Therapy, 48*(3), 217-240. https://doi.org/10.1080/16506073.2018.1508247

McEvoy, P. M., & Mahoney, A. E. (2012). To be sure, to be sure: Intolerance of uncertainty mediates symptoms of various anxiety disorders and depression. *Behavior Therapy, 43*(3), 533-545. https://doi.org/10.1016/j.beth.2011.02.007

McLaughlin, K. A., Hilt, L. M., & Nolen-Hoeksema, S. (2007). Racial/ethnic differences in internalizing and externalizing symptoms in adolescents. *Journal of Abnormal Child Psychology, 35*(5), 801-816. https://doi.org/10.1007/s10802-007-9128-1

Mendlowicz, M. V., & Stein, M. B. (2000). Quality of life in individuals with anxiety disorders. *American Journal of Psychiatry, 157*(5), 669-682. https://doi.org/10.1176/appi.ajp.157.5.669

Menon, V. (2011). Large-scale brain networks and psychopathology: A unifying

triple network model. *Trends in Cognitive Sciences, 15*(10), 483-506. https://doi.org/10.1016/j.tics.2011.08.003

Merikangas, K. R., He, J. P., Burstein, M., Swendsen, J., Avenevoli, S., Case, B., Georgiades, K., Heaton, L., Swanson, S., & Olfson, M. (2011). Service utilization for lifetime mental disorders in U.S. adolescents: Results of the National Comorbidity Survey-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry, 50*(1), 32-45. https://doi.org/10.1016/j.jaac.2010.10.006

Morriss, J., McSorley, E., & van Reekum, C. M. (2018). I don't know where to look: The impact of intolerance of uncertainty on saccades towards non-predictive emotional face distractors. *Cognition & Emotion, 32*(5), 953-962. https://doi.org/10.1080/02699931.2017.1370418

Murray, L., Creswell, C., & Cooper, P. J. (2009). The development of anxiety disorders in childhood: An integrative review. *Psychological Medicine, 39*(9), 1413-1423. https://doi.org/10.1017/S0033291709005157

Nelson, B. D., Kessel, E. M., Jackson, F., & Hajcak, G. (2016). The impact of an unpredictable context and intolerance of uncertainty on the electrocortical response to monetary gains and losses. *Cognitive, Affective & Behavioral Neuroscience, 16*(1), 153-163. https://doi.org/10.3758/s13415-015-0382-3

Nelson, B. D., Shankman, S. A., & Proudfit, G. H. (2014). Intolerance of uncertainty mediates reduced reward anticipation in major depressive disorder. *Journal of Affective Disorders, 158,* 108-113. https://doi.org/10.1016/j.jad.2014.02.014

Newby, J. M., McKinnon, A., Kuyken, W., Gilbody, S., & Dalgleish, T. (2015). Systematic review and meta-analysis of transdiagnostic psychological treatments for anxiety and depressive disorders in adulthood. *Clinical Psychology Review, 40*, 91-110. https://doi.org/10.1016/j.cpr.2015.06.002

Nock, M. K., Hwang, I., Sampson, N. A., & Kessler, R. C. (2010). Mental disorders, comorbidity and suicidal behavior: Results from the National Comorbidity Survey Replication. *Molecular Psychiatry, 15*(8), 868-876. https://doi.org/10.1038/mp.2009.29

Norton, P. J. (2005). A psychometric analysis of the Intolerance of Uncertainty Scale among four racial groups. *Journal of Anxiety Disorders, 19*(6), 699-707. https://doi.org/10.1016/j.janxdis.2004.08.002

Oathes, D. J., Hilt, L. M., & Nitschke, J. B. (2015). Affective neural responses modulated by serotonin transporter genotype in clinical anxiety and depression. *PloS One, 10*(2), e0115820. https://doi.org/10.1371/journal.pone.0115820

OECD. (2015). *Mental Health and Work Fit Mind, Fit Job: From Evidence to Practice in Mental Health and Work*. OECD Publishing.

Oglesby, M. E., Stentz, L. A., Portero, A. K., King, S. L., & Schmidt, N. B. (2019). Exaggerated interpretation bias for uncertain information as a predictor of anxiety-related symptoms: A new method of assessment for IU. *Journal of Behavior Therapy and Experimental Psychiatry, 64*, 64-71. https://doi.org/10.1016/j.jbtep.2019.02.010

Olatunji, B. O., Cisler, J. M., & Tolin, D. F. (2007). Quality of life in the anxiety disorders: A meta-analytic review. *Clinical Psychology Review, 27*(5), 572-581. https://doi.org/10.1016/j.cpr.2007.01.015

Pak, H., Süsen, Y., Denizci Nazlıgül, M., & Griffiths, M. (2021). The Mediating effects of fear of COVID-19 and depression on the association between intolerance of uncertainty and emotional eating during the COVID-19 pandemic in Turkey. *International Journal of Mental Health and Addiction,* 1-15. https://doi.org/10.1007/s11469-021-00489-z

Patel, V., Lund, C., Hatherill, S., Plagerson, S., Corrigall, J., Funk, M., & Flisher, A. J. (2010). Mental disorders: Equity and social determinants. In E. Blas & A. Sivasankara Kurup (Eds.), *Equity, social determinants and public health programmes* (Vol. 115, pp. 134). The World Health Organization.

Paulus, M. P., Hozack, N., Zauscher, B., McDowell, J. E., Frank, L., Brown, G. G., & Braff, D. L. (2001). Prefrontal, parietal, and temporal cortex networks underlie decision-making in the presence of uncertainty. *Neuroimage, 13*(1), 91-100. https://doi.org/10.1006/nimg.2000.0667

Piray, P., Ly, V., Roelofs, K., Cools, R., & Toni, I. (2019). Emotionally aversive cues suppress neural systems underlying optimal learning in socially anxious individuals. *Journal of Neuroscience, 39*(8), 1445-1456. https://doi.org/10.1523/JNEUROSCI.1394-18.2018

Power, J. D., Cohen, A. L., Nelson, S. M., Wig, G. S., Barnes, K. A., Church, J. A., Vogel, A. C., Laumann, T. O., Miezin, F. M., Schlaggar, B. L., & Petersen, S. E. (2011). Functional network organization of the human brain. *Neuron, 72*(4), 665-678. https://doi.org/10.1016/j.neuron.2011.09.006

Radell, M. L., Myers, C. E., Beck, K. D., Moustafa, A. A., & Allen, M. T. (2016). The personality trait of intolerance to uncertainty affects behavior in a novel computer-based conditioned place preference task. *Frontiers in Psychology, 7*, 1175. https://doi.org/10.3389/fpsyg.2016.01175

Renjan, V., McEvoy, P. M., Handley, A. K., & Fursland, A. (2016). Stomaching uncertainty: Relationships among intolerance of uncertainty, eating disorder pathology, and comorbid emotional symptoms. *Journal of Anxiety Disorders, 41*(Suppl C), 88-95. https://doi.org/10.1016/j.janxdis.2016.03.008

Roest, A. M., Martens, E. J., de Jonge, P., & Denollet, J. (2010). Anxiety and risk of incident coronary heart disease: A meta-analysis. *Journal of the American College of Cardiology, 56*(1), 38-46. https://doi.org/10.1016/j.jacc.2010.03.034

Rosen, N. O., Knäuper, B., & Sammut, J. (2007). Do individual differences in intolerance of uncertainty affect health monitoring? *Psychology & Health, 22*(4), 413-430. https://doi.org/10.1080/14768320600941038

Rucker, L. S., West, L. M., & Roemer, L. (2010). Relationships among perceived racial stress, intolerance of uncertainty, and worry in a black sample. *Behavior Therapy, 41*(2), 245-253. https://doi.org/10.1016/j.beth.2009.04.001

Salum, G. A., Desousa, D. A., do Rosario, M. C., Pine, D. S., & Manfro, G. G. (2013). Pediatric anxiety disorders: From neuroscience to evidence-based clinical practice. *Brazilian Journal of Psychiatry, 35* Suppl 1(S1), S03-21. https://doi.org/10.1590/1516-4446-2013-S108

Sarıçam, H., Erguvan, F. M., Akın, A., & Akça, M. Ş. (2014). The Turkish short version of the intolerance of uncertainty (IUS-12) scale: The study of validity and reliability. *Route Educational and Social Science Journal, 1*(3), 148-157. https://doi.org/10.17121/ressjournal.109

Sarinopoulos, I., Grupe, D. W., Mackiewicz, K. L., Herrington, J. D., Lor, M., Steege, E. E., & Nitschke, J. B. (2010). Uncertainty during anticipation modulates neural responses to aversion in human insula and amygdala. *Cerebral Cortex, 20*(4), 929-940. https://doi.org/10.1093/cercor/bhp155

Schick, A., Adam, R., Vollmayr, B., Kuehner, C., Kanske, P., & Wessa, M. (2015). Neural correlates of valence generalization in an affective conditioning paradigm. *Behavioural Brain Research, 292*, 147-156. https://doi.org/10.1016/j.bbr.2015.06.009

Schienle, A., Kochel, A., Ebner, F., Reishofer, G., & Schafer, A. (2010). Neural correlates of intolerance of uncertainty. *Neuroscience Letters, 479*(3), 272-276. https://doi.org/10.1016/j.neulet.2010.05.078

Schraufnagel, T. J., Wagner, A. W., Miranda, J., & Roy-Byrne, P. P. (2006). Treating minority patients with depression and anxiety: What does the evidence tell us? *General Hospital Psychiatry, 28*(1), 27-36. https://doi.org/10.1016/j.genhosppsych.2005.07.002

Schwarzmeier, H., Kleint, N. I., Wittchen, H. U., Strohle, A., Hamm, A. O., & Lueken, U. (2019). Characterizing the nature of emotional-associative learning deficits in panic disorder: An fMRI study on fear conditioning, extinction training and recall. *European Neuropsychopharmacology, 29*(2), 306-318. https://doi.org/10.1016/j.euroneuro.2018.11.1108

Sexton, K. A., & Dugas, M. J. (2009). Defining distinct negative beliefs about uncertainty: Validating the factor structure of the Intolerance of Uncertainty Scale. *Psychological Assessment, 21*(2), 176-186. https://doi.org/10.1037/a0015827

Shankman, S. A., Gorka, S. M., Nelson, B. D., Fitzgerald, D. A., Phan, K. L., & O'Daly, O. (2014). Anterior insula responds to temporally unpredictable aversiveness: An fMRI study. *Neuroreport, 25*(8), 596-600. https://doi.org/10.1097/WNR.0000000000000144

Simmons, A., Matthews, S. C., Paulus, M. P., & Stein, M. B. (2008). Intolerance of uncertainty correlates with insula activation during affective ambiguity. *Neuroscience Letters, 430*(2), 92-97. https://doi.org/10.1016/j.neulet.2007.10.030

Simmons, A., Strigo, I., Matthews, S. C., Paulus, M. P., & Stein, M. B. (2006). Anticipation of aversive visual stimuli is associated with increased insula activation in anxiety-prone subjects. *Biological Psychiatry, 60*(4), 402-409. https://doi.org/10.1016/j.biopsych.2006.04.038

Simmons, A. N., Stein, M. B., Strigo, I. A., Arce, E., Hitchcock, C., & Paulus, M. P. (2011). Anxiety positive subjects show altered processing in the anterior insula during anticipation of negative stimuli. *Human Brain Mapping, 32*(11), 1836-1846. https://doi.org/10.1002/hbm.21154

Simpson, H. B., Neria, Y., Lewis-Fernández, R., & Schneier, F. (2010). *Anxiety Disorders: Theory, Research and Clinical Perspectives*. Cambridge University Press.

Snowden, L. R. (1999). African American service use for mental health problems. *Journal of Community Psychology, 27*(3), 303-313. https://doi.org/10.1002/(SICI)1520-6629(199905)27:3<303::AID-JCOP5>3.0.CO;2-9

Somerville, L. H., Wagner, D. D., Wig, G. S., Moran, J. M., Whalen, P. J., & Kelley, W. M. (2013). Interactions between transient and sustained neural signals support the generation and regulation of anxious emotion. *Cerebral Cortex, 23*(1), 49-60. https://doi.org/10.1093/cercor/bhr373

Stein, M. B., Simmons, A. N., Feinstein, J. S., & Paulus, M. P. (2007). Increased amygdala and insula activation during emotion processing in anxiety-prone subjects. *American Journal of Psychiatry, 164*(2), 318-327. https://doi.org/10.1176/ajp.2007.164.2.318

Stevens, K., Rogers, T., Campbell, M., Bjorgvinsson, T., & Kertz, S. (2018). A transdiagnostic examination of decreased intolerance of uncertainty and treatment outcome. *Cognitive Behaviour Therapy, 47*(1), 19-33. https://doi.org/10.1080/16506073.2017.1338311

Sylvester, C. M., Corbetta, M., Raichle, M. E., Rodebaugh, T. L., Schlaggar, B. L., Sheline, Y. I., Zorumski, C. F., & Lenze, E. J. (2012). Functional network dysfunction in anxiety and anxiety disorders. *Trends in Neurosciences, 35*(9), 527-535. https://doi.org/10.1016/j.tins.2012.04.012

Tan, Y., Wei, D., Zhang, M., Yang, J., Jelincic, V., & Qiu, J. (2018). The role of mid-insula in the relationship between cardiac interoceptive attention and anxiety: Evidence from an fMRI study. *Scientific Reports, 8*(1), 17280. https://doi.org/10.1038/s41598-018-35635-6

Tang, G. S., van den Bos, W., Andrade, E. B., & McClure, S. M. (2011). Social anxiety modulates risk sensitivity through activity in the anterior insula. *Frontiers in Neuroscience, 5*, 142. https://doi.org/10.3389/fnins.2011.00142

Tanovic, E., Gee, D. G., & Joormann, J. (2018). Intolerance of uncertainty: Neural and psychophysiological correlates of the perception of uncertainty as threatening. *Clinical Psychology Review, 60*, 87-99. https://doi.org/10.1016/j.cpr.2018.01.001

Thibodeau, M. A., Carleton, R. N., Gomez-Perez, L., & Asmundson, G. J. (2013). "What if I make a mistake?": Intolerance of uncertainty is associated with poor behavioral performance. *Journal of Nervous and Mental Disease, 201*(9), 760-766. https://doi.org/10.1097/NMD.0b013e3182a21298

Tolin, D. F., Abramowitz, J. S., Brigidi, B. D., & Foa, E. B. (2003). Intolerance of uncertainty in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 17*(2), 233-242. https://doi.org/10.1016/S0887-6185(02)00182-2

Uddin, L. Q. (2015). Salience processing and insular cortical function and dysfunction. *Nature Reviews Neuroscience. 15*, 55-61. https://doi.org/10.1038/nrn3857

Uddin, L. Q. (2017). *Salience network of the human brain*. Academic Press. https://doi.org/10.1016/C2015-0-01862-7

Van Lancker Sidtis, D., Pachana, N., Cummings, J. L., & Sidtis, J. J. (2006). Dysprosodic speech following basal ganglia insult: Toward a conceptual framework for the study of the cerebral representation of prosody. *Brain and Language, 97*(2), 135-153. https://doi.org/10.1016/j.bandl.2005.09.001

Varela, R. E., Vernberg, E. M., Sanchez-Sosa, J. J., Riveros, A., Mitchell, M., & Mashunkashey, J. (2004). Anxiety reporting and culturally associated interpretation biases and cognitive schemas: A comparison of Mexican, Mexican American, and European American families. *Journal of Clinical Child and Adolescent Psychology, 33*(2), 237-247. https://doi.org/10.1207/s15374424jccp3302_4

Volz, K. G., Schubotz, R. I., & Von Cramon, D. Y. (2003). Predicting events of varying probability: Uncertainty investigated by fMRI. *Neuroimage, 19*(2), 271-280. https://doi.org/10.1016/S1053-8119(03)00122-8

Volz, K. G., Schubotz, R. I., & von Cramon, D. Y. (2004). Why am I unsure? Internal and external attributions of uncertainty dissociated by fMRI. *Neuroimage, 21*(3), 848-857. https://doi.org/10.1016/j.neuroimage.2003.10.028

Wang, P. S., Lane, M., Olfson, M., Pincus, H. A., Wells, K. B., & Kessler, R. C. (2005). Twelve-month use of mental health services in the United States: Results from the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 629-640. https://doi.org/10.1001/archpsyc.62.6.629

Whaley, A. L. (2001). Cultural mistrust and mental health services for African Americans: A review and meta-analysis. *Counseling Psychologist, 29*(4), 513-531. https://doi.org/10.1177/0011000001294003

White, T. P., Engen, N. H., Sørensen, S., Overgaard, M., & Shergill, S. S. (2014). Uncertainty and confidence from the triple-network perspective: Voxel-based meta-analyses. *Brain and Cognition, 85,* 191-200. https://doi.org/10.1016/j.bandc.2013.12.002

Williams, D. R., Costa, M. V., Odunlami, A. O., & Mohammed, S. A. (2008). Moving upstream: How interventions that address the social determinants of health can improve health and reduce disparities. *Journal of public health management and practice, 14*(Suppl), S8-S17. https://doi.org/10.1097/01.PHH.0000338382.36695.42

Wilson, E. J., Stapinski, L., Dueber, D. M., Rapee, R. M., Burton, A. L., & Abbott, M. J. (2020). Psychometric properties of the Intolerance of Uncertainty Scale-12 in generalized anxiety disorder: Assessment of factor structure, measurement properties and clinical utility. *Journal of Anxiety*

Disorders, 76, 102309. https://doi.org/10.1016/j.janxdis.2020.102309

Wojtalik, J. A., Eack, S. M., Smith, M. J., & Keshavan, M. S. (2018). Using cognitive neuroscience to improve mental health treatment: A comprehensive review. *Journal of the Society for Social Work and Research, 9*(2), 223-260. https://doi.org/10.1086/697566

Xu, J., Van Dam, N. T., Feng, C., Luo, Y., Ai, H., Gu, R., & Xu, P. (2018). Anxious brain networks: A coordinate-based activation likelihood estimation meta-analysis of resting-state functional connectivity studies in anxiety. *Neuroscience and Biobehavioral Reviews, 96,* 21-30. https://doi.org/10.1016/j.neubiorev.2018.11.005

Xu, P., Gu, R., Broster, L. S., Wu, R., Van Dam, N. T., Jiang, Y., Fan, J., & Luo, Y. J. (2013). Neural basis of emotional decision making in trait anxiety. *Journal of Neuroscience, 33*(47), 18641-18653. https://doi.org/10.1523/jneurosci.1253-13.2013

Yang, Z. (2013). Psychometric properties of the Intolerance of Uncertainty Scale (IUS) in a Chinese-speaking population. *Behavioural and Cognitive Psychotherapy, 41*(4), 500-504. https://doi.org/10.1017/S1352465812000975

Yao, N., Qian, M., Jiang, Y., & Elhai, J. D. (2021). The influence of intolerance of uncertainty on anxiety and depression symptoms in Chinese-speaking samples: Structure and validity of the Chinese translation of the Intolerance of Uncertainty Scale. *Journal of Personality Assessment, 103*(3), 406-415. https://doi.org/10.1080/00223891.2020.1739058

Yeo, B. T., Krienen, F. M., Sepulcre, J., Sabuncu, M. R., Lashkari, D., Hollinshead, M., Roffman, J. L., Smoller, J. W., Zollei, L., Polimeni, J. R., Fischl, B., Liu, H., & Buckner, R. L. (2011). The organization of the human cerebral cortex estimated by intrinsic functional connectivity. *Journal of Neurophysiology, 106*(3), 1125-1165. https://doi.org/10.1152/jn.00338.2011

Zemestani, M., Didehban, R., Comer, J. S., & Kendall, P. C. (2021). Psychometric evaluation of the Intolerance of Uncertainty Scale for Children (IUSC): Findings from clinical and community samples in Iran. *Assessment*. https://doi.org/10.1177/1073191121998769

Zinbarg, R. E., Barlow, D. H., Brown, T. A., & Hertz, R. M. (1992). Cognitive-behavioral approaches to the nature and treatment of anxiety disorders. *Annual Review of Psychology, 43*(1), 235-267. https://doi.org/10.1146/annurev.ps.43.020192.001315

Ziv, M., Goldin, P. R., Jazaieri, H., Hahn, K. S., & Gross, J. J. (2013). Is there less to social anxiety than meets the eye? Behavioral and neural responses to three socioemotional tasks. *Biology of Mood & Anxiety Disorders, 3*(1), 5. https://doi.org/10.1186/2045-5380-3-5

. . .

The authors have no conflicts of interest or funding to disclose.

Correspondence to Mariah DeSerisy, Ph.D., Fordham University, Dealy Hall, Room 418, Bronx, NY 10458; mdeserisy@fordham.edu

SPECIAL ISSUE ARTICLE

Why Don't Cognitive Training Programs Transfer to Real Life? Three Possible Explanations and Recommendations for Future Research

Andrew D. Peckham, *McLean Hospital and Harvard Medical School*

COGNITIVE MECHANISMS are implicated in nearly every type of psychological disorder, from addiction to mood disorders to psychopathy. Since the early writings of Aaron Beck more than 50 years ago (Beck, 1967), clinical scientists have devoted considerable time and effort into elucidating the specific aspects of cognitive functioning that underlie psychological disorders and symptoms. Based on these studies, a natural extension of this field led to the question of whether directly modifying cognition might yield improvements in symptoms and functioning. This question has been approached both through cognitive bias modification (CBM; attempts to modify symptom-specific biases in attention, interpretation, or memory) and cognitive training of "basic" cognitive functions such as working memory and inhibitory control. Aided by rapid improvements in technology, these computerized cognitive training approaches have been extensively tested as potential treatments for psychological disorders. Unfortunately, many of these studies have failed to find evidence that cognitive training improves clinically meaningful outcomes such as functioning or symptoms (known as "far transfer"), despite more consistent evidence that training improves specific aspects of cognition related to the training itself ("near transfer"). This poses a vexing question for clinical scientists: Why do cognitive training interventions so often fail to transfer to real-world outcomes, even when these same interventions seem to engage the cognitive mechanisms of interest?

Previous commentaries, reviews, and meta-analyses have extensively litigated this question (Sala & Gobet, 2017; Simons et al., 2016; Wiers, 2018). Although the degree of optimism for cognitive training varies substantially across researchers, the consensus from many is that cognitive training has not worked as well as initially hoped. Clearly, one possibility is that far transfer might not be possible for most behaviors (e.g., Sala & Gobet). However, this interpretation is difficult to reconcile with findings from recent well-controlled, high-quality trials that show specific benefits associated with cognitive training for certain symptoms (e.g., Hsu et al., 2021; Siegle et al., 2014). To better understand the conditions under which far transfer is possible, several recent publications provided concrete methodological suggestions for improving future research in this area (Redick, 2019; Smid et al., 2020) and for precisely defining transfer effects (Harvey et al., 2018). The goal of this commentary is not to rehash these suggestions, but rather to highlight three broader ideas for how future studies could deliver cognitive training with the greatest potential to yield far transfer.

Better Personalization

Cognitive training will almost certainly fail to transfer if the training being offered does not match the specific needs of an individual. Just as a cognitive-behavioral therapist would likely refrain from restructuring a thought that is not biased, cognitive training methods are likely only helpful if matched to specific biases or other cognitive needs. Multiple researchers have recently proposed that successful outcomes in cognitive training studies could be better achieved by incorporating personalized methods (Redick, 2019; Smid et al., 2020). Personalization of training can take many forms. At a broad level, this might include selecting participants based on demographic characteristics linked to successful training outcomes: for example, Price and colleagues demonstrated that across studies, attentional bias training was most effective for reducing anxiety symptoms among participants younger than age 37 (Price et al., 2016). In the case of cognitive bias modification paradigms, another promising aspect of personalization involves only selecting those participants who demonstrate the bias of interest on a prescreening measure. In a recent large, preregistered randomized clinical trial, Hsu and colleagues demonstrated that attention bias modification was associated with decreased depression symptoms in comparison to a sham condition; importantly, this study included only those participants who showed a preexisting bias to negative images (Hsu et al., 2021). Recent studies of cognitive bias modification for negative interpretations have also embraced personalization, such as by allowing participants to select themes and situations that are personally relevant prior to beginning training with these stimuli (e.g., Beard et al., 2021). Other ongoing studies highlight the promise of personalizing interventions on multiple metrics simultaneously, through the use of machine learning methods applied to predictors of cognitive training outcomes (Shani et al., 2021).

Personalization can also be achieved by testing how specific neural mechanisms predict training outcomes, and assigning patients to treatment on the basis of these markers. Many researchers have long advocated for the need to assess both clinical outcomes and underlying neural mechanisms to understand how cognitive training interventions work (e.g., Siegle et al., 2007). Unfortunately, few studies of cognitive training have included pre and post-training neuroimaging assessments, and even fewer have assigned patients to specific interventions on the basis of neural markers (Baykara et al., 2020). The time and cost required for neuroimaging is undoubtedly a barrier to this work. However, recent findings highlight some of the ways in which clinical and cognitive outcomes of attentional training for transdiagnostic anxiety can be predicted by multiple measures of neural functioning. For example, in addition to functional MRI (Price et al., 2018), response to attentional training can also be predicted by peripheral measures such as by pupillometry (Woody et al., 2020). Other research demonstrates changes in specific event-related potentials captured in EEG paradigms during cognitive training (e.g., Hartmann et al., 2016). Thus, future studies seeking to personalize training procedures may be enhanced by incorporating one or more of these potential neurocognitive predictors of training outcome.

Interventions at the Right Time and Place

Another barrier to transfer may be that cognitive training interventions are too far removed—both temporally and conceptually—from the outcomes that are desired. Many cognitive training studies have implicitly or explicitly relied on the "exercise routine" metaphor, in which it is assumed that training exerts effects through repeated practice of tasks. For example, in studies targeting rumination via working memory training, it is hoped that a general improvement in working memory will transfer to more effective use of working memory at the moments when someone is ruminating. This type of transfer may be possible, but a major limitation of this approach is that cognitive tasks are not typically practiced at the same time that a person is experiencing a given symptom. This is problematic for several reasons. First, the temporal gap between a training session and a moment when a person might "use" the training in action, which could be hours or even days, makes it difficult to pinpoint mechanisms of how training works, and difficult to tell how much the training sessions are responsible for momentary changes in symptoms or other outcomes. Second, cognitive functioning is variable within an individual, and intraindividual variability is tied to a number of dynamic factors such as state affect (Weizenbaum et al., 2020). Thus, the working memory resources a person uses in a cognitive training session on Tuesday afternoon might be appreciably different than the working memory capacity they have available on Friday night. One promising method that can meet this challenge is that of smartphone-based Ecological Momentary Interventions (EMIs). As technology rapidly advances, it is increasingly possible to achieve reliable measurement of momentary cognitive functioning via smartphone (Germine et al., 2019; Weizenbaum et al.), which opens the door for cognitive training procedures to be delivered via this same mechanism. Future studies could take advantage of this approach by using smartphone-based assessments to measure momentary changes in a process of interest (for example, rumination), and then tailor cognitive training interventions exactly when needed, thereby merging the cognitive training field with the advancing science on this "Just-in Time" Adaptive Interventions (JiTAI) approach (Nahum-Shani et al., 2018). "Momentary" cognitive interventions such as these do not preclude the possibility that the traditional method of delivering cognitive training (e.g., spaced-out sessions at regular intervals) is also efficacious. Future studies would do well to evaluate ways to maximize transfer effects that combine or compare these approaches.

A related limitation of transfer effects is that cognitive training alone may not give participants enough information to understand how to apply those same cognitive resources in real-life contexts. This is likely a less significant problem for cognitive bias modification studies that incorporate stimuli directly relevant to the outcome of interest (such as pictures of alcohol in attentional training procedures for alcohol use disorder), in contrast to paradigms that use basic executive functioning tasks (Wiers, 2018). Explicitly incorporating assessments of what participants think about the intervention, incorporating both quantitative and qualitative methods (e.g., Yardley et al., 2015), can be a fruitful addition in order to better understand how participants think about the training. For example, a recent study by this author found that many participants did not understand how working memory training was relevant to their real-life impulse control (Peckham et al., 2021). However, there is encouraging evidence that combining cognitive training methods can be enhanced and made significantly more practical with the addition of explicit psychosocial interventions that help to actively practice real-life scenarios in which cognitive skills can be used (e.g., Bowie et al.,

2012; Bowie et al., 2017). Future studies would do well to determine best practices for combining cognitive training procedures with explicit strategy coaching in order to refine our understanding about how to maximize transfer effects from such interventions.

Enhancing Multiculturalism in Cognitive Training Research

The existing literature on cognitive training also suffers from the same problem as the field of psychology as a whole: namely, a significant lack of racial and ethnic diversity among study participants. As others have noted (e.g., Hsu et al., 2021), many cognitive training studies rely on WEIRD (White, Educated, Industrialized, Rich, and Democratic; Henrich et al., 2010) samples that do not reflect the demographic realities of the broader community. There is also concerning evidence that cognitive psychology lags behind other areas of the field in terms of racial diversity of study participants, and also racial diversity among journal editors and authors (Roberts et al., 2020). These problems represent a significant barrier for transfer effects: if training paradigms are overwhelmingly designed by and tested among White individuals, there is reason to be skeptical that any transfer effects will reproduce outside of these narrow confines.

Comprehensive recommendations for enhancing inclusivity and multiculturalism in clinical psychology have been documented elsewhere (Galán et al., 2021), and nearly all such recommendations apply to the field of cognitive training as well. In addition to these suggestions, two additional areas of concern might be particularly relevant to cognitive training research. First, many proponents of cognitive training argue that the potential reach of this approach—being able to deliver training remotely via the internet—can allow for the dissemination and rapid scaling-up of such treatments. However, this strength is inherently limited by disparities in high-speed internet access, with clear racial disparities manifesting in lower rates of internet access for Black and Latinx households across the United States (Nallen, 2020). Addressing this barrier will require those of us in the cognitive training field to think creatively about issues such as how to ensure our interventions are available on devices that do not require constant internet connectivity and to ensure that internet access is not a barrier to study recruitment.

A second potential threat to transfer effects stems from the overwhelming preponderance of study designs that use White faces for stimuli. This issue is likely most relevant to cognitive bias modification paradigms, such as attention training, that involve images as an inherent part of study design. The extent to which racial differences in face stimuli relate to differences in image processing is an area of ongoing research (e.g., Gonzalez & Schnyer, 2019), but very few cognitive training studies have explicitly incorporated racial diversity into study stimuli. Fortunately, there are multiple options for researchers seeking to enhance racial diversity in paradigms that require affectively valenced faces, such as the RADIATE database (Conley et al., 2018). Incorporating a more racially diverse array of stimuli will be an important priority for future studies of attentional bias modification in particular.

Summary and Conclusions

A recent article described the field of working memory training as going through phases of the "hype cycle," in which a "trough of disillusionment" follows the "peak of inflated expectations," although some technologies may reach beyond this to the "slope of enlightenment" (Redick, 2019). Given well-documented null findings and questions about the validity of transfer effects, this metaphor indeed appears appropriate for the field of cognitive training in general. Yet, by considering the many ways in which cognitive training may fail to transfer to real-life outcomes, there are also reasons to be hopeful that potential innovations could be revealed. By continuing to conduct rigorous research on transfer effects using the recommendations outlined above, cognitive training interventions designed to address symptoms and functioning may yet hold promise.

References

Baykara, E., Könen, T., Unger, K., & Karbach, J. (2020). MRI predictors of cognitive training outcomes. *Journal of Cognitive Enhancement, 5*, 245–258. https://doi.org/10.1007/s41465-020-00188-y

Beard, C., Ramadurai, R., McHugh, R. K., Pollak, J., & Björgvinsson, T. (2021). HabitWorks: Development of a CBM-I smartphone app to augment and extend acute treatment. *Behavior Therapy, 52*(2), 365–378.

Beck, A. T. (1967). *Depression*. Harper and Row.

Bowie, C. R., Grossman, M., Gupta, M., Holshausen, K., & Best, M. W. (2017). Action-Based Cognitive Remediation for individuals with serious mental illnesses: Effects of real-world simulations and goal setting on functional and vocational outcomes. *Psychiatric Rehabilitation Journal, 40*(1), 53–60.

Bowie, C. R., McGurk, S. R., Mausbach, B., Patterson, T. L., & Harvey, P. D. (2012). Combined cognitive remediation and functional skills training for schizophrenia: Effects on cognition, functional competence, and real-world behavior. *American Journal of Psychiatry, 169*, 710–718. https://doi.org/10.1176/appi.ajp.2012.11091337

Conley, M. I., Dellarco, D. V., Rubien-Thomas, E., Cohen, A. O., Cervera, A., Tottenham, N., & Casey, B. J. (2018). The Racially Diverse Affective Expression (RADIATE) face stimulus set. *Psychiatry Research, 270*, 1059–1067. https://doi.org/10.1016/j.psychres.2018.04.066

Galán, C. A., Bekele, B., Boness, C., Bowdring, M., Call, C., Hails, K., McPhee, J., Mendes, S. H., Moses, J., Northrup, J., Rupert, P., Savell, S., Sequeira, S., Tervo-Clemmens, B., Tung, I., Vanwoerden, S., Womack, S., & Yilmaz, B. (2021). Editorial: A call to action for an antiracist clinical science. *Journal of Clinical Child and Adolescent Psychology, 50*(1), 12–57. https://doi.org/10.1080/15374416.2020.1860066

Germine, L., Reinecke, K., & Chaytor, N. S. (2019). Digital neuropsychology: Challenges and opportunities at the intersection of science and software. *The Clinical Neuropsychologist, 33*(2), 271–286. https://doi.org/10.1080/13854046.2018.1535662

Gonzalez, G. D. S., & Schnyer, D. M. (2019). Attention and working memory biases to Black and Asian faces during intergroup contexts. *Frontiers in Psychology, 9*, 2743. https://doi.org/10.3389/fpsyg.2018.02743

Hartmann, L., Sallard, E., & Spierer, L. (2016). Enhancing frontal top-down inhibitory control with Go/NoGo training. *Brain Structure and Function, 221*, 3835–3842. https://doi.org/10.1007/s00429-015-1131-7

Harvey, P. D., McGurk, S. R., Mahncke, H., & Wykes, T. (2018). Controversies in computerized cognitive training. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 3*, 907–915. https://doi.org/10.1016/j.bpsc.2018.06.008

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2–3), 61–135.

Hsu, K. J., Shumake, J., Caffey, K., Risom, S., Labrada, J., Smits, J. A. J., Schnyer, D. M., & Beevers, C. G. (2021). Efficacy of attention bias modification training for depressed adults: A randomized clinical trial. *Psychological Medicine.* https://doi.org/10.1017/S0033291721000702

Nahum-Shani, I., Smith, S. N., Spring, B. J., Collins, L. M., Witkiewitz, K., Tewari, A., & Murphy, S. A. (2018). Just-in-time adaptive interventions (JITAIs) in mobile health: Key components and design principles for ongoing health behavior support. *Annals of Behavioral Medicine, 52*(6), 446–462. https://doi.org/10.1007/s12160-016-9830-8

Nallen, J. (2020, June 24). Digital injustice: Disparities in digital access across the US and how they disproportionally hurt the Black and Latinx communities. *Digital Planet*. https://sites.tufts.edu/digitalplanet/digital-injustice-covid19/

Peckham, A. D., Sandler, J. P., Dattolico, D., McHugh, R. K., Johnson, D. S., Björgvinsson, T., Pizzagalli, D. A., & Beard, C. (2021). *Cognitive control training for urgency: A pilot randomized controlled trial in an acute clinical sample.* Manuscript submitted for publication.

Price, R. B., Cummings, L., Gilchrist, D., Graur, S., Banihashemi, L., Kuo, S. S., & Siegle, G. J. (2018). Towards personalized, brain-based behavioral intervention for transdiagnostic anxiety: Transient neural responses to negative images predict outcomes following a targeted computer-based intervention. *Journal of Consulting and Clinical Psychology, 86*(12), 1031–1045. https://doi.org/10.1037/ccp0000309

Price, R. B., Wallace, M., Kuckertz, J. M., Amir, N., Graur, S., Cummings, L., Popa, P., Carlbring, P., & Bar-Haim, Y. (2016). Pooled patient-level meta-analysis of children and adults completing a computer-based anxiety intervention targeting attentional bias. *Clinical Psychology Review, 50*, 37–49. https://doi.org/10.1016/j.cpr.2016.09.009

Redick, T. S. (2019). The hype cycle of working memory training. Current *Directions in Psychological Science, 28*(5), 423–429. https://doi.org/10.1177/0963721419848668

Roberts, S. O., Bareket-Shavit, C., Dollins, F. A., Goldie, P. D., & Mortenson, E. (2020). Racial inequality in psychological research: Trends of the past and recommendations for the future. *Perspectives on Psychological Science, 15*(6), 1295–1309. https://doi.org/10.1177/1745691620927709

Sala, G., & Gobet, F. (2017). Does far transfer exist? Negative evidence from chess, music, and working memory training. *Current Directions in Psychological Science, 26*(6), 515–520. https://doi.org/10.1177/0963721417712760

Shani, R., Tal, S., Derakshan, N., Cohen, N., Enock, P. M., McNally, R. J., Daches, S., Williams, A. D., Yiend, J., Carlbring, P., Kuckertz, J. M., Yang, W., Reinecke, A., Beevers, C. G., Bunnell, B. E., Koster, E. H. W., Zilcha-Mano, S., & Okon-Singer, H. (2021). Personalized cognitive training: Protocol for individual-level meta-analysis implementing machine learning methods. *Journal of Psychiatric Research, 138*, 342–348. https://doi.org/10.1016/j.jpsychires.2021.03.043

Siegle, G. J., Price, R. B., Jones, N. P., Ghinassi, F., Painter, T., & Thase, M. E. (2014). You gotta work at it: Pupillary indices of task focus are prognostic for response to a neurocognitive intervention for rumination in depression. *Clinical Psychological Science, 2*(4), 455–471. https://doi.org/10.1177/2167702614536160

Siegle, G. J., Ghinassi, F., & Thase, M. E. (2007). Neurobehavioral therapies in the 21st century: Summary of an emerging field and an extended example of cognitive control training for depression. *Cognitive Therapy and Research, 31*, 235–262. https://doi.org/10.1007/s10608-006-9118-6

Simons, D. J., Boot, W. R., Charness, N., Gathercole, S. E., Chabris, C. F., Hambrick, D. Z., & Stine-Morrow, E. A. L. (2016). Do "brain-training" programs work? *Psychological Science in the Public Interest, 17*(3), 103–186. https://doi.org/10.1177/1529100616661983

Smid, C. R., Karbach, J., & Steinbeis, N. (2020). Toward a science of effective cognitive training. *Current Directions in Psychological Science, 29*(6), 531–537. https://doi.org/10.1177/0963721420951599

Weizenbaum, E., Torous, J., & Fulford, D. (2020). Cognition in context: Understanding the everyday predictors of cognitive performance in a new era of measurement. *JMIR MHealth and UHealth, 8*(7), e14328. https://doi.org/10.2196/14328

Wiers, R. W. (2018). Cognitive training in addiction: Does it have clinical potential? *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 3*, 101–102. https://doi.org/10.1016/j.bpsc.2017.12.008

Woody, M. L., Vaughn-Coaxum, R. A., Siegle, G. J., & Price, R. B. (2020). Time course of pupillary response to threat words before and after attention bias modification for transdiagnostic anxiety disorders: A randomized controlled trial. *Brain and Behavior, 10*(8), e01664. https://doi.org/10.1002/brb3.1664

Yardley, L., Morrison, L., Bradbury, K., & Muller, I. (2015). The person-based approach to intervention development: Application to digital health-related behavior change interventions. *Journal of Medical Internet Research, 17*(1), e30. doi: 10.2196/jmir.4055

. . .

Andrew Peckham was supported by NIDA grant K23 DA051406 during preparation of this article. No conflicts of interest to disclose.

Correspondence to Andrew D. Peckham, Ph.D., 115 Mill Street, Mail Stop 222, Belmont, MA 02478; adpeckham@mclean.harvard.edu

SPECIAL ISSUE ARTICLE

Integrating Neuroeducation Into Psychotherapy Practice: Why and How to Talk to Patients About the Brain

Maria Kryza-Lacombe, *San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology*

Elizabeth Richards and Natasha Hansen, *Stanford University School of Medicine*

Philippe Goldin, *University of California, Davis*

AS CLINICIANS we have numerous tools at our disposal when working with patients in the therapeutic context, ranging from rapport building to empirically validated psychotherapy manuals. Psychoeducation is another invaluable clinical tool that can help patients make sense of the causes and consequences of their symptoms and how psychotherapy tools work to facilitate change. Psychoeducation furthermore provides an opportunity to define terms and arrive at a common language for speaking about psychological processes throughout the course of psychotherapy. And although knowledge alone is often not sufficient to change behavior (Raynor et al., 2007), psychoeducation has been suggested to play a critical role in effective interventions that target behavior change (Arlinghaus & Johnston, 2018). Indeed, evidence suggests that psychoeducation is an important factor in the treatment of general psychological distress (Donker et al., 2009) as well as a number of specific psychological disorders, including depression (Tursi et al., 2013), anxiety (Rodrigues et al., 2018), bipolar disorder (Bond & Anderson, 2015), and schizophrenia (Zhao et al., 2015). Thus, psychoeducation appears to be important as it supports a common understanding, clarifies terms and concepts, and provides a framework for psychotherapy to proceed successfully.

One specific aspect of psychoeducation that many clinicians may not be leveraging to full effect is neuroscience-informed psychoeducation, or "neuroeducation." Neuroeducation in the context of clinical practice refers to communication with our patients about the brain's role in mental health, learning and memory, and brain-based explanations for how and why psychosocial interventions work. Although our understanding of the complex brain mechanisms underlying psychological disorders is still in its infancy, an ever-growing body of clinical neuroscience research is laying a strong foundation for the utility of neuroeducation in psychotherapy. Compelling evidence is accumulating not only to map the neural processes underlying the etiology and maintenance of many mental disorders (Chavanne & Robinson, 2021; Disner et al., 2011; Melcher et al., 2008; Pico-Perez et al., 2019; Pico-Perez et al., 2017) but also to show that psychotherapy can facilitate meaningful changes in our patients' brain function and even anatomy (Fu et al., 2008; Gotink et al., 2016; Ochsner et al., 2002; Porto et al., 2009; Tang et al., 2015; Young & Craske, 2018). Understanding the brain-mind-body connection provides context within which to appreciate our biological vulnerabilities, the spectrum of neurodiversity, the impact of cultural and genetic diversity on brain functioning, and our strengths as humans. We can harness this understanding to change our thoughts and behaviors, and thereby change our brains.

Benefits of Using Neuroeducation in the Clinic

Providing basic neuroeducation in a therapeutic setting can offer profound benefits to our patients, among them reducing stigma, appreciating the spectrum of individual variability, and promoting an understanding for how treatments work, which can in turn spur improved motivation for change. Research suggests that presenting biological explanations to patients about their disorder reduces the self-stigmatizing attitudes they may hold about their mental health struggles (Deacon & Baird, 2009; Lebowitz et al., 2014). For example, learning that environmental factors combined with genetic propensities impact how the brain develops, and generates patterns of thinking, behaving, and feeling (Miguel et al., 2019), may reduce self-blame and help challenge long-held assumptions that any shortcomings are intrinsic and fixed features of the self. Instead of blaming oneself for psychological disturbances, a patient might instead understand that the neural circuits in the brain may, for a variety of reasons, at times work more and at other times less effectively throughout the lifespan. Thus, by reducing stigma and maladaptive interpretations, neuroeducation can help reduce these therapy-interfering misattributions.

Given the growing body of evidence demonstrating that psychotherapy is linked to brain changes, offering neuroeducation in the therapeutic space may enhance motivation for pursuing treatment, particularly for those who take an interest in physiological evidence and who find comfort in knowing how and why things happen. Furthermore, psychoeducation about treatment mechanisms in general creates positive expectancy about treatment efficacy and predicts better therapy outcomes (Constantino et al., 2011). Indeed, neuroeducation may offer an increased sense of empowerment (Goss & Parnell, 2016). For example, some patients who receive psychoeducation about the malleability of biological mechanisms related to depression believe more strongly in their ability to regulate their mood (Lebowitz & Ahn, 2015). Also, patients who are trying to determine whether to use medication and/or psychotherapy to treat a mood or anxiety disorder, for example, may be more assured knowing that both medication and psychotherapy (e.g., CBT) target similar or overlapping brain mechanisms related to clinical improvement (Gorka et al., 2019; Porto et al., 2009). This knowledge might reduce initial resistance to starting treatment and enhance perseverance in psychotherapy.

The clinician may also benefit from integrating neuroscience into their work (Goss & Parnell, 2016). Thoughtfully incorporating the neuroscientific basis of presenting problems and psychological reactions into our conceptualization of a patient may allow us to develop an enriched and more holistic perspective, which may deepen our understanding of our patients. Additionally, by developing an appreciation for the neuroscientific mechanisms underlying the interventions

we utilize as clinicians, we can strengthen our trust in the quality of the treatment we are providing. Finally, being versed in the neuroscientific underpinnings of our patients' distress and the mechanisms underlying psychotherapeutic interventions offers a shared language when interacting with medically oriented professionals (e.g., in a hospital setting or when consulting with psychiatrists), which may promote more effective communication, case conceptualization, and interdisciplinary coordination of care.

Barriers to Using Neuroeducation in the Clinic

Despite its potential benefits, there are several potential obstacles to integrating neuroeducation into psychotherapy. One common barrier is a lack of neuroscience background among clinicians (Goss & Parnell, 2016), for some of whom neuroscience may have been virtually absent from training curricula. Many of us may fear our training and professional experiences have not offered sufficient exposure to neuroscientific topics to develop the familiarity and confidence necessary to responsibly utilize neuroeducational tools in our clinical work. This lack of familiarity may make it feel daunting to explain neuroscience concepts in a way that is both accurate and simple enough to be easily digestible by a lay patient audience, especially one experiencing psychological distress.

For some clinicians, years of clinical experience without incorporating neuroscience findings may have given the understandable impression that neuroeducation is not "necessary" for effective treatment. Consequently, we may believe that there is not enough added value in neuroeducation to warrant the challenge of incorporating something new and potentially intimidating into our tried and tested clinical routines. For various reasons, some clinicians may conceptualize "the mind" and/or "the self" as entities distinct from the brain (Fuchs, 2004; Glannon, 2020) and may not find it important to consider the role of the brain in human psychology, psychotherapy, or healing practices. There may also be concerns that, if not utilized properly by the clinician, neuroeducation could undermine the patient's subjective, lived experience and could feel pathologizing, disempowering, and/or alienating. Additionally, a "medical model" of psychotherapy conflicts with many clinicians' professional identities and may even feel like a threat to the field of psychotherapy itself (Goss & Parnell, 2016).

Even clinicians who recognize the value of neuroeducation and seek resources to educate themselves on brain-based mechanisms that elucidate psychotherapeutic processes may be presented with the challenge of locating fact-checked materials that explain neural processes in straightforward, comprehensible, concise, and effective language. Available clinical neuroscience articles are often dense with field-specific jargon and are predominantly written for scientists who already possess expertise in this arena and are seeking to use the information as the basis for further lab research, rather than as a tool to be applied directly in clinical practice. The complexity of pertinent resources in conjunction with a lack of science background can be discouraging and demotivating for many clinicians (Goss & Parnell, 2016).

To reap the many valuable potential benefits of incorporating neuroeducation into psychotherapy practice, the relevant information must be presented in a simple, digestible form that can be readily understood by clinician and patient. Given the paucity of such resources, coupled with our proposal that neuroeducation can be used effectively, conscientiously, and ethically to promote our patients' understanding of their mental health challenges and how psychotherapy can be beneficial to them, we aim here to provide clinicians with a few basic neuroeducational tools, outlined below. We hope to thereby begin to bridge the gap between clinically relevant neuroscience research and neuroscience-informed psychoeducation in the clinic.

Circumstances in Which Neuroeducation May Not Be Appropriate

Before we elaborate on how neuroeducation could be used in psychotherapy, it is important to acknowledge that neuroeducation is not the only or the "right" way to educate patients in clinical practice. As with any clinical tool or modality, it is vital to consider the patient's worldview, intersectional identities, cultural background, and personal beliefs to determine whether incorporating neuroeducation would be beneficial in each unique circumstance. Thus, it is important to assess the patient's receptiveness to the role of biology in their symptoms and mental well-being as neuroeducation may have the most positive impact with patients who ascribe to this perspective. Neuroeducation may not always be appropriate for patients who do not conceptualize the brain as playing a primary role in producing their thoughts, emotions, and behaviors, especially if adaptive sources of coping that more closely align with their worldviews can be identified. For example, some patients may identify with spiritual or religious beliefs that consider the "soul" as separate from the "body" and may place greater emphasis on a connection with God (not biological factors) when coping with their psychological symptoms. Other patients may ascribe to Eastern medicine approaches that emphasize restoring energy and balance in the body by other means than through talk therapy, behavioral modification, and cognitive skills. These examples illustrate only a few of the many ways humans conceptualize and cope with their symptoms, which, if unappreciated by the clinician, could not only result in the ineffective use of neuroeducation, but also risk undermining the therapeutic relationship and/or leaving the patient feeling alienated. Neuroeducation is thus neither appropriate in all circumstances nor with all patients. It is simply one powerful therapeutic tool, which we argue should be made more widely accessible among the array of such tools, so that it can be selectively applied with the appropriate patient at the appropriate time according to the discerning judgement of the trained clinician.

Components of Basic Neuroeducation

Although more research is needed to understand the intricacies of the neural mechanisms underlying psychological functioning and treatment response, there are a handful of overarching elements of well-established neuroscientific knowledge that patients may benefit from. We would like to propose four basic points of neuroeducation that could be useful in general psychotherapy practice. Communication about these points does not require a background in neuroscience and can be incorporated into psychoeducation during the initial intake, or as needed throughout therapy. We provide a description of each component below as well as sample language that may be helpful for introducing these concepts to patients. The sample language may need to be adapted for children, the elderly, those with certain learning needs, those not fluent in English, or patients from different cultural backgrounds.

1. Balance Neuroeducation About Brain Mechanisms of Psychological Disorders and Mechanisms of Therapeutic Change Linked to Psychotherapy, With an Emphasis on the Latter

Learning about brain-based mechanisms can reduce stigma in patients, but there is also a risk of patients being left with faulty assumptions or misconceptions of having a fixed, permanent problem, thus generating prognostic pessimism (Deacon & Baird, 2009; Lebowitz et al., 2014). Given evidence that an emphasis on the malleability of biological mechanisms can reduce prognostic pessimism and increase patients' belief in their ability to change (Lebowitz & Ahn, 2015), we believe that it is imperative to balance explanations of brain-based mechanisms of psychological difficulties with information about how psychotherapy changes the brain. This understanding alone will likely induce hope and agency, in a manner reminiscent of the function and benefits of biofeedback (e.g., experiencing how intentional changes in breathing influence heart rate and can result in a patient's increased sense of control over their body). Patients who are educated about the positive impact of psychotherapy on the brain may experience increased motivation to engage in therapy, as well as a sense of self-efficacy and empowerment that can facilitate taking actionable steps to make changes in their lives.

- **Sample language that could be used with patients**:

"*We all have experiences in life that shape the way we see the world, other people, and ourselves. Sometimes these experiences are challenging and can have a lasting impact on us, even if we may not recognize it. Many studies have shown that our brain activation patterns are in part shaped by our life experiences, and because of this the impact of difficult life situations can vary from person to person. In other words, brain activity differs across people with different psychological reactions to the stressors they encounter in life. These differences in the brain's response can be influenced by genetic variations, past life events the person has experienced, and/or other aspects of the person's broader health and wellbeing. But importantly, there is hope, because research has shown that psychotherapy treatments can change patterns of brain activity in ways that are linked to positive outcomes, for example, a decrease in the symptoms you've been experiencing*. So, what we learn during *therapy can change the way we respond in stressful situations and helps us use our brain in ways that promote health and well-being*."

Use of metaphors: It can be helpful to use the simple metaphor of a well-known physiological condition, like diabetes, to undermine prognostic pessimism by illustrating how a psychological disorder may both have a biological basis and be meaningfully improved through behavioral change. Such metaphors may be particularly useful with patients who respond to neuroeducation about brain mechanisms underlying psychological conditions by assuming that psychotherapy will be unhelpful because only a "biological intervention," like medication, could impact a brain-based condition.

PATIENT: I heard there are studies showing bipolar disorder is in the brain. Doesn't that mean there's nothing I can do about it? How could sitting here and talking with you do anything to change my brain? Only medications will make any difference. Why should I even bother with therapy?

CLINICIAN: Yes, you're right, there are studies showing that certain brain activation patterns are associated with bipolar disorder. Your brain is one important piece of a complex puzzle. Symptoms of bipolar disorder emerge as brain-based factors interact with life experiences, thinking patterns, and various social and behavioral factors. All these factors in turn also influence how your brain functions. So while medication can be an important part of treatment, the work we do in psychotherapy can also change the brain by addressing unhelpful thoughts, behaviors, and social factors that often emerge in bipolar disorder.

Let's use the metaphor of diabetes. Diabetes is a biological disorder that manifests as too much sugar in the blood. By changing psychological and behavioral factors, such as refining diet and exercise, many people with diabetes can help get their blood sugar levels back into a healthy range. In a similar way, people with bipolar disorder can use tools learned in psychotherapy, like balancing social rhythms (greater routine regularity, improved sleep hygiene) and emotion regulation strategies (consciously challenging and reformulating negative or maladaptive interpretations of events), as well as seeking social support from family and friends to help co-regulate difficult emotions. These types of interventions can change their brain activation patterns over time and help their brains function in a way that makes mania or depression less likely to occur or less intense when they do occur. You mentioned medication. Some people with bipolar disorder do benefit from medication, and in a similar way some people with diabetes require insulin injections to manage their blood sugar. But in both cases, there are behavioral and social changes that still play a meaningful role in changing physiological patterns over time to help a person live a more healthy and balanced life.

2. Brain Plasticity Underlies the Development of Many Psychological Challenges, But Also Enables Us to Make Lasting Positive Changes

Neuroplasticity, or brain plasticity, refers to the brain's extraordinary ability to change through growth and reorganization of its patterns of activation. Neurons that are co-activated will become more associated with each other such that activity in one neuron (or neural circuit) will facilitate activity in the other neuron (or neural circuit). In other words, "cells that fire together, wire together" (Hebb, 1949). This tenet connects fundamentally to the main areas of neuroeducation described in this article, as it can serve as a basis for providing brain-based explanations for how psychological resilience and difficulties develop, and how the specific skills acquired during psychotherapy can aid in literally sculpting the structure and function of the brain and serve as the mechanisms of therapeutic change. Neuroplasticity appears to underlie our ability to change our thoughts, emotions, and behaviors. However, this same plasticity in neural circuit activity and function can also contribute to developing psychological inflexibility and emotional disturbances in the first place, and potential worsening of those difficulties. But perhaps this reality serves as a valid justification for harnessing the beneficial features of brain plasticity through neuroeducation and psychotherapy. Indeed, a conversation about brain plasticity may benefit patients in several ways:

- *Reduction in self-stigma*: Patients may experience a reduction in self-critical

beliefs and interpretations about their struggles when provided with a brain-based physiological explanation for psychological problems and by emphasizing that they did not have control over many factors in their life (i.e., the environment in which they grew up, their genetic predisposition) that may have contributed to their challenges (Schiele et al., 2020). Self-stigmatization upon relapse may also be reduced by explaining that, even though old neural pathways can weaken, they may not go away completely.

- *Motivation for therapy:* By explaining that previously established neural pathways appear to weaken when used less frequently (Asok et al., 2019), and that psychotherapy is a means by which new neural pathways can develop, patients may experience increased motivation to engage in therapy that actively modifies brain circuitry.
- *Sense of empowerment:* Knowledge about brain plasticity may empower our patients to create changes in their lives outside of the therapy room. There is abundant evidence (Sweatt, 2016) that through intentional action, we can build new pathways and that if we nurture them, they will become stronger and easier to access. Thus, what we do and the habits we develop literally shape brain function and connectivity.

These brain-based explanations may in principle not be much different from providing psychoeducation about habit formation and behavioral change. However, it is possible that for some patients, psychoeducation focusing specifically on the brain may increase motivation and commitment to psychotherapy and learning (Illes et al., 2008).

- **Sample language that could be used with patients:**

"*What fires together, wires together": "It can be surprisingly easy to get 'stuck' in patterns of thinking that stem from past life experiences. Did you know that every time we have a thought, engage in a behavior, or experience something, our brain cells fire in specific ways that are characteristic of that thought, behavior, or experience? When repeated over and over again, these thoughts, behaviors, or experiences create firing pathways in the brain. In this way, our brain creates habits of firing. Our past and current experiences, combined with genetic predispositions that we inherited, seem to be responsible for how our brain is wired and how it functions on an everyday basis. It's also possible that certain patterns of responding were helpful at one point in our lives, such as being overprotective in the face of real danger, but end up not serving us well in future situations when the danger is no longer there. We might need to help our brains flexibly respond to new environments we encounter.*"

How psychotherapy can help: "*Through intentional actions that can be learned and supported through our work in therapy, it's possible to make our brain respond differently. By unlearning our maladaptive thoughts and behaviors and developing new, more flexible and adaptive patterns of thinking and behaving, our brain will gradually rely less and less on those well-worn firing pathways that are no longer serving us well. And, like before, if new experiences, thoughts, and behaviors are repeated over and over again, new firing pathways are created, which can facilitate improvement in symptoms, more adaptive coping, and increased wellbeing.*"

Establishing expectations: "*Our brain is plastic, but creating change requires intentional practice and repetition. It takes time to relearn, to build new connections and break down old ones. As we create new pathways, the old ones may become weaker but may not go away completely, so it's possible for our brain to slip into the old pathway's firing patterns.*"

Reinforcing hope: "*Even though our maladaptive thoughts and behaviors may not immediately or even entirely disappear, if we take care of the new pathways and make sure they are activated frequently through intentional action, they will be there to help us stay on our path toward increased wellbeing.*"

Use of metaphors: A metaphor could help illustrate how neural activation patterns can become overlearned as neuropsychological habits yet remain malleable as they can be modified through new learning and repeated behavior change. It may also provide validation for why change is hard, and thus help strengthen the patient's motivation for sticking with it until the new behavior becomes habit.

PATIENT: I already know some of the thoughts and behaviors I want to change, but the same negative thoughts still pop into my mind and I still fall back into the same patterns of behavior. How will anything ever change?

CLINICIAN: This is a very common experience, and, yes, it can be very frustrating. A few things we know about the brain may illustrate why there's hope: Our thoughts function in part through electrical signals that flow through tiny 'wires' in our brains called neurons. As we learn new things, our brains literally form new neural 'wire' connections, called synapses. When we repeat a particular behavior again and again, the neural connections associated with that behavior are strengthened and that behavior will become more automatic and require less effort—like mastering a new skill. The same is true of our thought patterns. When we practice particular patterns of thinking (like the tendency to catastrophize or to assume everything that goes wrong is your fault), the connections associated with that pattern of thinking are strengthened until the information traveling in those connections becomes more and more automatic because your behavior and thinking have established deeply rooted firing pathways in your brain. The amazing news is that our brains can continue to learn new things and form new synaptic connections throughout our life! The challenging news is that the process of breaking an old habit and mastering a new skill often requires conscious effort and it may feel difficult at first. Instead of your thoughts flying freely along the 18-lane freeway of your old habitual negative thought patterns, you will be taking your machete and bushwhacking through the jungle for a while to form a new neural path. At first, your thoughts will keep wanting to take the habitual super freeway route. But over time with conscious, intentional practice of the new way of thinking, the new dirt track you build will become a paved road…and eventually a freeway of its own. And the old road will fall into disrepair and begin to feel less tempting.

3. The Evolutionary History of the Human Brain Provides a Framework for Understanding Emotion Regulation

An understanding about the evolutionary history of the brain can be helpful when introducing conversations about emotions and emotion regulation. However, for patients with alternative worldviews, this part of neuroeducation may not be appropriate or may be introduced without direct

reference to evolution. The evolution of the human brain illustrates the brain's core structure: the more primitive brain areas—situated more deeply in the brain and closer to the spine—have similar functions across species, including control of heartbeat and breath (Angeles Fernandez-Gil et al., 2010), and are also linked to survival instincts, including appetitive drives and the fight or flight response (Bracha, 2004; Cannon, 1922) and emotions (Stujenske & Likhtik, 2017). Because of their location in the brain, these processes are sometimes called "bottom-up" processes. Brain areas that are further toward the surface are evolutionarily more novel and responsible for integrating information and for deliberate thought and action (Coutlee & Huettel, 2012), sometimes referred to as "top-down" processes.

Bottom-up and top-down processes have also been conceptualized as "automatic" and "controlled" systems of the brain which interact: psychological challenges often emerge when too much emotional reactivity (a bottom-up process) is not met with effective regulation by top-down cognitive and attention skills (Etkin et al., 2015; Goldin et al., 2008). It may be valuable for the patient to know that psychotherapy leverages these processes, by strengthening the patient's ability to effectively regulate or override automatic emotions and behaviors and by implementing more controlled, adaptive responses. This effect is the basis of much of cognitive-behavioral therapy (CBT) and has been documented across many studies (Young & Craske, 2018). For example, areas in more evolutionarily advanced regions of the brain show increased activation following CBT for anxiety compared to individuals with anxiety who did not undergo CBT, suggesting increased regulatory capacity (Goldin et al., 2013). Furthermore, CBT-related increases in brain activity linked to emotion regulation can predict longer-term reduction in anxiety symptoms up to 1-year posttreatment completion (Goldin et al., 2021). However, it is also important to keep in mind that although top-down processes are key to emotion regulation, they may not always serve us well. For example, there is evidence that the maladaptive coping mechanisms of anxiety, such as avoidance, are likely mediated by top-down processes (Hofmann et al., 2012). Thus, the same neural architecture can produce patterns of behavior that might be adaptive or maladaptive. Flexible use of top-down processes may therefore be key to adaptive functioning. Psychotherapy can increase the repertoire and flexible use of top-down processes to optimize adaptive regulation of automatic bottom-up responses.

- **Sample language that could be used with patients:**

"*Our emotions are a cornerstone of the human experience, but they're not just for making life more colorful, they have specific functions. Each of the emotions we experience has a purpose, although they don't work as intended 100% of the time. To get a better idea of how our emotions are designed to help us, we can look at things from a brain perspective. The basic building blocks of human brains are quite similar to those of other mammals, and even reptiles. These are the very important, and more evolutionarily primitive areas of our brain are responsible for ensuring our survival, including making sure our heart keeps beating and that we keep breathing. But they're also what we rely on to support our survival in a savannah-like environment, where we'd need to find food, or fight or flee from predators. In a way, our drives (such as hunger) and emotions (such as fear) are the internal experience of these survival responses. These brain areas are located toward the bottom of the brain and, for this reason, these processes are sometimes called "bottom-up" processes. In contrast, "top down" processes, such as thinking and decision-making, are linked to functions in brain areas that are more toward the top of the brain and are more advanced from an evolutionary standpoint. When we encounter a real or imagined threat, the more evolutionarily primitive bottom-up processes, which are designed to protect us, activate arousal, fear, and anxiety within milliseconds. These emotional and physiological reactions are, in other words, our brain's instinctual, "automatic" response to a perceived threat. The automatic "bottom-up" signals are then sent to more evolutionarily advanced regions of the brain, which then respond by triggering thoughts or behaviors. This creates a top-down influence that might increase or decrease the emotion we're experiencing at the moment, giving us an opportunity to take some "control" over how we respond. Thoughts, emotions, and behaviors, whether adaptive or maladaptive, are generated through a dance between top-down and bottom-up processes and typically follow the choreography created through our genetic predispositions and repeated life experiences. In this analogy, engaging in psychotherapy is like hiring a dance teacher to help modify and improve the existing choreography.*"

Use of metaphors: Common everyday examples or clinical examples can be useful to illustrate the idea of bottom-up vs. top-down processing in the context of emotion regulation. Below are two examples, one relevant to drives and the other to perceived threat.

1. The following example illustrates how bottom-up vs. top-down processes could be used to describe impulse control in the context of drives. This has clinical relevance in addiction, for example, but could be adapted to many clinical scenarios that involve urges to act on an impulse. "There is this famous marshmallow study. Maybe you're already familiar with it. In the study, a child is given a marshmallow and told they have two options: They may eat the marshmallow now if they want. But they are also told that they can have two marshmallows, if they can stop themselves from eating the marshmallow that the experimenter already gave to them while the experimenter leaves them alone for a period of time. The experience the child is facing can illustrate bottom-up (or 'automatic') processes vs. top-down (or 'controlled') processes. Automatic bottom-up processes in the instinctual emotional part of the brain say 'look at that fresh plump marshmallow, go ahead and devour it now!' But the top-down processes in the logical reasoning part of the brain, especially when practiced, may help control and inhibit that urge by remembering the benefit of waiting: 'Stop! If you can hold off on eating that marshmallow just a little longer the researcher will come back and give you another marshmallow and you will have twice the treats to enjoy.' When you are addicted to a substance the automatic bottom-up processes are extremely strong and create an urge to use the substance. Because of this, it is especially difficult to engage top-down processes to control the urge and stop yourself from using the substance. In therapy, you'll learn ways to strengthen the top-down processes by practicing how to change your thoughts and behaviors in ways that will eventually help you have better control over the urges so that you can work toward achieving your long-term goals [consider directly referring to the long-term goals that motivate the patient to stop using the substance]."

2. Another example illustrates bottom-up and top-down processes in the context

of threat. Here, a common experience of fleeting anxiety related to heights in a safe context is applied to illustrate therapy for phobias. The example can be modified to apply to other clinical scenarios where reactions to threat are at play. Here we used "driving across the Brooklyn Bridge" to illustrate a bottom-up response to heights in a safe context, but the example may work best when using a specific local example that is familiar to the patient, such as driving across a local bridge or standing next to a window on one of the top floors of a skyscraper (this illustration may not be appropriate for patients with a significant fear of heights): "Perhaps you've had the following experience when driving across the Brooklyn Bridge: You glance to take in the view and suddenly, perhaps even just for a moment, your body is tense, your heart beats faster, your hands tremble, and you feel a little panicked. What happened? When you took in the view, your brain registered that you were at a great height, immediately detected danger, and activated 'bottom-up' processes to protect you. But the panicked feeling probably quickly subsided because you didn't actually need your alarm system to go off in this specific situation. Even if you're not always aware of it, 'top-down' processes jumped in to remind you that you're safe because you've driven across the Brooklyn Bridge many times before without anything happening. When you experience overwhelming anxiety in social situations, bottom-up processes in your brain interpret a social situation as dangerous and threatening similar to, yet much stronger than, the automatic threat reaction in the context of driving across the Brooklyn Bridge. Because of this perceived threat, you may flee and escape the social situation to protect yourself from harm. In contrast to driving across the Brooklyn Bridge, your top-down control systems may not have found a way to shift your perception of the situation to be less threatening. In therapy, you'll learn some skills that can gradually strengthen your ability to regulate these automatic, bottom-up fear responses, by practicing deliberate use of more controlled, top-down responses. For example, you'll use techniques to gather "evidence" for and against unhelpful negative thoughts/assumptions you may have about or during social situations. You'll also learn how inhibiting your impulse to avoid or escape a social situation may actually reduce your anxiety, similar to how your brain learned to shift the perception of driving across the Brooklyn Bridge from threatening to increasingly 'safe' through repeated exposure. Learning to use top-down processes to regulate how you think and behave in social situations, rather than allowing your automatic bottom-up system to take the driver's seat, may provide you with tools that can improve the quality and satisfaction of your social experiences."

4. Our Understanding About Brain Mechanisms Is Evolving

Patients may want to know more and ask details about their specific situation and their brain. We can then direct them to reliable resources to learn more about their psychological challenges and the mechanisms known about the specific psychotherapy techniques used. However, it is imperative to communicate to patients that this line of research is always developing. Patients may also benefit from knowing that findings are based on groups of people rather than individuals. And although we cannot conclude with certainty that what is observed in one group of people is true for all individuals, the empirical findings to date are, at the very least, clues about the connections that may exist between the brain, psychological functioning, and psychotherapy. Of particular importance to future research is the need for greater cultural representation, as the longstanding and pervasive oppression of various racial and cultural groups within neuroscience, as well as in science more generally, has resulted in a body of research that is lacking in representation and may have limited generalizability (Abiodun, 2019; Fernando, 2017).

- **Sample language that could be used with patients:**

"*The brain is extraordinarily complex, as are human beings. So, while there's a growing body of research related to the brain's role in our psychological functioning and the mechanisms related to change, it's important to keep in mind that what we know so far may only be the first clues about how things work. Scientists are working on repeating studies to confirm what has been discovered thus far, and to expand our understanding of the brain-mind-body connection.*

Over the course of history, scientific research unfortunately excluded study participants from various cultural/racial/ethnic and other minority backgrounds and issues around representation and ethical practices linger to the present day. Scientists are working on including participants who are more representative of the rich diversity of the population. This is vitally important as one of the goals of research is to generate findings that can be generalized across all subgroups in our society, not just one subgroup. Because of this, we still need to learn a lot about how scientific findings about the brain apply across individuals from various backgrounds. Many scientists are now making efforts to expand the scope of participants so that they are representative and reflective of the wide array of cultural and minority backgrounds. This shift will help us better understand how scientific findings apply across all individuals and will improve our appreciation of individual differences in brain functioning.

We're accumulating evidence about how our brains work, but there is still a lot left to be discovered."

Caveats: What to Watch Out for When Using Neuroeducation in the Clinic

Validity and Accuracy of Information Sources

Research suggests that explanations that are physiological in nature (e.g., brain-based) generate more interest and may be more convincing than behavior-based explanations (Weisberg et al., 2008). This may be an argument for using neuroeducation to engage patients in treatment, but it carries an important ethical and intellectual responsibility to ensure the information we provide to patients is accurate (Racine et al., 2005). For this reason, it is important to communicate clearly what we know and do not know to be valid and accurate, based on current, reliable scientific evidence. Furthermore, it is important to state the limitations of scientific findings (e.g., point #4 above) and to utilize resources that conscientiously reference the scientific literature including its limitations.

Mindful Use of Scientific Language

When neuroeducation is deemed appropriate with a given patient, too much jargon may interfere with learning. For the neuroscience enthusiasts among clinicians who have assimilated terms commonly used in neuroscience research into their everyday vocabulary, it is important to keep in mind that our patients' familiarity of those terms may be limited. Frequent use of neuroscience jargon and detailed descriptions of mechanisms may feel intimidating and distract the patient from

the key message. Sharing key principles in simple language, such as the examples provided above, may help establish a foundation of terminology and shared understanding of concepts which can be built upon during therapy.

Cultural Differences

We would like to reemphasize the importance of bearing in mind that neuroscience research has been conducted in samples that are often not culturally/ethnically/racially representative, which creates limits to the generalizability of findings (for a discussion of this important limitation of extant neuroscience research, see Laky et al., 2021, this issue). Neuroeducation should therefore be provided from a perspective of cultural humility, keeping in mind our own and our patients' unique cultural experiences that may filter the perception and understanding of the information provided. For example, most of CBT and related neuroscience research has Western, Eurocentric roots that assign a positive value to psychological change, yet this perspective may not be shared by everyone. Understanding our patients' worldviews and beliefs is fundamental to determining whether neuroeducation could be helpful.

Risk of Pathologizing

Further, it is paramount to consider that some patients may have experienced trauma and/or marginalization by a healthcare professional on the basis of one or more minority identities. To name one of many potentially relevant examples, the field of clinical psychology has a dark history of falsely pathologizing sexual and gender minorities as "biologically disordered." Even though much has since been done to improve diagnostic characterization, it is important for the field to remain vigilant about ways it may still be contributing to marginalization. Thus, when incorporating neuroeducation about how differences in brain structure or function may contribute to clinical symptoms, it is vital to not inadvertently pathologize differences or to send the message that the goal of therapy is to reach some "neurotypical" ideal. Even when neuroeducation is accurately delivered with mindful consideration of the patient's needs, diversity status, intersectional identities, preferences, and capabilities, there is still a possibility that patients may misunderstand or misinterpret the information putting the patient at risk for prognostic pessimism or for assuming that the goal of therapy is to make their brain "neurotypical." It is therefore important that we assess the patient's understanding after delivering neuroeducation. This can be done by asking the patient to summarize what they understood about the information provided and to then provide feedback on their summary. Maintaining this type of open and respectful dialogue with the patient about how the neuroeducation is landing creates space for in-the-moment adaptations to help ensure the tool is meeting the individual needs of our patients, and, most importantly, is never causing harm.

Where to Obtain More Neuroeducation

Many patients seen in psychotherapy may benefit from the basic neuroeducational discussion points described in this article. Yet, it may sometimes be important to tailor the information to the patient's specific situation and specific psychological challenges, and to provide additional information. Resources are available. The National Neuroscience Curriculum Initiative (https://www.nncionline.org/) is a collaborative effort by neuroscientists and educators to create and disseminate training resources for clinicians in the mental health field to support integration of neuroscience perspectives into clinical work. Their abundant inventory of resources provides both general and disorder-specific information and ranges from brief videos to full courses; many materials are free. A clinical neuroscience article repository that includes many disorder-specific articles has been accumulated by the by Neurocognitive Therapies and Translational Research SIG at ABCT and is available on their website (https://www.neurocognitive-therapies.com/articles).

Clinicians treating patients with addiction disorders may find a helpful resource in a highly relevant article by Ekhtiari and colleagues discussing neuroscience-informed psychoeducation for addiction medicine (Ekhtiari et al., 2017). An article by Laky et al. in the current issue discusses neuroscience findings from a cultural lens highlighting an OCD case example and may be helpful to clinicians serving patients with OCD.

Acquiring additional education on clinically informed neuroscience is an excellent way to build our toolkits as clinicians. Continuing education credits are available through a variety of sources, including courses through the National Neuroscience Curriculum Initiative (https://www.nncionline.org/), webinars organized by the Neurocognitive Therapies and Translational Research (https://www.neurocognitive-therapies.com/) SIG, as well as neuroscience-focused sessions at ABCT's Annual Convention.

For more general information on the brain-mind-body connection, resources that target a lay audience may be helpful and could, as appropriate, be recommended to interested patients. For example, Brain Science, a podcast by Ginger Campbell (https://brainsciencepodcast.com/), features many episodes on mental-health-related topics that may be of value to both clinicians and patients seeking to enrich their neuroscience knowledge.

Conclusion

Although research on applied neuroscience in the clinic is still in its infancy, we believe that the neuroscientific knowledge gained over the past few decades can be a useful tool in the psychology clinic. Still, it will be important to further empirically examine the effectiveness of neuroeducation in psychotherapy, as well as its perception by patients and clinicians.

In closing, we would like to point out another potential benefit of neuroeducation: Increased diversity of populations studied in neuroscience research will expand our understanding of the influence of culture on the brain and challenge assumptions of what is typical or normal. Evidence already points to a wide spectrum of "normative" brain functioning that changes over time and is influenced by culture (e.g., Cantlon & Brannon, 2007). The cultures among which we grow up and those with which we interact throughout our lives influence how we use language, what we pay attention to, what factors we use to make decisions, what features we find attractive in partners, and what we value. There is an ongoing interaction of brain patterns, intergenerational genetic inheritance, psychological functioning, interpersonal relationships, and individual and societal beliefs and values. This intricate and dynamic complexity challenges the concept of a singular neurotypical pattern that defines "normality." Thus, neuroeducation can, if presented skillfully, elucidate and scaffold an appreciation of the wide array of individual differences in how people respond, understand, approach and solve life challenges.

We hope that the information presented in this article will serve as a helpful tool to clinicians who would like to incor-

porate more neuroeducation into their psychotherapy practice. Yet we would like to stress that the tools presented here require thoughtful and conscientious application by remaining attuned and responsive to our patients' individual needs, strengths, and limitations. This means that the "if," "how much," and "when" to integrate neuroeducation into a patient's treatment is ultimately in the hands of each therapist's clinical judgment, in mindful collaboration with the patient.

References

Abiodun, S. J. (2019). "Seeing color," a discussion of the implications and applications of race in the Field of neuroscience. *Frontiers in Human Neuroscience, 13*. https://doi.org/10.3389/fnhum.2019.00280

Angeles Fernandez-Gil, M., Palacios-Bote, R., Leo-Barahona, M., & Mora-Encinas, J. P. (2010). Anatomy of the brainstem: A gaze into the stem of life. *Seminars in Ultrasound, CT, and MRI, 31*(3), 196-219. https://doi.org/10.1053/j.sult.2010.03.006

Arlinghaus, K. R., & Johnston, C. A. (2018). Advocating for behavior change with education. *American Journal of Lifestyle Medicine, 12*(2), 113-116. https://doi.org/http://doi.org/10.1177/1559827617745479

Asok, A., Leroy, F., Rayman, J. B., & Kandel, E. R. (2019). Molecular mechanisms of the memory trace. *Trends in Neurosciences, 42*(1), 14-22. https://doi.org/10.1016/j.tins.2018.10.005

Bond, K., & Anderson, I. M. (2015). Psychoeducation for relapse prevention in bipolar disorder: A systematic review of efficacy in randomized controlled trials. *Bipolar Disorders, 17*(4), 349-362. https://doi.org/http://doi.org/10.1111/bdi.12287

Bracha, H. S. (2004). Freeze, flight, fight, fright, faint: Adaptationist perspectives on the acute stress response spectrum. *CNS Spectrums, 9*(9), 679-685. https://doi.org/10.1017/s1092852900001954

Cannon, W. B. (1922). *Bodily changes in pain, hunger, fear and rage: An account of recent researches into the function of emotional excitement.* D. Appleton.

Cantlon, J. F., & Brannon, E. M. (2007). Adding up the effects of cultural experience on the brain. *Trends in Cognitive Sciences, 11*(1), 1-4. https://doi.org/10.1016/j.tics.2006.10.008

Chavanne, A. V., & Robinson, O. J. (2021). The overlapping neurobiology of induced and pathological anxiety: A meta-analysis of functional neural activation. *American Journal of Psychiatry*, 178(2), 156-164. https://doi.org/10.1176/appi.ajp.2020.19111153

Constantino, M. J., Arnkoff, D. B., Glass, C. R., Ametrano, R. M., & Smith, J. Z. (2011). Expectations. *Journal of Clinical Psychology, 67*(2), 184-192. https://doi.org/http://doi.org/10.1002/jclp.20754

Coutlee, C. G., & Huettel, S. A. (2012). The functional neuroanatomy of decision making: Prefrontal control of thought and action. *Brain Research, 1428*, 3-12. https://doi.org/10.1016/j.brainres.2011.05.053

Deacon, B. J., & Baird, G. L. (2009). The chemical imbalance explanation of depression: Reducing blame at what cost? *Journal of Social and Clinical Psychology, 28*(4), 415-435. https://doi.org/10.1521/jscp.2009.28.4.415

Disner, S. G., Beevers, C. G., Haigh, E. A., & Beck, A. T. (2011). Neural mechanisms of the cognitive model of depression. *Nature Reviews Neuroscience, 12*(8), 467-477. https://doi.org/10.1038/nrn3027

Donker, T., Griffiths, K. M., Cuijpers, P., & Christensen, H. (2009). Psychoeducation for depression, anxiety and psychological distress: A meta-analysis. *BMC Medicine, 7*(1), 1-9. https://doi.org/10.1186/1741-7015-7-79

Ekhtiari, H., Rezapour, T., Aupperle, R. L., & Paulus, M. P. (2017). Neuroscience-informed psychoeducation for addiction medicine: A neurocognitive perspective. *Progress in Brain Research, 235*, 239-264. https://doi.org/https://doi.org/10.1016/bs.pbr.2017.08.013

Etkin, A., Büchel, C., & Gross, J. J. (2015). The neural bases of emotion regulation. *Nature Reviews Neuroscience, 16*(11), 693-700. https://doi.org/10.1038/nrn4044

Fernando, S. (2017). *Institutional racism in psychiatry and clinical psychology: Race matters in mental health*. Palgrave Macmillan.

Fu, C. H., Williams, S. C., Cleare, A. J., Scott, J., Mitterschiffthaler, M. T., Walsh, N. D., Donaldson, C., Suckling, J., Andrew, C., Steiner, H., & Murray, R. M. (2008). Neural responses to sad facial expressions in major depression following cognitive behavioral therapy. *Biological Psychiatry, 64*(6), 505-512. https://doi.org/10.1016/j.biopsych.2008.04.033

Fuchs, T. (2004). Neurobiology and psychotherapy: An emerging dialogue. *Current Opinion in Psychiatry, 17*(6), 479-485.

Glannon, W. (2020). Mind-brain dualism in psychiatry: Ethical implications. *Frontiers in Psychiatry, 11*, 85. https://doi.org/10.3389/fpsyt.2020.00085

Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: Reappraisal and suppression of negative emotion. *Biological Psychiatry, 63*(6), 577-586. https://doi.org/10.1016/j.biopsych.2007.05.031

Goldin, P. R., Thurston, M., Allende, S., Moodie, C., Dixon, M. L., Heimberg, R. G., & Gross, J. J. (2021). Evaluation of cognitive behavioral therapy vs mindfulness meditation in brain changes during reappraisal and acceptance among patients with social anxiety disorder: A randomized clinical trial. *JAMA Psychiatry*. https://doi.org/10.1001/jamapsychiatry.2021.1862

Goldin, P. R., Ziv, M., Jazaieri, H., Hahn, K., Heimberg, R., & Gross, J. J. (2013). Impact of cognitive behavioral therapy for social anxiety disorder on the neural dynamics of cognitive reappraisal of negative self-beliefs: Randomized clinical trial. *JAMA Psychiatry, 70*(10), 1048-1056. https://doi.org/10.1001/jamapsychiatry.2013.234

Gorka, S. M., Young, C. B., Klumpp, H., Kennedy, A. E., Francis, J., Ajilore, O., Langenecker, S. A., Shankman, S. A., Craske, M. G., Stein, M. B., & Phan, K. L. (2019). Emotion-based brain mechanisms and predictors for SSRI and CBT treatment of anxiety and depression: A randomized trial. *Neuropsychopharmacology, 44*(9), 1639-1648. https://doi.org/10.1038/s41386-019-0407-7

Goss, D., & Parnell, T. (2016). Integrating neuroscience into counselling psychology: Exploring the views and experiences of UK based counselling psychologists. *Counselling Psychology Review 32*, 4-17.

Gotink, R. A., Meijboom, R., Vernooij, M. W., Smits, M., & Hunink, M. G. (2016). 8-week mindfulness based stress reduction induces brain changes similar to traditional long-term meditation practice – A systematic review. *Brain and Cognition, 108*, 32-41. https://doi.org/10.1016/j.bandc.2016.07.001

Hebb, D. O. (1949). *The organization of behavior: A neuropsychological theory*. Wiley.

Hofmann, S. G., Ellard, K. K., & Siegle, G. J. (2012). Neurobiological correlates of cognitions in fear and anxiety: A cognitive-neurobiological information-processing model. *Cognition & Emotion, 26*(2), 282-299. https://doi.org/10.1080/02699931.2011.579414

Illes, J., Lombera, S., Rosenberg, J., & Arnow, B. (2008). In the mind's eye: Provider and patient attitudes on functional brain imaging. *Journal of Psychiatric Research, 43*(2), 107-114. https://doi.org/http://doi.org/10.1016/j.jpsychires.2008.02.008

Laky, Z., Szkutak, A., & Fang, A. (2021). Toward a more inclusive neuroscience-informed treatment of OCD: A clinical case example. *the Behavior Therapist, 44*(7), 340-345.

Lebowitz, M. S., & Ahn, W. (2015). Emphasizing malleability in the biology of depression: Durable effects on perceived agency and prognostic pessimism. *Behaviour Research and Therapy, 71,* 125-130. https://doi.org/10.1016/j.brat.2015.06.005

Lebowitz, M. S., Pyun, J. J., & Ahn, W. (2014). Biological explanations of generalized anxiety disorder: Effects on beliefs about prognosis and responsibility. *Psychiatric Services, 65*(4), 498-503. https://doi.org/http://doi.org/10.1176/appi.ps.201300011

Melcher, T., Falkai, P., & Gruber, O. (2008). Functional brain abnormalities in psychiatric disorders: Neural mechanisms to detect and resolve cognitive conflict and interference. *Brain Research Reviews, 59*(1), 96-124. https://doi.org/10.1016/j.brainresrev.2008.06.003

Miguel, P. M., Pereira, L. O., Silveira, P. P., & Meaney, M. J. (2019). Early environmental influences on the development of children's brain structure and function. *Developmental Medicine & Child Neurology, 61*(10), 1127-1133. https://doi.org/10.1111/dmcn.14182

Ochsner, K. N., Bunge, S. A., Gross, J. J., & Gabrieli, J. D. (2002). Rethinking feelings: An fMRI study of the cognitive regulation of emotion. *Journal of Cognitive Neuroscience, 14*(8), 1215-1229. https://doi.org/10.1162/089892902760807212

Pico-Perez, M., Alemany-Navarro, M., Dunsmoor, J. E., Radua, J., Albajes-Eizagirre, A., Vervliet, B., Cardoner, N., Benet, O., Harrison, B. J., Soriano-Mas, C., & Fullana, M. A. (2019). Common and distinct neural correlates of fear extinction and cognitive reappraisal: A meta-analysis of fMRI studies. *Neuroscience & Biobehavioral Reviews, 104,* 102-115. https://doi.org/10.1016/j.neubiorev.2019.06.029

Pico-Perez, M., Radua, J., Steward, T., Menchon, J. M., & Soriano-Mas, C. (2017). Emotion regulation in mood and anxiety disorders: A meta-analysis of fMRI cognitive reappraisal studies. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 79*, 96-104. https://doi.org/10.1016/j.pnpbp.2017.06.001

Porto, P. R., Oliveira, L., Mari, J., Volchan, E., Figueira, I., & Ventura, P. (2009). Does cognitive behavioral therapy change the brain? A systematic review of neuroimaging in anxiety disorders. *Journal of Neuropsychiatry and Clinical Neurosciences, 21*(2), 114-125. https://doi.org/http://doi.org/10.1176/jnp.2009.21.2.114

Racine, E., Bar-Ilan, O., & Illes, J. (2005). fMRI in the public eye. *Nature Reviews Neuroscience, 6*(2), 159-164. https://doi.org/https://doi.org/10.1038/nrn1609

Raynor, D., Blenkinsopp, A., Knapp, P., Grime, J., Nicolson, D., Pollock, K., Dorer, G., Gilbody, S., Dickinson, D., & Maule, A. (2007). A systematic review of quantitative and qualitative research on the role and effectiveness of written information available to patients about individual medicines. *Health Technology Assessment, 11*(5), 1-177. https://doi.org/10.3310/hta11050

Rodrigues, F., Bártolo, A., Pacheco, E., Pereira, A., Silva, C., & Oliveira, C. (2018). Psycho-education for anxiety disorders in adults: A systematic review of its effectiveness. *Journal of Forensic Psychology, 3*(2). https://doi.org/10.4172/2475-319X.1000142

Schiele, M. A., Gottschalk, M. G., & Domschke, K. (2020). The applied implications of epigenetics in anxiety, affective and stress-related disorders – a review and synthesis on psychosocial stress, psychotherapy and prevention. *Clinical Psychology Review, 77*, 101830. https://doi.org/10.1016/j.cpr.2020.101830

Stujenske, J. M., & Likhtik, E. (2017). Fear from the bottom up. Nature Neuro-

science, 20(6), 765-767. https://doi.org/10.1038/nn.4578

Sweatt, J. D. (2016). Neural plasticity and behavior – sixty years of conceptual advances. *Journal of Neurochemistry, 139*(S2), 179-199. https://doi.org/10.1111/jnc.13580

Tang, Y. Y., Holzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience, 16*(4), 213-225. https://doi.org/10.1038/nrn3916

Tursi, M. F., Baes, C. V., Camacho, F. R., Tofoli, S. M., & Juruena, M. F. (2013). Effectiveness of psychoeducation for depression: A systematic review. *Australian & New Zealand Journal of Psychiatry, 47*(11), 1019-1031. https://doi.org/10.1177/0004867413491154

Weisberg, D. S., Keil, F. C., Goodstein, J., Rawson, E., & Gray, J. R. (2008). The seductive allure of neuroscience explanations. *Journal of Cognitive Neuroscience, 20*(3), 470-477. https://doi.org/10.1162/jocn.2008.20040

Young, K. S., & Craske, M. G. (2018). The cognitive neuroscience of psychological treatment action in depression and anxiety. *Current Behavioral Neuroscience Reports, 5*(1), 13-25. https://doi.org/10.1007/s40473-018-0137-x

Zhao, S., Sampson, S., Xia, J., & Jayaram, M. B. (2015). Psychoeducation (brief) for people with serious mental illness. *Cochrane Database of Systematic Reviews.* https://doi.org/10.1002/14651858.CD010823.pub2

. . .

The authors have no conflicts of interest or funding to disclose.

Correspondence to Maria Kryza-Lacombe, 6363 Alvarado Ct., Ste 103, San Diego, CA 92120; mkryza-lacombe@sdsu.edu

Interview Series: Clinical Psychology Careers "Off the Beaten Path": Part 2

Samantha Moshier, *Emmanuel College*

ALTHOUGH EARLY-CAREER psychologists are equipped to work in a wide range of roles and settings, many are exposed to a limited set of professional models during their training. This is the second of three sets of interviews conducted with psychologists whose career trajectories represent a departure from the dichotomy of tenure-track academia and full-time clinician. Their roles span the research consulting, pharmaceutical, tech start-up, and public sectors, illustrating the diverse ways that training in clinical psychology can be utilized. It is our hope that this series will provide ABCT student members with a broader picture of the possibilities that their training provides.

Thank you to the psychologists who generously gave their time to share their advice and experience. Interviews with Dr. Lisa Benson and Dr. Andrea Niles appear below. Drs. Sarah Kleiman and Michelle Davis were featured in the September issue, and interviews with Drs. Cassidy Gutner and Ellen Healy will appear in the forthcoming December issue.

■ Lisa Benson, Ph.D.

Los Angeles County Department of Mental Health

What type of degree do you have and where did you receive it from?

I have a Ph.D. in clinical psychology from the University of California, Los Angeles (UCLA).

What is your current position?

I am a supervising psychologist in the Office of Clinical Informatics, Los Angeles County Department of Mental Health (DMH).

Describe your job. What does a typical day or week look like for you?

The Office of Clinical Informatics serves as a bridge between DMH's clinical programs and its Information Technology (IT) staff. We are a group of 11 clinical psychologists and analysts based in the IT department. We have the primary responsibility for development of new functionality in DMH's electronic health record (EHR), so we work with clinical staff to understand their workflow, make recommendations, then build data collection instruments and widgets that display real-time data. We also pull EHR/other data to build reports or dashboards for DMH staff as well as outside researchers.

I report to the Chief of Clinical Informatics and supervise the rest of the team. I spend about a third of my time in a primarily supervisory role—having one-on-ones with staff, writing performance evaluations, and other administrative items. The rest of the time I'm doing individual contributor work. In a typical day, I have two or three meetings about current or potential new projects and then try to make progress on five or six currently active projects I am the lead on. Examples would be creating new EHR data collection instruments for a specialized DMH program focused on eviction prevention (so it can be evaluated on specific process and outcome measures), building a dashboard for DMH executive management with data visualization of the billable activities performed by DMH's outpatient clinics, and pulling data for academic researchers interested in the prevalence of opioid use disorders among the DMH population.

What attracted you to your current position?

Before transferring to the Office of Clinical Informatics, I was a staff psychologist at Harbor-UCLA Medical Center, which is a DMH-operated outpatient mental health clinic affiliated with UCLA's David Geffen School of Medicine. I enjoyed doing direct clinical service and also engaging in research in that setting. However, I became interested in being of service to the wider DMH community (clinicians and consumers) by working in administration. I was enthusiastic about having the opportunity to spend more of my time analyzing data and improving workflows. Clinical Informatics seemed to combine my research and administrative interests perfectly.

What prior experiences or positions made this career path possible for you?

During my graduate training, I completed a clinical externship at Harbor-UCLA, where I learned how much I enjoy working with the DMH population and also developed important relationships with mentors. I was able to return there for my postdoctoral fellowship and was hired on as a staff psychologist. I am so grateful to the Harbor team for my wonderful time there and also for being the ones to introduce me to the Chief of Clinical Informatics, who had been at Harbor prior to taking on that role. The Harbor staff told me it seemed like I had a similar way of thinking! They were right, and also my experience as a DMH front-line clinician has been crucial for understanding data and planning workflows in an effective way.

What skills from your graduate training do you use most often?

The research training I received in graduate school is critical for this position. Understanding how to manage and think about data—even just "long" vs. "wide" formats—is necessary for both setting up data collection instruments and writing reports. Beyond that, I often consult on formative evaluations of new programs in DMH and work with outside researchers to help them better understand our data before providing it. I ask questions about how researchers intend to operationalize a construct or how much variability they are expecting to see. For example, I have had to advise researchers not to use change in diagnosis as a measure. In our system, diagnosis is submitted at intake and does not have to be resubmitted at future appointments, so it often is never changed. I also rely constantly on my clinical training from graduate school to help me be a better supervisor and advisor to others.

What do you enjoy about your work?

Other than a few administrative tasks, I enjoy everything about my work! I love the variety of challenges and that I have so many opportunities to help make DMH consumers' and/or clinicians' experience better. I am so grateful for my insightful, highly committed team and all our wonderful collaborators across DMH.

What do you find most challenging about your work?

One of the challenges of working in local government is you are not only dealing with your own bureaucracy but also regulations coming from the state and federal

levels. For example, it can be difficult to determine how to implement a new state requirement in the context of our system, fulfilling what was intended while also protecting DMH clinicians and consumers from unnecessary data-entry burden.

As a graduate student, what was your intended career path?

When I was in graduate school, initially I intended to go into academia, and then moved toward an academic medicine or clinic-based research path. However, if I had known about Clinical Informatics I certainly would have been interested! I was not aware of the many opportunities for analysis and evaluation activities in government settings.

What advice would you give to a graduate student who is interested in pursuing a similar line of work?

Last year, I was part of a group of psychologists from a variety of government settings who wrote a piece for *the Behavior Therapist* with our collective advice. I will emphasize from that piece (Regan et al., 2020) that it is very helpful to get experience early with any setting you think you might want to be part of. Like me, you may not be aware of the kinds of job opportunities that exist until you understand the system better and develop personal connections. You will also get a sense of the degree to which decision making in this system is currently data-driven and what kinds of analytic or planning roles exist.

I will also note that the position I took in the Office of Clinical Informatics, like many, was only posted as a transfer – I could not have applied to it if I was not already employed at DMH. Therefore, in some cases it may be effective to begin working in a system of care you feel passionate about and then follow your interests into different roles over time.

Reference

Regan, J., Okamura, K., Rodriguez, A., Benson, L. A., Orimoto, T., & Ward, A. (2020). Applying psychological science in government behavioral health settings – A psychologist's perspective. *the Behavior Therapist, 43*(6), 217-223.

■ Andrea Niles, Ph.D.

Youper AI

What type of degree do you have and where did you receive it from?

Ph.D. in Clinical Psychology from UCLA.

What is your current position? (include your employer if applicable)

Chief Science Officer and Co-Founder at Youper AI.

Describe your job. What does a typical day or week look like for you?

Youper is a mental health app that uses cognitive and behavioral just-in-time interventions to help users improve emotion regulation skills. More simply, Youper provides self-guided therapy for anxiety and depression. My role at Youper is to write content for the app that is based in scientific evidence and to conduct data analyses to (a) better understand how users are engaging with Youper and (b) improve clinical outcomes. At Youper, we work in 2-week "sprints" where we aim to achieve specific goals by the end of each 2-week period. On a given day, I may be writing content for the app, designing new interventions, analyzing data to understand our users, or presenting ideas and findings to the team.

What attracted you to your current position?

In academia, I was doing research in digital mental health. But I saw some limitations to how academics were approaching digital solutions, and I felt that there were opportunities in industry that had greater potential to reach more people. I saw the position posted, and it described a lot of the things that I was doing in my own research like creating an evidence-based digital intervention and identifying how to personalize the intervention to each unique user. The idea of reaching more users quickly, and applying my expertise in an industry setting was very exciting to me, so I decided to apply.

What prior experiences or positions made this career path possible for you?

In my post-doc, I had done work in digital mental health, designing two of my own apps. This experience was helpful in demonstrating that I would be a good fit for a similar role in industry. In addition, my experience with data analysis proved to be valuable, and set me apart from some of the other clinical psychologists who applied for the position. Specifically, I had some experience with machine learning and extensive experience with inferential statistics. Having a strong publication record also demonstrated my commitment to science, which was an important value for Youper.

What skills from your graduate training do you use most often?

I use my knowledge of multiple evidence-based behavioral therapies, and data analytic and inferential statistics knowledge. I also use my presentation and writing skills.

What do you enjoy about your work?

I like being able to take an idea from conceptualization to implementation very quickly and applying my expertise in behavioral therapies in a completely new and different context. I also love having access to large datasets to better understand how our app is working and what can be improved.

What do you find most challenging about your work?

Because everything moves very fast, it's not always possible to carry out your entire vision of a product feature. So, I may have lots of ideas about how to design a behavioral activation intervention, for example, but for the first version, I can only do a small part of that vision. Sometimes it can be frustrating to not put a perfect feature out into the world, but this is a critical part of the strategy in tech to help companies create products that really meet the needs of the users, not what we as developers think the users need.

As a graduate student, what was your intended career path?

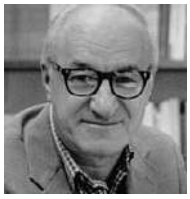
I was aiming for a tenure track, R1 faculty position. However, there were some aspects of this career path that I was less excited about, including applying for grants and doing large amounts of course preparation. I enjoyed research, but it seemed that to be able to do research, I would have to do many other things that would take a significant amount of time. It didn't make sense to me to spend the majority of my time writing grants or teaching only to have a little bit of time left over to do research.

What advice would you give to a graduate student who is interested in pursuing a similar line of work?

My first piece of advice is to join DMH Hub (dmhhub.org). I created this community to build a network of professionals working in digital mental health. There are

great opportunities to network with digital mental health professionals, learn about the field, and find jobs. From there, I recommend doing informational interviews with different people who are doing the work that you're interested in. You can find out more about what they do day to day, what skills are needed for their specific role, and what openings might be available for someone like yourself. ■

OBITUARY



Obituary for Albert Bandura

Gerald C. Davison, *University of Southern California*

ALBERT BANDURA was born in 1925 and passed away on July 26, 2021. He was one of the most highly cited psychologists in the history of psychology. From a very modest childhood in rural Canada, Bandura emerged as an innovative theorist and experimentalist in the development of a social cognitive theory that placed strong emphasis on the human capacity to control both the external and internal environment. His work on modeling and complex social cognition has had a profound influence on our conceptions of personality development and change, including the burgeoning field of cognitive behavior therapy. In recent years his work was applied to large-scale societal efforts to improve human health and safety and to help people make choices in creating meaningful lives for themselves.

Albert Bandura was born in Mundare, Alberta, Canada and was the David Starr Jordan Professor Emeritus of Social Science in Psychology at Stanford University, where he was on the psychology faculty for his entire professional career, retiring in 2010 but remaining active to his final days. He was working on yet another book when he passed at age 95. He graduated in 1949 in 3 years with a B.A. in psychology from the University of British Columbia, and then he received his M.A. in 1951 and his Ph.D. in 1952 from the University of Iowa under Arthur Benton, a highly regarded neuropsychologist. He completed his clinical internship postdoctorally in 1953 at the Witchita Kansas Guidance Center and thence to Stanford. By his own account (Bandura, 2007), he acquired at Iowa a deep appreciation for the value of clear theorizing and rigorous experimentation. He became a naturalized U.S. citizen in 1956. His long marriage to Virginia (nee Varns) Bandura ended with her passing in 2011. They had two daughters, one a clinical psychologist, the other a nurse and director of an adolescent clinic for children of migrant workers.

In his autobiography (Bandura, 2007), Bandura attached great importance to his childhood circumstances for what he called his agentic perspective, a worldview that, in common with existential philosophy, sees primary power in the individual's decision-making, constructions of the world, and willful determination to take certain courses of action. His parents had emigrated as teenagers from eastern Europe, his father from Poland and his mother from Ukraine. They lived a hard-scrabble life laying track for a railroad, working in a general store, and converting by hand a boulder-ridden parcel of land into an arable farm. These industrious parental role models provided a pattern for Bandura that he pursued with commitment and vigor at the intellectual level, something that his parents were unable to do themselves but which they did all that they could to nurture and facilitate in their uncommonly intelligent son.

Bandura earned many honors and awards during his long and illustrious career, among which were election as Fellow of the American Association for Arts and Sciences, the Lifetime Achievement Award from the Association for Behavioral and Cognitive Therapies, the James McKeen Cattell Award from the Association for Psychological Science, the Award for Distinguished Scientific Contributions from the American Psychological Association, membership in the Institute of Medicine of the National Academy of Sciences, the Grawemeyer Award in psychology, and, in 2016, the National Medal of Science conferred on him by President Barack Obama. He was also the recipient of more than 20 honorary doctoral degrees both in North America and Europe.

Many of his books and articles are seminal contributions to the interrelated fields of personality and behavior therapy. His 1961 *Psychological Bulletin* article, "Psychotherapy as a Learning Process," was one of the earliest position papers on developing psychological interventions that were based on theory and research in classical and operant conditioning. Called "behavior therapy" or "behavior modification," this movement posed both epistemological and procedural challenges to the then-cur-

rent dominant approaches, namely psychoanalysis and its variants, as well as to humanistic-existential therapies. He is generally regarded as one of the founders of behavior therapy along with B. F. Skinner (1904–1990), Joseph Wolpe (1915–1997), Hans Eysenck (1961–1997), Arthur Staats (1924–2021), and Arnold Lazarus (1932–2013).

In 1963, Bandura and his first Ph.D. student, Richard Walters (1918–1967), published their classic book, *Social Learning Theory and Personality Development*. This book heralded Bandura's theoretical expansion into cognitive factors as critical components of learning. In the 1960s he and his students conducted a series of experiments—the famous "Bobo doll" studies—that demonstrated how children could acquire complex behavioral patterns by observing others without imitating their overt behavior or being reinforced for doing so. These studies challenged the behavioristic focus on reinforcing overt behavior as a necessary condition of learning. It was in the performance of what was learned "merely" by observing that reinforcement played a role, not in the initial learning itself. These elegant, deceptively simple experiments were a key factor in the development of cognitive behavior therapy, an expansion of behavior therapy that assigned causal influence to how people perceive and appraise their world.

Bandura's embracing of cognitive constructs was a sharp departure from the behaviorism in which he was steeped as a graduate student at Iowa and which was a widely accepted paradigm for many psychologists in the 1940s and 1950s. The cognitive theme of self-regulation and self-reflection was cogently elaborated in his classic 1969 book, *Principles of Behavior Modification*, not an easy read but worth the effort. A milestone in the development of social learning theory and behavior change, this tome made the case for including social cognitive variables into a theory-based and research-driven conceptualization of cognitive behavior therapy. Originally called "social learning theory," Bandura's evolving emphasis on complex cognitive and other self-regulatory processes led him to rename it "social cognitive theory" (Bandura, 1986).

This cognitive emphasis was developed further in his concept of self-efficacy (Bandura, 1997), or the sense that one can achieve a particular goal, whether it be to approach a phobic object like a nonpoisonous snake or execute complex intellectual tasks like writing a dissertation. Bandura posited self-efficacy as the primary controlling variable to which other factors, like obtaining positive reinforcement, contribute. While never losing the focus on overt behavior and contingencies, Bandura argued for a shift of emphasis to cognition and, in particular, self-efficacy.

It should be mentioned that Bandura's focus on principles of development and change reflected what was the original core of behavior therapy, in contrast to the preoccupation with treatment packages designed for DSM-defined mental disorders. We are beginning to return to concentrating on process mechanisms of cognitive, affective, and behavioral change, something that Bandura argued for and exemplified throughout his long and distinguished career.

In more recent years Bandura's theoretical and applied interests expanded to encompass larger-scale social issues. For example, he supported television programming in Mexico that applied his theories and research findings to the design of telenovelas (soap operas) for the promotion of family planning. His influence is evident also in Africa, Asia, and other parts of Latin America in encouraging literacy, safer sex practices, and environmental conservation. Bandura demonstrated that high-level theorizing and meticulous laboratory research can be applied successfully at the macro level.

While aptly described as "the compleat scholar," Bandura also made important contributions to psychology's place in the hurly-burly world of politics and science during his presidency of the American Psychological Association in 1974. At that time there was hostility towards the field from both the federal government and from the American Psychiatric Association, the latter making an effort to define psychotherapy as medical in nature and therefore requiring medical supervision of psychologists. With other forward-looking leading psychologists, Bandura worked effectively to legitimize independent psychological practice and psychological knowledge as a basis for mental health public policy decisions and, in general, to strengthen psychologists' standing as reliable sources of information and professional skills with regard to complex societal issues. Bandura understood and vigorously promoted the importance of science in the formulation of public policy.

In his later years Bandura reflected on the role of chance in the course of people's lives, how an unplanned or unanticipated event can change the direction of one's life. He recounted how discovering psychology as his intellectual passion occurred by chance when, as a freshman at UBC, he was skimming a course catalogue and came upon the introductory psychology course being offered at a time that would fill a gap in his schedule. Characteristically he used such fortuitous experiences to write incisively and creatively on the role of chance, not by focusing on random factors in the universe but on how unplanned and unexpected events enter into complex causal networks where the individual's agency plays the critical role in converting fortuitous events into meaningful and productive outcomes (Bandura, 1982).

As his graduate student at Stanford from 1962–1965, I'd like to offer a personal reflection on "Al," as he was always referred to. One memorable event was during his seminar on behavior therapy in the winter quarter of 1963–1964. He was holding forth in a critical way on the stranglehold that Freud's thinking had held in the field for decades. In mid-sentence, there was a mild earthquake. Most of the class were not from California so, understandably, we stared at each other and at Al in stark terror. Al seemed unperturbed, though he did pause during the worst of the temblor. When the shaking stopped, he cracked a smile and said something like, "Well, I'll have to be more careful in the future about speaking ill of Freud."

I sometimes tell students and colleagues that if I'd fully appreciated at the time the uncommon brilliance and creativity of Al Bandura, I might not have mustered the courage to ask him to be my advisor. Interacting with him was always mind-bending. I seldom came away from a conversation with him that did not leave my head spinning in a good sort of way. But one had to do one's homework, so to speak, before asking to meet with him, for while he was always kind and generous, he did not suffer fools gladly. Suffice it to say that one did not want to be in that category.

Reflecting on his more than 50 years at Stanford, Bandura commented in a way that captures the essence of the man: "I was blessed with illustrious colleagues, gifted students, considerable freedom to go wherever one's curiosity might lead, and a university ethos that approaches scholarship, not as a matter of publish or perish, but with puzzlement that the pursuit of knowledge should require coercion" (Bandura, 2007).

References

Bandura, A. (1961). Psychotherapy as a learning process. *Psychological Bulletin, 58*(2), 143-159.

Bandura, A. (1982). The psychology of chance encounters and life paths. *American Psychologist, 37*(7), 747-755.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.

Bandura, A. (2007). Autobiography. In G. Lindzey & W. M. Runyan (Eds.), *A history of psychology in autobiography* (Vol. IX). American Psychological Association.

Bandura, A., & Walters, R.H. (1963). *Social learning and personality development*. Holt Rinehart and Winston.

. . .

Acknowledgment: Some of this obituary is drawn from Davison, G. C. (2015). Albert Bandura. In R. Cautin & S. Lilienfeld (Eds.), *Encyclopedia of Clinical Psychology*. New York: Wiley-Blackwell.

Apps

ABCT & PsyberGuide

ABCT is delighted to announce a partnership with **PsyberGuide**, a nonprofit website reviewing smartphone applications and other digital mental health tools. This partnership was established with the aim of disseminating reviews of digital mental health tools to a broad audience of researchers, psychologists, psychiatrists, and other mental-health practitioners. App reviews from both PsyberGuide and *Cognitive and Behavioral Practice* are integrated on both sites.

PsyberGuide.org's goal is to help people make responsible and informed decisions about the technologies they use for management of mental health. PsyberGuide is committed to ensuring that this information is available to all, and that it is free of preference, bias, or endorsement.

PsyberGuide is funded by One Mind (Dr. Stephen Schueller, Executive Director), a leading nonprofit organization supporting collaborative brain research to provide patients who suffer from brain disease and injury better diagnostics and treatment. With over 325,000 emerging digital health technologies, and an estimated 15,000 of those designed for mental health, One Mind recognized the lack of advice or guidelines to help people navigate the expanding marketplace of mental health apps. Thus in 2013, One Mind established PsyberGuide to address this growing problem.

For full listings, visit:

http://www.abct.org/Resources/?m=mResources&fa=ABCT_APPS

2022 Call *for* Award Nominations

to be presented at the 56th Annual Convention in New York City

The ABCT Awards and Recognition Committee, chaired by Sara R. Elkins, Ph.D., University of Houston Clear Lake, is pleased to announce the 2022 awards program. Nominations are requested in all categories listed below. Applicants from traditionally underrepresented backgrounds are particularly encouraged to apply. Given the number of submissions received for these awards, the committee is unable to consider additional letters of support or supplemental materials beyond those specified in the instructions below. Please note that award nominations may not be submitted by current members of the ABCT Board of Directors.

Career/Lifetime Achievement

Eligible candidates for this award should be members of ABCT in good standing who have made significant contributions over a number of years to cognitive and/or behavior therapy. Recent recipients of this award include Thomas H. Ollendick, Lauren B. Alloy, Lyn Abramson, David M. Clark, Marsha Linehan, Dianne L. Chambless, Linda Carter Sobell and Mark B. Sobell, Philip C. Kendall, Richard G. Heimberg, and Patricia Resick. Applications should include a nomination form (available at www.abct.org/awards), two letters of support, and the nominee's curriculum vitae. Please e-mail the nomination materials as one pdf document to ABCTAwards@abct.org. Include "Career/Lifetime Achievement" in the subject line. ***Nomination deadline***: March 1, 2022.

Outstanding Educator/Trainer

This award is given to members of ABCT in good standing who have provided significant contributions toward educating and training cognitive and behavioral practitioners. Past recipients of this award include Gerald Davison, Leo Reyna, Harold Leitenberg, Marvin Goldfried, Philip Kendall, Patricia Resick, and Christine Maguth Nezu. Applications should include a nomination form (available at www.abct.org/awards), two letters of support, and the nominee's curriculum vitae. Please e-mail the nomination materials as one PDF document to ABCTAwards@abct.org. Include "Outstanding Educator/Trainer" in the subject line.
Nomination deadline: March 1, 2022

Outstanding Mentor

Eligible candidates for this award are members of ABCT in good standing who have encouraged the clinical and/or academic and professional excellence of psychology graduate students, interns, postdocs, and/or residents. Outstanding mentors are considered those who have provided exceptional guidance to students through leadership, advisement, and activities aimed at providing opportunities for professional development, networking, and future growth. Appropriate nominators are current or past students of the mentor. Previous recipients of this award are Richard Heimberg, G. Terence Wilson, Richard J. McNally, Mitchell J. Prinstein, Bethany Teachman, Evan Forman, Ricardo Munoz, and David A. F. Haaga. Please complete the nomination form at www.abct.org/awards. Email the completed form and associated materials as one pdf document to ABCTAwards@abct.org, and include "Outstanding Mentor" in the subject line. ***Nomination deadline:*** March 1, 2022

Sobell Innovative Addictions Research Award

The award is given to an individual who, through the performance of one or more research studies, has developed a novel and very innovative (1) program of research or (2) assessment or analytic tool or method that advances the understanding and/or treatment of addictions. The emphasis is on behavioral and/or cognitive research or research methods that have yielded exceptional breakthroughs in knowledge. The recipient receives $1500 and a plaque. The 2020 recipient of this award was Christopher Correia, Ph.D. Candidates must be current members of ABCT and are eligible for the award regardless of career stage. Candidates may self-nominate or be nominated by others who need not be members of ABCT. Submissions should include the nomination form (available at www.abct.org/awards), nominee's curriculum vitae, a statement describing the addictions research contribution and why it is novel and advances the field (maximum 3 pages), two letters of support, and copies of publications, web materials, or other documents supporting the innovation and impact described in the nomination. Please e-mail the nomination materials as one pdf document to ABCTAwards@abct.org. Include "Sobell Research Award" in the subject line. ***Nomination deadline***: March 1, 2022

David H. Barlow and Beverly A. Barlow Research Innovation Award

The David H. Barlow and Beverly A. Barlow Research Innovation Prize is an endowed named award that will be presented annually at the ABCT convention. A past president of the organization, Dr. Barlow has been actively involved in ABCT for over 50 years. Members of ABCT whose published work has contributed innovations that have significantly advanced cognitive behavioral theory, methodology, assessment, and intervention and/or related areas are eligible. These innovations will have made significant contributions to clinical practice or research on cognitive and/or behavioral modalities including their implementation and dissemination. Such contributions will be evident in one or more publications in high impact journals, citations of the candidate's work, evidence

that the work has advanced the field in important ways and letters by peers supporting these contributions and highlighting the innovations. The first award of $2,500 plus a personalized plaque will be given in November 2022 to a recipient chosen by the ABCT Awards and Recognition Committee. Candidate must be a current ABCT member and can be at any stage of their career. Applicants may be self-nominated or nominated by a colleague. Please complete the nomination form at www.abct.org/awards, and include CV, statement of clinical research contributions, list of relevant publications and citations, and two letters of support for the nomination based on the criteria in the nomination form. Email the nomination materials as one PDF document to ABCTAwards@abct.org. Include "The Barlow Prize" in the subject line. ***Nomination deadline:*** March 1, 2022

The Francis C. Sumner Excellence Award

The Francis Cecil Sumner Excellence Award is named in honor of Dr. Sumner, the first African American to receive a Ph.D. in psychology in 1920. Commonly referred to as the "Father of Black Psychology," he is recognized as an American leader in education reform. This award can be given on an annual basis, awarded in even years to a graduate student and in odd years to an early career professional within the first 10 years of terminal degree. Candidate must be a current member of ABCT at the time of the awards ceremony and priority will be given to students and professional members of ABCT at the time of the nomination. The award is intended to acknowledge and promote the excellence in research, clinical work, teaching, or service by an ABCT member who is a doctoral student or early career professional within 10 years of award of the PhD/PsyD/EdD/ScD/MD who identifies as Black or Indigenous. The award is given to recognize that Black and Indigenous practitioners and scholars are underrepresented in clinical psychology, despite making important contributions to our field. The Francis C. Sumner Excellence Award is meant to reflect the overarching goal of ABCT supporting its members of color. The 2021 recipient of this award was Isha Metzger, Ph.D. The recipient will receive $1,000 and a certificate. Please complete the online nomination materials at www.abct.org/awards. Email the nomination materials as one PDF document to ABCTAwards@abct.org, and include "Francis C. Sumner Award" in the subject line.
Nomination deadline: March 1, 2022

Anne Marie Albano Early Career Award for Excellence in the Integration of Science and Practice

Dr. Anne Marie Albano is recognized as an outstanding clinician, scientist, and teacher dedicated to ABCT's mission. She is known for her contagious enthusiasm for the advancement of cognitive and behavioral science and practice. The purpose of this award is to recognize early career professionals who share Dr. Albano's core commitments. The 2021 recipient of this award was Christian Webb, Ph.D. This award includes a cash prize of $1,000 to support travel to the ABCT Annual Convention and to sponsor participation in a clinical treatment workshop. Eligibility requirements are as follows: (1) Candidates must be active members of ABCT, (2) New/Early Career Professionals within the first 10 years of receiving his/her the doctoral degree (PhD, PsyD, EdD). Preference will be given to applicants with a demonstrated interest in and commitment to child and adolescent mental health care. Applicants should submit: nominating cover letter, CV, personal statement up to three pages, and two supporting letters. Application materials should be emailed as one pdf document to ABCTAwards@abct.org. Include candidate's last name and "Albano Award" in the subject line.
Nomination deadline: March 1, 2022

Distinguished Friend to Behavior Therapy

This award is given annually to an individual or organization that supports the aims of ABCT in providing awareness, advocacy, or evidence-based behavioral health services in the field of cognitive and behavioral therapies. Eligible candidates for this award should NOT be members of ABCT, but are individuals who have promoted the mission of cognitive and/or behavioral work outside of our organization. Candidates are nominated by an ABCT member and applications should include a letter of nomination/support and a curriculum vitae of the nominee. Recent recipients of this award include The Honorable Erik K. Shinseki, Michael Gelder, Mark S. Bauer, Vikram Patel, Benedict Carey, and Bivian "Sonny" Lee III. Please e-mail the nomination materials as one PDF document to ABCTAwards@abct.org. Include "Distinguished Friend to BT" in the subject line. ***Nomination deadline***: March 1, 2022

President's New Researcher Award

ABCT's 2021-22 President, Laura Seligman, Ph.D., invites submissions for the 44th Annual President's New Researcher Award. The winner will receive a certificate and a cash prize of $500. The award will be based upon an early program of research that reflects factors such as: consistency with the mission of ABCT; independent, innovative work published in high-impact journals; and promise of contributing to cognitive and behavioral theory to advance the field. Scholars who trained in smaller labs or who work in less research-intensive environments are encouraged to apply, as the quality and potential impact of one's work, not the number of publications, will be the focus. Requirements: must have had terminal degree (Ph.D., M.D., etc.) for at least 1 year but no longer than 5 years (i.e., completed during or after 2015); must submit an article for which they are the first author (in press, or published during or after 2018); 2 letters of recommendation must be included; self-nominations are accepted; the author's CV, letters of support, and paper must be submitted in electronic form. Applicants from traditionally underrepresented backgrounds, or whose work advances our understanding of behavioral health disparities, are particularly encouraged to apply. E-mail the nomination materials (including letter of recommendation) as one pdf document to PNRAward@abct.org. Include candidate's last name and "President's New Researcher" in the subject line. ***Nomination deadline***: March 1, 2022.

Student Dissertation Awards

• Virginia A. Roswell Student Dissertation Award ($1,000)
• Leonard Krasner Student Dissertation Award ($1,000)
• John R. Z. Abela Student Dissertation Award ($500)

Each award will be given to one student based on his/her doctoral dissertation proposal. Accompanying this honor will be a monetary award (see above) to be used in support of research (e.g., to pay participants, to purchase testing equipment) and/or to facilitate travel to the ABCT convention. Eligibility requirements for these awards are as follows: 1) Candidates must be student members of ABCT, 2) Topic area of dissertation research must be of direct relevance to cognitive-behavioral therapy, broadly defined, 3) The dissertation must have been successfully proposed, and 4) The dissertation must not have been defended prior to November 2022. Proposals with preliminary results included are preferred. To be considered for the Abela Award, research should be relevant to the development, maintenance, and/or treatment of depression in children and/or adolescents (i.e., under age 18). Self-nominations are accepted, or a student's dissertation mentor may complete the nomination. The nomination must include a letter of recommendation from the dissertation advisor. Please complete the nomination form found online at www.abct.org/awards. Email the nomination materials (including letter of recommendation) as one pdf document to ABCTAwards@abct.org, and include candidate's last name and "Student Dissertation Award" in the subject line. ***Nomination deadline***: March 1, 2022

Graduate Student Research Grant

The ABCT Research Facilitation Committee is sponsoring a grant of up to $1000 to support graduate student research. The grant will be awarded based on a combination of merit and need. Eligible candidates are graduate student members of ABCT seeking funding for an unfunded (including internal sources of funding) thesis or dissertation project that has been approved by either the faculty advisor or the student's full committee. Applications should include all of the materials listed in GSRG Application Guidelines (https://www.abct.org/membership/abct-awards/) and one letter of support from a faculty advisor. Please email the application, excluding the advisor letter, in a single pdf to the chair of the Research Facilitation Committee, Ryan Jacoby, Ph.D. Include "Graduate Student Research Grant" in your subject heading. Please ask your faculty advisor to e-mail a letter of support separately.
Application deadline: March 1, 2022

Student Travel Award

This award recognizes excellence among our student presenters and is intended to defray some of the travel costs associated with presenting at the convention with a cash prize of $500. This award money is to be used to facilitate travel to the ABCT convention. To be eligible, students must 1) have their symposium or panel submission for the 2022 ABCT convention accepted for presentation; 2) be a symposium presenter (i.e., first author on a symposium talk) at the ABCT annual convention; 3) be a student member of ABCT in good standing; and 3) be enrolled as a student at the time of the convention, including individuals on predoctoral internships, but excluding post-baccalaureates. Awards are highly competitive and preference is given to projects demonstrating student initiation and independence, and innovation for the field. Two awards are given annually, with one granted to an underrepresented student member, defined broadly as race, ethnic background, sexual orientation, or discipline. Additional requirements and submission instructions are available on the Student Travel Award Application found online at www.abct.org/awards. Award winners will be announced in mid-September 2022. ***Application deadline***: July 22, 2022

Elsie Ramos Memorial Student Poster Awards

This award is given to student first authors whose posters have been accepted for presentation at ABCT's Annual Convention. The winners each receive an ABCT Student Membership and a complimentary general registration at the next year's ABCT's Annual Convention. To be eligible, students must 1) have their poster submission for this year's ABCT convention accepted for presentation; 2) be student members of ABCT in good standing; and 3) be enrolled as a student at the time of the convention. Awards are highly competitive and preference is given to projects demonstrating student initiation and independence and innovation for the field. Three awards are grantedannually. Additional requirements and submission instructions are available on the Elsie Ramos Memorial Student Poster Award Application found online at www.abct.org/awards. Award winners will be announced in mid-September 2022.
Application deadline: July 22, 2022

Outstanding Service to ABCT

This award is given annually to an individual who has displayed exceptional service to ABCT. Nominations for this award are solicited from members of the ABCT governance. Please complete the nomination form found online at www.abct.org/awards/. Email the completed form and associated materials as one pdf document to ABCTAwards@abct.org. Include "Outstanding Service" in the subject line. ***Nomination deadline***: March 1, 2022

ABCT 2022 November 17–20 | New York City

Emergency & Disaster Preparedness and Response: Using Cognitive and Behavioral Science to Make an Impact

Call for Ticketed Sessions

Emergency & Disaster Preparedness and Response: Using Cognitive and Behavioral Science to Make an Impact

PROGRAM CHAIR: Rosaura Orengo-Aguayo, Ph.D.
ASSOCIATE PROGRAM CHAIR: Emily Thomas, Ph.D.

Workshops & Mini Workshops

Workshops cover concerns of the practitioner/ educator/researcher. Workshops are 3 hours long, are generally limited to 60 attendees, and are scheduled for Friday and Saturday. Please limit to no more than 4 presenters. Mini Workshops address direct clinical care or training at a broad introductory level. They are 90 minutes long and are scheduled throughout the convention. Please limit to no more than 4 presenters. When submitting for Workshops or Mini Workshop, please indicate whether you would like to be considered for the other format as well.

➔ **For more information** or to answer any questions before you submit your abstract, email Christina Boisseau, Workshop Committee Chair, workshops@abct.org

Institutes

Institutes, designed for clinical practitioners, are 5 hours or 7 hours long, are generally limited to 40 attendees, and are scheduled for Thursday. Please limit to no more than 4 presenters.

➔ **For more information** or to answer any questions before you submit your abstract, email Samantha G. Farris, Institutes Committee Chair, institutes@abct.org

Master Clinician Seminars

Master Clinician Seminars are opportunities to hear the most skilled clinicians explain their methods and show taped demonstrations of client sessions. They are 2 hours long, are limited to 40 attendees, and are scheduled Friday through Sunday. Please limit to no more than 2 presenters.

➔ **For more information** or to answer any questions before you submit your abstract, email Courtney Benjamin Wolk, Master Clinician Seminars Committee Chair, masterclinicianseminars@abct.org

Research and Professional Development

Presentations focus on "how to" develop one's own career and/or conduct research, rather than on broad-based research issues (e.g., a methodological or design issue, grantsmanship, manuscript review) and/or professional development topics (e.g., evidence-based supervision approaches, establishing a private practice, academic productivity, publishing for the general public). Submissions will be of specific preferred length (60, 90, or 120 minutes) and format (panel discussion or more hands-on participation by the audience). Please limit to no more than 4 presenters, and be sure to indicate preferred presentation length and format.

➔ **For more information** or to answer any questions before you submit your abstract, email Cole Hooley, Research and Professional Development Committee Chair, researchanddevelopmentseminars@abct.org

---

Submission Deadline for Ticketed events: Friday, February 11, 2022

Information about the convention and how to submit abstracts will be on ABCT's website www.abct.org, after January 1, 2022.

the Behavior Therapist
Association for Behavioral
and Cognitive Therapies
305 Seventh Avenue, 16th floor
New York, NY 10001-6008
212-647-1890 | www.abct.org
ADDRESS SERVICE REQUESTED