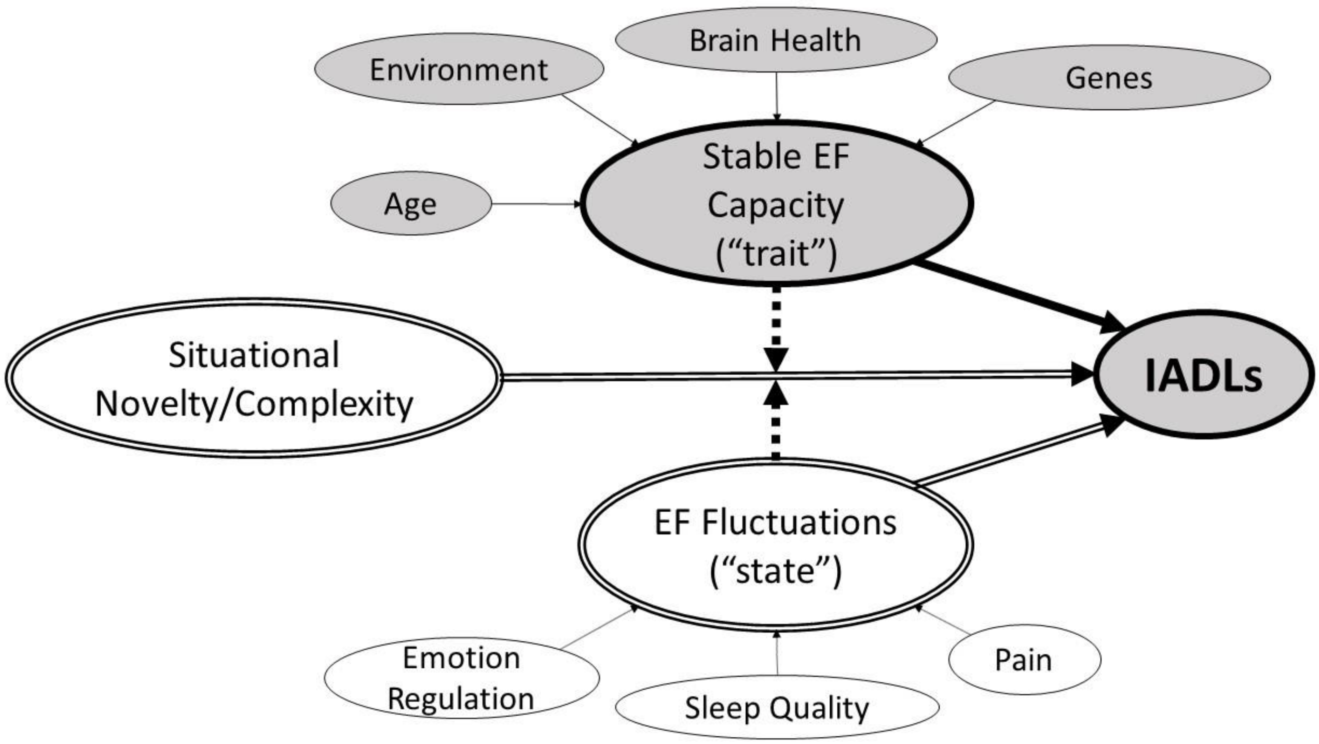
Research Statement

In recent years, the focus of my research has been on improving our theoretical, conceptual, and clinical understanding of (1) the contextual factors that trigger lapses in executive functioning (EF) and (2) the interaction between EF and various contextual factors in determining daily functioning. This work is important because clinical neuropsychologists are increasingly tasked with providing recommendations pertaining to patients' abilities to function independently, yet meaningful translation of group data to clinical decision-making regarding individual patients has been elusive.

Background: As reviewed by Royall & Lauterbach (2007), EF clearly plays a key role in the ability to function independently and successfully. Work form my laboratory also supports this notion, whether it be the ability to perform instrumental activities of daily living (IADL) (Kraybill & Suchy, 2011; Kraybill, Thorgusen, & Suchy, 2013), manage medical regimens (Suchy et al., 2016; Ziemnik & Suchy, in press), or inhibit impulsive maladaptive behaviors (Eastvold, Suchy, & Strassberg, 2011; Huebner, Garrity, Perry, Smith, & Suchy, 2018; Suchy & Kosson, 2005, 2006). However, although research overwhelmingly supports the association between EF and daily functioning, group statistics do not tell us who is at risk for functional lapses, and under what circumstances. To accomplish this work, I have developed a model (Contextually Valid Executive Assessment; ConVExA; Suchy, 2015; Suchy, Ziemnik, Niermeyer, & Brothers, 2020) that serves as a framework for studies conducted in my laboratory.

The ConVExA model: The ConVExA model was developed as a more nuanced alternative to the "traditional" model, according to which office-based EF performance reflects the trait of EF and, as such, should predict daily functioning (this model is illustrated by the shaded ovals and solid lines in the Figure below). However, the utility of office-based EF assessment as a predictor of individual patients' daily functioning has been questioned. This is in part because office-based assessment does not take into account a variety of contextual factors that may transiently affect a patient's EF, either during the assessment session, or in daily life, or both. Specifically, according to the ConVExA model, daily functioning is influenced not only by the stable EF capacity (which is determined by a variety of biopsychosocial factors such as, for example, genes, age, and brain health; Williams, Suchy, & Rau, 2009; see the top half of the Figure below), but also by intra-individual fluctuations in EF (see the bottom half of the Figure below). Such fluctuations are caused by transient contextual factors such as, for example, experience of pain (Berryman et al., 2014; Niermeyer & Suchy, 2020a), non-restorative sleep (Tinajero et al., 2018; Niermeyer & Suchy, 2020a), or emotion-regulation demands (Franchow & Suchy, 2017; Franchow & Suchy, 2015; Niermeyer, Franchow, & Suchy, 2016; Niermeyer, Ziemnik, Franchow, Barron, & Suchy, 2019). Importantly, we have found that naturally-occurring burdensome engagement in emotion regulation within 24 hours prior to testing can result in a decrement of 2 Scaled Scores (i.e., 2/3 SD). An effect of this magnitude is clinically meaningful and can impact both daily functioning (Niermeyer & Suchy, 2020b; Suchy, Niermeyer, Franchow, Ziemnik, 2019a) and clinical interpretation in the context of a neuropsychological evaluation. Relatedly, we have shown that this decrement can be long-lasting, since burdensome emotion regulation seems to interfere not only with EF, but also with the ability to benefit from practice (Suchy, Niermeyer, Franchow, Ziemnik, 2019b). Consequently, clinical re-evaluation at a later date will fail to show the expected practice effect, potentially once again influencing clinical decision making. Of note, we have recently shown that the impact of multiple and diverse transient factors on EF is additive, such that the greater the additive burden of such factors, the greater the EF decrement (Niermeyer & Suchy, 2020a). Importantly, the effect of these factors appears to be specific to EF and holds beyond depressive symptoms (Franchow & Suchy, 2015, 2017; Niermeyer et al., 2019; Niermeyer & Suchy, 2020ab).



In addition to the transient contextual factors that deleteriously affect EF and lead to EF fluctuations, some other contextual factors (e.g., situational novelty or complexity, and possibly others) influence the degree to which EF resources are needed for execution of a given daily task. This is because the same task may be experienced as more executively demanding when performed in a novel context (Euler, Niermeyer, & Suchy, 2016), or when imbedded in a situation that is unusually complex (Niermeyer, Suchy, & Ziemnik, 2017; Suchy, Lee, & Marchand, 2013). Importantly, if situational novelty or complexity increase EF demands, it follows that these factors should impact IADL performance, but *only* to the extent that they overwhelm available EF resources. This is in fact what we have found in a recent study (Suchy, Ziemnik, Niermeyer, and Brothers, 2020). Specifically, the association of situational complexity with IADLs was moderated by EF (see Figure above, dotted lines), such that only individuals with low EF were affected by complexity in daily life. This moderation effect is also consistent with our prior work. For example, older adults who are in preclinical stages of cognitive decline are more derailed by task novelty than those whose cognition is intact (Suchy, Franchow, Niermeyer, Ziemnik, Williams, & Pennington, 2018; Suchy, Kraybill, & Franchow, 2011; Williams, Suchy, & Kraybill, 2013). Along the same lines, older adults are more derailed by increases in contextual complexity than their younger adult counterparts (Niermeyer et al., 2017). Similarly, individuals who have suffered a traumatic brain injury are more affected by task novelty than non-injured controls (Suchy, Euler, Eastvold, 2014).

In sum, the ConVExA model offers a framework for a systematic study of a variety of contextual factors that complicate the well-known association between EF and IADLs. Future work needs to not only examine additional contextual factors, but also seek to gain a better understanding of how the model applies to specific populations or specific types of IADLs. Answering these questions will improve clinical neuropsychologists' ability to predict who, and under what circumstances, is at risk for lapses in daily life.

REFERENCES

Berryman, C., Stanton, T. R., Bowering, K. J., Tabor, A., McFarlane, A., & Moseley, G. L. (2014). Do people with chronic pain have impaired executive function? A meta-analytical review. *Clinical Psychology Review*, *34*(7), 563–579.

Eastvold, A.E., Suchy, Y., & Strassberg, D (2011). Executive function profiles of pedophilic and nonpedophilic child molesters. *Journal of the International Neuropsychological Society, 17,* 295-307.

Euler, M., Niermeyer, M., & Suchy, Y. (2016). Neurocognitive and neurophysiological correlates of motor planning during familiar and novel contexts. *Neuropsychology*. *30 (1),* 109-119.

Franchow, E.I., & Suchy, Y. (2017). Expressive suppression depletes executive functioning in older adulthood. *The Journal of the International Neuropsychological Society, 23,* 341-351.

Huebner, D., McGarrity, L.A., Perry, N., Smith, T., & Suchy, Y. (2018). Changes in executive function following a stressful interpersonal task are associated with condomless anal intercourse among men who have sex with men. *Annals of Behavioral Medicine*, *52* (5), 406-411.

Kraybill, M., & Suchy, Y. (2011). Executive functioning, motor programming, and functional independence: Accounting for variance, people, and time. *The Clinical Neuropsychologist, 25 (2),* 210-223.

Kraybill, M., Thorgusen, S.R., & Suchy, Y. (2013). The Push-Turn-Taptap task outperforms measures of executive functioning in predicting declines in functionality: Evidence-based approach to test validation. *The Clinical Neuropsychologist*, *27* (2), 238-55.

Niermeyer, M. A., Franchow, E.I., & Suchy, Y. (2016). Reported Expressive Suppression in Daily Life is Associated with Slower Action Planning. *The Journal of the International Neuropsychological Society, 22, 671-681.*

Niermeyer, M.A. & Suchy, Y. (2020a). The Vulnerability of Executive Functioning: The Additive Effects of Recent Non-Restorative Sleep, Pain Interference, and Use of Expressive Suppression on Test Performance. *The Clinical Neuropsychologist.*

Niermeyer, M.A., & Suchy, Y. (2020b). Walking, talking, and suppressing: Executive functioning mediates the relationship between higher expressive suppression and slower dual-task walking among older adults. *The Clinical Neuropsychologist.*

Niermeyer, M. A., Suchy, Y. & Ziemnik, R. E. (2017). Motor sequencing in older adulthood: Relationships with executive functioning and effects of complexity. *The Clinical Neuropsychologist, 31(3),* 598-618.

Niermeyer, M., Ziemnik, R., Franchow, E., Barron, C., Suchy, Y. (2019). Greater Naturally-Occurring Expressive Suppression is Associated with Poorer Executive Functioning and Motor-Sequence

Learning Among Older Adults. *Journal of Clinical and Experimental Neuropsychology, 41 (2),* 118-132.

Royall, D., & Lauterbach, E. (2007). The cognitive correlates of functional status: A review from the Committee on Research of the American Neuropsychiatric Association. *Journal of Neuropsychiatry and Clinical Neurosciences*, *19*(3), 249–265. https://doi.org/19/3/249

Suchy, Y. (2015). *Executive functioning: A Comprehensive guide for clinical practice.* New York: Oxford University Press.

Suchy, Y. Euler, M. & Eastvold, A. (2014). Exaggerated reaction to novelty as a subclinical consequence of mild traumatic brain injury. *Brain Injury, 44(9),* 2147-2161. DOI: 10.3109/02699052.2014.888766

Suchy, Y., Franchow, E.I., Niermeyer, M.A., Ziemnik, R., Williams, P.G., & Pennington, N. (2018). Exaggerated reaction to novelty as a predictor of incipient cognitive decline among community dwelling older adults. *Journal of Clinical and Experimental Neuropsychology, 40 (10), 987-999.*

Suchy, Y., Kraybill, M., Franchow, E. (2011). Practice effects and beyond: Reaction to novelty as an independent predictor of cognitive decline among older adults. *Journal of the International Neuropsychological Society, 17,* 101-111.

Suchy, Y., Kraybill, M., Franchow, E. (2011). Instrumental activities of daily living among community-dwelling older adults: Discrepancies between self-report and performance are mediated by cognitive reserve. *Journal of Clinical and Experimental Neuropsychology, 33,* 92-100.

Suchy, Y. Niermeyer, M., Franchow, E., Ziemnik, R. (2019a). The deleterious impact of expressive suppression on test performance persists at one-year follow-up in community-dwelling older adults. *The Journal of the International Neuropsychological Society, 25 (1), 29-38.*

Suchy, Y. Niermeyer, M., Franchow, E., Ziemnik, R. (2019b). Naturally-occurring expressive suppression is associated with lapses in instrumental activities of daily living among community-dwelling older adults. *The Journal of the International Neuropsychological Society, 25 (7),* 718-728.

Suchy, Y., *Turner, S.L.*, Queen, T.L., *Durracio, K.*, Wiebe, D.J., Butner, J, Franchow, E.I., White, P.C., Murray, M.A., Swinyard, M., Berg, C.A. (2016). The Relation of Questionnaire and Performance-based Measures of Executive Functioning with Type 1 Diabetes Outcomes among Late Adolescents. *Health Psychology, 35(7),* 661-669.

Suchy, Y., Ziemnik, R., Niermeyer, M.A., & Brothers, S. (in press). Executive Functioning Interacts with Complexity of Daily Life in Predicting Daily Medication Management among Older Adults. *The Clinical Neuropsychologist.*

Tinajero, R.A., Williams, P.G., Cribbet, M., Rau, H., Bride, D., & Suchy, Y. (2018). Nonrestorative sleep in healthy, young adults without insomnia: Associations with executive functioning, fatigue, and pre-sleep arousal. *Sleep Health: Journal of the National Sleep Foundation, 4(3),* 284-291.

Williams, P.G., Suchy, Y., and Kraybill, M. (2013). Preliminary evidence for low openness to experience as a pre-clinical marker of incipient cognitive decline in older adults. *Journal for Research in Personality.*

Williams, P. G., Suchy, Y., & Rau, H. (2009). Individual differences in executive functioning: Implications for stress regulation. *Annals of Behavioral Medicine, 37(2), 126-140.*

Ziemnik, R.E., & Suchy, Y. (in press). Ecological validity of performance-based measures of executive functions: Is face validity necessary for prediction of daily functioning? *Psychological Assessment.*