Silent Suffering:

The Gender Disparity in ADHD Diagnosis and Its Mental Health Implications for Females

By

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Abstract

Attention Deficit Hyperactivity Disorder (ADHD) has historically been understood through the lens of research primarily focused on males, owing to the externalized symptomatic presentation commonly associated with the condition. Diagnosis and treatment protocols for ADHD have largely evolved from studies predominantly involving male participants. However, there is a growing recognition of the need to understand how ADHD manifests in females. Beyond the commonly explored symptoms, such as inattention and hyperactivity, a nuanced examination reveals a profound impact of emotional dysregulation, particularly among women. The ability to emotionally regulate is often cited in the literature as the most impairing deficit associated with ADHD that prolongs throughout the lifespan for both males and females. This underexplored area emphasizes a narrative of under recognition and while suggesting a potential for further research within the domain of mental health. This paper reviews the nuanced relationship between ADHD, emotional regulation, and associated factors such as rejection sensitivity and the autonomic nervous system. While drawing on polyvagal theory to provide a framework into the ADHD presentation in females, suggesting a need for internal safety.

Keywords: rejection sensitivity, emotional regulation, polyvagal theory, comorbidity, autonomic nervous system

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To my capstone supervisor, Dr. Ron Manley, thank you for your patience, wisdom, direction and encouragement. Your mentorship has been instrumental in shaping this work, and I am immensely grateful.

Dedication

I would like to dedicate this capstone to my older sister, Ashley– I know you would've continued to do great deeds. Your legacy lives on in the work I do.

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Chapter 1: Introduction

Research tells us that the skill of emotional regulation in individuals with attention deficit hyperactivity disorder (ADHD) is at a greater risk for deficits when it is measured at levels of neuropsychological, neurophysiological, and psychophysiological assessments (Christiansen et al., 2019). ADHD is linked to higher levels of negative social experiences which, as a result, can negatively impact self-esteem (Kita et al., 2016). The literature explains how internalized emotional dysregulation has an impact on overall health and well-being and that gender plays a role in internalized emotional dysregulation (Lonigro, et al., 2022). As a result, those with ADHD are also at a greater risk of comorbidity such as depression (Zhou, et al., 2018). This is significant to the research as it suggests the negative impact ADHD symptoms can have on an individual health trajectory. Often, ADHD is identified and treated predominantly through the presentation of externalized behaviours, but research suggests there is more going on internally. Kok et al. (2016) explains how females with ADHD are more likely to internalize their symptoms, which tends to manifest in a more inattentive presentation. In contrast, males with ADHD typically exhibit their symptoms externally, leading to a more prevalent diagnosis of hyperactivity and earlier diagnosis due to the observable and disruptive behaviours. Current literature speaks to how the expression of internalizing symptoms has the same impairment level as those who exhibit their symptoms more externally. This is further supported by a study conducted by Swanson et al. (2014), which revealed that females diagnosed with ADHD are significantly more likely to attempt suicide and engage in self-harming behaviours compared to their non-ADHD counterparts. This longitudinal study showed the increased risk of self-harm associated with internalizing symptoms in females with ADHD. When we consider that females with ADHD are at a greater risk of developing internalizing symptoms due to ADHD and lack of

diagnosis, this heightened risk of self-harming behaviours sheds light on the profound negative correlation between their mental health and their relationship with their bodies, ultimately rendering their internal state as an unsafe place.

Monopoli et al. (2020) describes part of the criteria for ADHD as having an impact on emotional responses and often poses challenges in the ability to innately modulate between emotions. Furthermore, they delineate common areas of the brain that are affected due to ADHD, including the amygdala, orbitofrontal cortex, dorsolateral frontal cortex, and ventrolateral frontal cortex. It is suggested that these affected areas play a crucial role in shaping an individual's emotional regulation. The research emphasizes how the brain structure of individuals with ADHD significantly influences their emotional responses. Furthermore, Monopoli et al. (2020) continue by shedding light on the phenomenon of emotional dysregulation in individuals diagnosed with ADHD, naming a common struggle is the ability to organize feelings and emotions to effectively achieve goals. This reveals a significant element to understanding the challenges individuals with ADHD face, and yet, provides insight to areas research should further consider in the long-term impact on overall health.

Internalizing is the process in which an emotion is expressed and experienced internally, without an observable outward manifestation (Leaberry et al., 2020). Research suggests that internalizing may be influenced by environmental factors, partly driven by societal norms. Individuals with ADHD often demonstrate heightened awareness of social situations, which may lead to the suppression of externalizing emotions. Kok et al. (2016) highlights that females with ADHD are at a greater risk of developing comorbid mental health conditions such as depression. This vulnerability may stem from societal expectations of gender norms, wherein certain external features of ADHD may go unrecognized in females. The prolonged internalization of emotions

could contribute to the long-term health impacts of comorbidity such as depression and anxiety. This raises concerns regarding the diagnostic criteria for ADHD, especially in females, as many individuals may remain undiagnosed or untreated due to the absence of outward symptoms and receive later in life a diagnosis of anxiety disorder, potentially missing the baseline diagnosis of ADHD entirely. By asking the question of why there is a gender disparity in ADHD diagnosis, social implications can offer particular insights. As noted by Kok et al. (2016), females with ADHD face greater social consequences if they were to externalize their symptoms. This suggests a potential hypothesis for the underdiagnosis of ADHD in females, indicating that social settings may inhibit the external expression of ADHD symptoms. Research indicates that females who do exhibit externalized ADHD symptoms may stand out more than males with the same diagnosis, yet they may face lower social tolerance for such behaviours. This highlights the social challenges females may encounter due to ADHD symptoms, potentially leading to the masking of these symptoms.

Without a diagnosis, females face increasingly lower rates of receiving adequate support, leaving them untreated for their symptoms and vulnerable to long-term implications. This reality is concerning as many women go undiagnosed for decades, elevating their risk for developing comorbid conditions (Biederman et al., 2008). The absence of a diagnosis can result in feelings of disconnection or internal insecurity, which may manifest as anxiety, a frequently observed condition among females (McLean et al., 2011). Nevertheless, if the underlying diagnosis of ADHD remains unaddressed, it can risk treating the symptoms rather than the root cause, leaving them persisting (Biederman et al., 2008).

The autonomic nervous system (ANS) plays a crucial role in modulating the body's processes, particularly in response to perceived threats (Porges, 2011). When a threat is detected,

the ANS initiates an adaptive response to shield the individual from danger and restore normal function once the threat has subsided (Porges, 2011). For individuals with ADHD who experience deficits in emotional regulation and a sense of safety, understanding the role of the ANS becomes imperative. Utilizing Polyvagal Theory, which emphasizes the role of the ANS in social engagement and emotional regulation, can provide a framework for studying the impact of ADHD in women and developing tailored interventions. By leveraging the mind-body connection as treatment for ADHD, interventions can be designed to foster a sense of safety within one's own body thereby addressing a fundamental aspect of ADHD management in females.

Purpose Statements

This paper aims to explore several key areas. Firstly, it examines the neurobiological and physiological manifestations of ADHD unique to females. It will include considerations of how ADHD presents differently in gender, historically focusing on the external expression of symptoms, predominantly in males. Literature will be examined to address the gap in understanding ADHD in females and the implications of access to treatment. Secondly, this paper will incorporate a lens of gender-based theories and their unique implications for women, taking into account societal demands. Additionally, it investigates the intersection of ADHD and overall health, shedding light on how Polyvagal Theory can enrich our comprehension by integrating a sense of safety. This will involve discussing the literature and how recent research has contributed to our understanding of this intersection. Finally, it identifies existing gaps in knowledge to lay the groundwork for a workshop framework designed to support professionals working with women with ADHD. This research is crucial to the field of psychotherapy and healthcare in general, as research on women with ADHD and health outcomes is vastly

understudied. The intention is to bridge a gap that is otherwise lacking in the field to better equip therapists working with this population.

Theoretical Framework

The primary theoretical framework of this study will specifically address ADHD in relation to women and the prevalent outcome of internalized symptoms. Throughout the research, the terms ADHD and internalization will be consistently utilized. Embracing a constructivist worldview, the research will approach the subject with an understanding of how individuals construct meaning in their lives. Furthermore, the framework will incorporate cutting-edge perspectives on neurodiversity, acknowledging ADHD not merely as a deficit but as a unique variation in human cognition. To achieve this understanding, it is imperative to consider the intersectionality of ADHD with other identity factors such as gender, socioeconomic status, and cultural background. This holistic approach is crucial for recognizing the intricacies of these variables in shaping individuals' experiences.

In contrast, females face a heightened risk of social consequences when exhibiting externalized ADHD symptoms, leading them to adapt in ways to conform, often resulting in internalized emotions and diminished self-esteem. In individuals with ADHD, heightened feelings of rejection and symptoms of psychopathology amplify the association between attachment levels and lower self-esteem, as evidenced by Kok et al. (2016). The heightened vulnerability to perceived rejection and psychopathological symptoms emphasizes the association between attachment and rejection sensitivity. Rejection sensitivity, a term frequently linked with ADHD symptoms, will be a focal point of this paper, suggesting that this awareness should be factored into therapy models (Bondü et al., 2015). Moreover, the influence of peer social situations and connections directly correlates with potential psychiatric symptoms and

outcomes (Hsu et al., 2021).

The use of the word “female” will be used intentionally throughout the paper, particularly when discussing gender-based theories and neuroscience, in order to provide clarity and specificity. It is imperative to acknowledge the distinction between biological gender and the gender an individual identifies with. This paper respects the diversity of all gender identities and aims to provide an inclusive framework for understanding ADHD experiences. While the term "female" will be utilized for clarity, it is the goal of this paper to begin to initiate necessary conversations on the prevalence of diversity within ADHD experiences and the importance of incorporating a diverse lens when working with all individuals.

Contributions to the Field

This paper attempts to offer comprehensive insights into effective strategies for addressing ADHD in females, providing mental health practitioners and educators with evidence-based tools derived from contemporary research. By engaging with this material, therapists specializing in ADHD treatment can foster constructive dialogues centered on validation and therapeutic interventions tailored to the unique needs of female patients. Through initiating such discussions, this paper aims to advance the field by emphasizing the gap in literature of what we know about the presentation of ADHD in females and the long-term effects of being untreated. An emphasis will be placed on the imperative need for ongoing research to continually update our understanding of the longitudinal health ramifications associated with internalized emotional symptoms in this population. Neglecting these conversations risks exacerbating negative health outcomes, including heightened risks of comorbid conditions such as anxiety and depression. Establishing a robust knowledge base and conceptual framework is pivotal in effecting enduring change, suggesting the need for gender-specific therapeutic

modalities for individuals with ADHD. Ultimately, this paper aspires to resonate with therapists, educators, and individuals faced with internalized ADHD symptoms, fostering awareness, stimulating conversations, and promoting potentially effective intervention strategies.

In light of this topic, it is crucial to consider experts in the field; Dr. Gabor Maté is a physician and author who has invested heavily in human development, addiction and ADHD. Maté identifies a similar idea regarding ADHD emotionally felt symptoms. Maté (1996) states, "The DSM IV defines attention deficit disorder by its external features, not by its emotional meaning in the lives of individual human beings. It commits the faux pas of calling these external observations symptoms, whereas that word in medical language denotes a patient's own felt experience" (p. 15). This is relevant to the research as it addresses a gap in the medical model and the perspective in which we see individuals with this diagnosis. By emphasizing the subjective emotional experiences commonly associated with ADHD, Maté challenges the traditional diagnostic template while encouraging a nuanced way to consider the condition. Through his work he pushes for the need toward holistic approaches to be integrated in this realm versus simply primarily observable behaviours. This opens a dialogue toward considering the internal experiences and emotional complexities those with ADHD face. It would be remiss if this capstone failed to acknowledge Maté's work, and the exploration of the emotional dimensions in ADHD that has been done.

Positionality Statement

As the author of this capstone paper, I acknowledge my positionality as integral to the research process and the influence I may hold. As a white, educated, female, inevitably my background informs my perspectives and biases shaping the way I approach and interpret the literature. I grew up in a middle-class white community, where I experienced the dynamics of

being a middle child among three sisters for the majority of my childhood. After losing my older sister to cancer as a teen, this familial context instilled in me values of empathy, connection, and an awareness of social dynamics. While my upbringing provided me with certain privileges, it also instilled in me a deep appreciation for the value of education and the importance of community.

Throughout my educational journey, I've been fortunate to engage with diverse communities and perspectives. Spending several years volunteering with local non-profit organizations serving marginalized communities, particularly those experiencing homelessness and lower-income families, exposed me to the stark realities of socioeconomic disparities. These experiences fueled my commitment to addressing systemic inequities. Additionally, dedicating several years to working with neurodivergent individuals and advocating for mental health support, primarily focusing on children and youth, provided invaluable insights into the challenges faced by individuals navigating complex care systems. This work emphasized the importance of accessible and inclusive support services. Therefore, I am committed to approaching this topic with humility, actively listening to diverse voices, and amplifying the experiences of those whose voices are often marginalized.

I recognize the influence of my experiences and beliefs. I strive to maintain reflexivity throughout the literature presented continually examining and critiquing my assumptions to mitigate potential biases. By transparently disclosing my positionality, my aim is to enhance the credibility and reliability of this topic while fostering dialogue and critical engagement within the academic community.

Definition of Terms

Attention Deficit Hyperactivity Disorder (ADHD)

Kita et al. (2016) describe ADHD as characterized by symptoms of inattention, hyperactivity, and impulsivity. ADHD affects brain growth, particularly in the frontal lobe, where executive functioning is impacted. Symptoms may manifest as difficulties in academic settings and/or social situations due to potential social skill considerations.

Comorbidity

Comorbidity refers to the presence of two or more disorders, often linked or with one disorder having a higher risk of prevalence due to the presence of another diagnosed disorder.

Coregulation

Coregulation refers to the bidirectional process through which individuals mutually influence each other's emotional states and behaviors within the context of a relationship (Feldman, 2007). It involves the dynamic interaction between two or more individuals in regulating emotions, with each person's responses influencing and being influenced by the other(s). Coregulation commonly occurs in close relationships, such as a child and caregiver relationship, and can extend to relationships such as romantic partnerships or friendships. Providing a shared emotional experience where the connection modulates their emotional responses.

Dorsolateral Frontal Cortex

Badre and Wagner (2004) indicate that traditionally the dorsolateral prefrontal cortex (DLPFC) is associated with domain-general executive control functions such as task switching, task-set reconfiguration, prevention of interference, inhibition, planning, and working memory.

Internalize

Internalization is the process in which an individual experiences an emotion but chooses or feels obligated to keep the emotional response inside.

Interoception

Interoception refers to the sense of the internal state of one's body, including sensations such as hunger, thirst, heartbeat, and visceral pain (Garfinkel et al., 2015).

Orbitofrontal Cortex

Rolls et al. (2004) indicate that the orbitofrontal cortex contains the secondary taste cortex, where the reward value of taste is represented. It also contains the secondary and tertiary olfactory cortical areas, where information about the identity and reward value of odors is represented.

Regulation

Regulation refers to the overall state of the body and mind. To feel 'regulated,' individuals must have their physical and mental needs met. Regulation also considers sensory input and output; if an individual is sensory-seeking or sensory-avoidant, these aspects need to be addressed to achieve a grounded state for the body's overall nervous system (Harrison et al., 2019).

Rejection Sensitivity

Foxhall et al. (2019) define rejection sensitivity as an elevated emotion perceived by a person as hurtful, often manifesting in a physical form.

Self-esteem

Self-esteem refers to how individuals perceive and value themselves, including their perception of their abilities and overall self worth.

White Matter Integrity

White matter integrity refers to the structural wholeness and connectivity of white matter tracts in the brain. It plays a crucial role in facilitating efficient communication between different

brain regions and is implicated in various cognitive and behavioral functions (Konrad et al., 2010).

Chapter Summary

In this paper, we began the discussion on ADHD and internalized symptoms in women and how this impacts self-esteem and leads to negative health outcomes. In the literature review, it was discussed that research has indicated females innately experience differing ADHD symptoms versus their male counterparts. The research suggests that this may be due to several factors, yet one highlighted consequence females face is negative social implications that are less acceptable. The overarching impact females with ADHD face when it comes to internalizing symptoms are increased negative health outcomes. In return, females are at a greater risk for lower self-esteem which may lead to self-harming behaviours. Considering these impacts, it highlights a concern about females' relationship with themselves and their bodies. This paper intends to bridge the gap in the research and educate healthcare providers and counsellors. In short, the hope for this paper is to serve as a stepping stone toward further chapters which will aim to address the question; so, what now?

Outline of Capstone Chapters

Chapter one is intended to lay a foundational framework for the subsequent discussion in chapter two by introducing the complex interconnections among ADHD, emotional regulation, and gender-specific manifestations. In doing so, chapter one serves as a proposal for consideration to an area that has received insufficient research attention. The initial chapter sets the tone to where the author locates themselves in the research offering the reader insight into their perspective. Therefore, paving the way for the purpose statements that guides the trajectory into later chapters around the physiological, gender-related, and overall health dimensions of

ADHD, particularly in females.

Chapter two explores the current and historical research surrounding ADHD and the overall impact it poses on an individual. It aims to bridge the gap of what is known about ADHD and how it relates to females. In this chapter, the research is organized into key themes: neurobiological aspects of emotional regulation, gender-based theories, societal implications, and the intersection of ADHD with overall health. This chapter aims to critically analyze the literature while identifying gaps, which will contribute to a proposal for a framework in a subsequent chapter. Overall, chapter two utilizes a meta-analysis of current research to assist with potential future directions on this topic.

Chapter three shifts focus from what we know into what we do about it by suggesting a framework for a workshop. This workshop considers the importance in understanding the unique symptoms of ADHD in females and integrating possible therapeutic approaches for managing some of the influence it has on females. The intention of chapter three is to outline a workshop for therapists and mental health practitioners to consider in shaping their understanding and approach to treating individuals with ADHD. Specifically, chapter three aims to explore the impact of masked and internalized ADHD symptoms in females by providing a compassionate application of the mind-body connection. This chapter serves as a culmination of the research findings providing a comprehensive framework for addressing ADHD in females.

Chapter 2: Literature Review

The ability to emotionally regulate is commonly cited as one of the leading deficits those with ADHD face. Often, emotional dysregulation is characterized in external presentations, such as mood and the ability to emotionally modulate (Morley et al., 2023). When we look at the historical research on ADHD and its diagnostic criteria, it is often summed into behavioural presentations. The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association, 2013) is one of the most widely used resources within the mental health profession. ADHD in the DSM–5 is described as two types: inattention and hyperactivity-impulsivity. The DSM–5's description highlights how inattention presents behaviourally, such as the inability to remain focused on and follow through on tasks. Similarly, hyperactivity presents with increased movement and challenges remaining still. Considering gender theories, females face higher social consequences with enacting behaviours that would potentially threaten the social norms. Therefore, understanding how ADHD presents and impacts females is a major task as it involves various considerations and lenses to look through. Nevertheless, it remains an important question to ponder: How does ADHD affect women? What and why are there barriers to diagnosis? What are the potential long-term consequences of these implications, considering the societal expectations imposed on women that may conflict with the observable symptoms of ADHD they may display?

This chapter aims to address the relationship between the impact ADHD has on women and how untreated ADHD poses significant health risks. Specifically, the emphasis will be on the vastly underdiagnosed population of ADHD in females, and the potential trajectory of health risks. In order to explore this topic, the discussion will begin by looking at how emotional regulation plays an important role in ADHD and the challenges and approaches to treatment.

Further, it will consider the impact undiagnosed ADHD has on an individual, highlighting the increased focus surrounding ADHD and the lack of diagnosis pertaining to females. The effort of chapter 2 is to stimulate conversation of what we thought we knew about ADHD and why a shift in conceptualizing the manifestation of ADHD in females can lead to better health outcomes. In order to address this seemingly nuanced neuropsychological disorder, this chapter will explore how current research identifies ADHD and acknowledges the symptomology females most commonly face. The discussion will continue by reviewing literature on neuroscience and Polyvagal theory as it relates to ADHD in females and what mental health care professionals should be informed of when working within this context. This chapter will influence the further discussions for chapter three and address the gaps identified. Finally, this chapter will address the limitations and end with a synthesis of the research reviewed.

ADHD in Females

The way in which ADHD presents itself in females is nuanced and requires a multifaceted approach to research. Historically, ADHD has been represented as a behavioural issue, primarily presenting and largely diagnosed through observable behavioural characteristics. As new research emerges, the consideration to how ADHD shows up in females indicates more subtler, and internalized symptoms, tending to go unnoticed or misattributed to other factors. Females with ADHD may exhibit more hidden manifestations with emotional dysregulation and challenges with self-control, yet these tend to be overshadowed by societal expectations and implicit gender norms (Quinn & Madhoo, 2014). Rejection sensitivity dysphoria (RSD) is noted as a common comorbidity associated with ADHD that amplifies emotional dysregulation, furthering the impact of emotional responses and incorporating perceived rejection or criticism (Surman et al., 2019). The inconsistency between diagnostic criteria and emerging insights to the

lived experiences of females with ADHD draws the need for gender-sensitive approaches in further understanding and treating ADHD. By elucidating the role of emotional regulation and RSD into how ADHD presents for females, the intention further advocates for a more inclusive and effective approach to health care for females with ADHD.

Understanding Emotional Regulation in ADHD

Emotional regulation is defined as, "the processes by which we influence the occurrence, duration, and intensity of subjective experience, expression, and physiological arousal associated with emotions" (Butler et al., 2013, p. 202). Emotions are experienced both psychologically and physiologically. Research has recently honed in on the impact emotional regulation has in the trajectory toward overall health such as in the study conducted by Aune et al. (2023). They looked at the relationship between an individual's ability to manage life's stressors and the prevalence in developing depression. The results revealed that stressful life events indirectly influenced depressive symptoms through emotion regulation abilities, accounting for 64.6% of the total effect. This implies that through emotional regulation, an individual is able to interact with their world by managing stressors and as a result shield themselves from subsequent conditions, such as depression.

Coregulation in Close Relationships

Butler et al. (2013) acknowledges close relationships as an aspect of where emotional regulation is often exhibited and developed. The term coregulation is used to describe this phenomenon and defined as "the bidirectional linkage of oscillating emotional channels" (p. 203). As emotions are experienced between two individuals, they are then processed within the relationship. Emotional regulation plays an important role in structuring interpersonal connectedness, managing stressors and serving as a protective factor by potentially mitigating

the risk of developing depression. As such, the ability to emotionally regulate does not only constitute an individual process but extends into close relationships as an extension of emotional development and coregulation.

Development of Emotional Regulation in Infancy

For some, the development of emotions and the ability to regulate is a lifelong venture. The moment humans enter the world, they are innately connected to those around them, and as Trentini et al. (2020) explain, infants' livelihood and ongoing development largely rely on the connection with their caregiver to attend to the emotional attachment. These initial connections foster the development of one's capacity to emotionally regulate, ultimately increasing autonomy in managing emotions. Research conducted by Feldman (2007) on the relationality of coregulation between caregivers highlighted the varying attributes of caregivers in supporting the development of emotional regulation. Results indicated mothers' emotional synchrony with an infant correlates with decreasing negative emotions whereas fathers increase positive emotions. The author highlighted the impact of depressive symptoms in mothers, such as postpartum depression, which impairs the ability to emotionally regulate with an infant resulting in fewer emotional interactions. This acknowledges the fundamental role caregivers have in contributing to an infant's emotional experience, thus beginning the process towards emotional regulation.

Emotional Dysregulation in ADHD and its Impact on Relationships

While neurotypical individuals may experience occasional mood swings, those with ADHD face an influx of intense and unpredictable emotional responses. These experiences may leave an individual feeling irritable, lacking control over their emotional experiences, and discomfort in their body. A lack of control and connection over emotional experiences can negatively impact interpersonal interactions, consequently posing challenges with creating and

maintaining meaningful relationships (Sánchez et al., 2019). Unfortunately, emotional dysregulation, a symptom of ADHD, contributes to greater loss, such as lasting relationships. According to Sánchez et al. (2019), individuals with ADHD often struggle with regulating their emotions in social situations, which can lead to difficulties forming and maintaining relationships. The article highlights how emotional dysregulation in ADHD can hinder social functioning and impair an individual's ability to effectively manage emotions in various contexts. Young (2008) acknowledges how “humans are inherently social” (p. 391), highlighting the innate desire individuals have toward connection and the potential consequences when there are barriers in doing so. A longitudinal research study (Shaw et al., 2014) looked at the relationship between emotional regulation and ADHD, finding that those with ADHD experience emotional dysregulation at rates ranging from 25-45%, which continues into adulthood for 30-70% of individuals. These findings describe emotional dysregulation as having a significant impact on clinical outcomes (Shaw et al., 2014). Overall, the ability to emotionally regulate has profound impacts on an individual’s interpersonal experience that extends to the quality of these relationships.

Neurobiological Aspects of Emotional Regulation

Christiansen et al. (2019) highlights the involvement of both central and autonomic nervous system correlates, suggesting impact on a broad spectrum of self-regulation deficits, including emotional deficits. Further, research has shown those with ADHD have structural and functional impairments located in the neuronal networks of the brain, specifically in the prefrontal cortex. This physical difference in brain size and functionality has shown differences in executive functioning which contributes to cognitive controls such as decision-making (Christiansen et al., 2019). The orbitofrontal cortex is located in the prefrontal cortex, above the

right eye and is said to play a particularly crucial role in emotional regulation (Rolls, 2004). Rolls further explains the role of the orbitofrontal cortex as it contributes to the integration of processing sensory information through processes such as taste, olfaction and somatosensation stemming from emotional processing. Christiansen et al. (2019) introduces research that shows dysfunction in the orbitofrontal cortex is correlated with deficits in emotional valuation and regulation, primarily observed in those with ADHD. Overall, research has shown both bottom-up emotional activation in the amygdala and limitations in emotional valuation connected to the orbitofrontal cortex, are neurobiological impacts on emotional dysregulation for those with ADHD.

Research has explored the association between emotional self-regulation abilities and activity in the nervous system. (Christiansen et al., 2019) identified the mediated high frequency of heart rate variability, which models the engagement of the parasympathetic nervous system, to demonstrate self-regulation abilities. They found that those with deficits in emotional regulation show an association with individuals with ADHD. This research provides a unique perspective in looking at nervous system functioning to further explore the regulation of emotions in ADHD. In sum, neurobiological research suggests that emotional regulation in ADHD is seen as a product of the frontal brain regions, specifically the orbitofrontal cortex. Further, the research also highlights physiological impacts in emotional regulation in those with ADHD connected to autonomic nervous system functioning.

Brain Regions Affected and Neuroimaging Studies in ADHD

Empirical research over the last few decades has shown ADHD to be associated with alterations in the overall physical structure and functionality of the brain. A sum of the deficits previously explored indicated attention, impulse control and executive functioning to be common

challenges (Shaw et al., 2006). As research has furthered, neuroimaging has also provided perspicacious insight to ADHD and brain regions affected, specifically the neural processes in structural and functional differences.

Prefrontal Cortex (PFC). The prefrontal cortex, specifically the dorsolateral prefrontal cortex (DLPFC) as well as the orbitofrontal cortex (OFC) play an essential role in cognitive control and decision making (Shaw et al., 2006). Research has highlighted that structural imaging studies have continually shown physically smaller size and volume in connectivity patterns in the PFC in those with ADHD. This research has further highlighted differences in activity during tasks, revealing elevated hypoactivity with the DLPFC when individuals with ADHD are engaging in tasks that require inhibitory control and working memory (Bush et al., 2005).

Striatum. The stratum is involved with reward processing and motor control, this also including the caudate nucleus and putamen (Posner et al., 2011). Through the use of neuroimaging studies, the alterations in the striatal volume and functionality in those with ADHD has been demonstrated (Castellanos et al., 2002). As a result, studies have also begun to look at white matter integrity within the brain, which is bundles of myelinated nerve fibers that facilitate communication between different regions of the brain and the connection to attention and impulsivity, showing a direct correlation (Konrad et al., 2010). This shows functional differences with transmission in the brain of those with ADHD contributing to hyperactivity and impulsive behaviours.

Amygdala. The amygdala plays an important role in emotional processing and regulation abilities. Studies have indicated structural and functional differences in those with ADHD, specifically highlighting changes in activation and volume during emotional tasks (Posner et al.,

2011). Differences to the amygdala may elicit emotional dysregulation and overall challenges socially in those with ADHD. Through neuroimaging, studies have come out indicating how neural mechanisms play a part in understanding regional brain impact in those with ADHD. Functional magnetic resonance imaging (fMRI) has unfolded aberrant activity in numerous regions in the brain concurrently with tasks that require inhibition, attention, and working memory for those with ADHD (Bush et al., 2005). This research emphasizes the grand impact ADHD has on the brain, specifically the amygdala, and how differences can perpetuate further challenges in the emotional process function.

Overall, neuroimaging has majorly influenced research and the current understanding of the impact ADHD has on structure and functioning in the brain. Neuroimaging has identified the major regions of the brain associated with ADHD as being the prefrontal cortex, striatum and amygdala. As research continues to evolve, these findings have the potential to develop targeted interventions that include cognitive and emotional functions as these consistently are demonstrated to be the primary areas of concern for those with ADHD.

Gender-Specific Implications of ADHD in Brain Regions

As research emerges, gender-specific implications and its impact on brain regions have developed increasing amounts of attention. Studies have considered the notable differences in how ADHD manifests and the neurobiological nature between males and females. In some of the findings looking into brain structure and function, it has shown clear patterns differences in the prefrontal cortical regions; dorsolateral prefrontal cortex (DLPFC) and orbitofrontal cortex (OFC) in which their role is critical in cognitive control and emotional regulation (Shaw et al., 2006). Males prove to show more signs of alternations in the DLPFC, demonstrating differences with inhibitory control. Females with ADHD on the other hand display differences in structural

and functional peculiarities of the OFC, which is linked more closely to emotional dysregulation. emotional dysregulation (Christiansen et al., 2019). In addition, research has also highlighted gender-specific dissimilarities of the subcortical structures, specifically, the striatum and amygdala; playing an essential role in reward processes and emotional regulation (Posner et al., 2011). Noting the gender-differences in brain regions associated with ADHD implies the heterogeneous nature of the diagnosis and how it is exhibited through the neurobiological profiles of affected individuals further emphasizing the necessity for gender-specific research.

Gender Differences and Societal Implications

As research is evolving on the topic of ADHD, it is slowly uncovering the alarming differences in how ADHD may present differently in women compared to men. Traditional diagnostic criteria and research studies have predominantly focused on the presentation of ADHD in males, dismissing the diversity in the diagnosis and symptomatology between genders. Arguably, this is due to the observable presentation of ADHD symptoms making it easier to study in some versus others. Incorporating a gender-based socialized lens into the research has the potential to offer nuanced perspectives that can influence the research trajectory and treatment outcomes of ADHD. Diagnosis for ADHD is commonly done in childhood and is initiated by abnormal and observable behaviours. Females tend to exhibit more signs of inattention and challenges in close relationships (Hinshaw et al., 2022). Studies are attempting to explain the why behind this phenomenon, alluding to the greater risk females have in social and gender compliance. The innate pressure imposed on females to exhibit certain behaviours, alongside the limited understanding of the presentation of ADHD in women, suggest areas for further research.

Integrating Gender-Based Theories

Contemporary research offers diverse frameworks that incorporate gender-specific differences in the presentation and developmental trajectories observed in males and females with ADHD, enhancing our understanding of how gender plays a role in the disorder. Using gender-based theories to inform the connection between ADHD and biological, psychological, and social factors provides valuable insights into the complexities of the condition. The cognitive-energetic model proposes that females with ADHD often exhibit compensatory strategies to mitigate cognitive deficits. This suggests that females may adopt a resilient view of themselves in the world, potentially contributing to underrepresentation and underdiagnosis (Biederman et al., 2006). The ability of females to protect and compensate for deficits has been hypothesized to result from both biological and sociocultural factors, leading to resilience against ADHD in women and the predominance of males in clinical samples (Quinn & Madhoo, 2014). Much of the research points to the impact of socialization on women and the implications of masking symptoms to meet societal expectations. Therefore, understanding ADHD as it relates to gender necessitates the development of gender-sensitive diagnostic criteria and interventions.

Intersectionality and Social Factors

Studies have discovered inequalities among ADHD diagnosis and medication use, stating higher rates observed among white children compared to Black and Hispanic children, suggesting systemic biases and disparities in healthcare access (Morgan et al., 2013). Continually, research highlights the socioeconomic factors that contribute to underdiagnosis and challenges with access to treatment; those affected by poverty, limited access to health care resources and marginalized communities (Larson et al., 2011). Intersectionality and social factors greatly impact the overall experience and outcome for those with ADHD. Research that approaches this work incorporating an intersectional lens calls attention to an important piece of

this field. Continually, untreated ADHD which stems from intersectionality and social factors brings to light further consideration to how race, ethnicity, socioeconomic status, and gender identity, intersect to exacerbate disparities in ADHD prevalence and management. Findings from Hornborg et al. (2023) further emphasizes how intersectionality and social factors are considerable influences toward ADHD diagnosis and treatment. The study analyzes the socioeconomic disparities in ADHD diagnosis and treatment across various demographic and socioeconomic status, finding substantial heterogeneity in diagnosis risk. This is essential to the research as it implies the substantial impact and complexities intersectionality and socioeconomic status has in ADHD presentation. Therefore, integrating findings from Hornborg et al. (2023) into further discussions provides a more inclusive and enriched understanding to how intersectionality and social factors perpetuate inequalities in ADHD prevalence and treatment options.

Longitudinal Impact of Internalizing Symptoms

Longitudinal studies have looked into the challenges that persist with internalizing symptoms of ADHD, specific to females. Hinshaw et al. (2012) conducted a follow-up study on girls diagnosed with ADHD in childhood and documented their outcomes into adulthood. The results of the findings demonstrated that females that received a childhood diagnosis of ADHD continued to experience higher rates of severity in ADHD symptoms and comorbidities versus males. The results of this study showed females experiencing these impacts across various domains of their life, highlighting increased rates of suicide attempts and self-injurious behaviours. These findings demonstrate the reciprocal relationship between internalizing symptoms and poor mental health outcomes women with ADHD face, putting forth concern as to the disparity in tailored treatment.

Internalizing symptoms have the potential to exert significant consequences on psychosocial functioning and relationships among females with ADHD. Studies show that females with ADHD exhibit increased responses to social withdrawal, interpersonal challenges and impaired social skills (Quinn & Madhoo, 2014). Part of this is explained to stem from persistent internalizing symptoms and the outcome of this manifestation. Longitudinal studies link internalizing symptoms throughout childhood to later in life in an overarching representation in the ability to form and sustain relationships and overall exacerbating social impairments (Hinshaw, 2002).

Rejection Sensitivity

Rejection sensitivity dysphoria (RSD) is becoming recognized in the literature as a common symptom associated with ADHD. RSD is a phenomenon in which individuals experience intense emotional dysregulation from perceived rejection. The literature characterizes RSD as intense emotional responses to perceived rejection or criticism that frequently results in feelings of inadequacy, embarrassment and shame (Hsu & Jarcho, 2021). Studies have indicated that individuals with ADHD are specifically vulnerable to RSD due to their heightened sensitivity and awareness of social cues. This tends to result in perceived rejection more acutely than neurotypical individuals (Sobanski et al., 2010). A research study done by Grygiel et al. (2018) aimed to explore some of the associations between ADHD and both objective and subjective dimensions of social relationship in primary school-aged children. The data consisted of 36 regular classrooms, comprising a total of 718 students. Of the 718 students partaking in this study, 38 of the children had a diagnosis of ADHD. Results showed that children with ADHD perceived lower quality of social relationships compared to their peers. These findings suggest that individuals with ADHD are more at risk of peer rejection and tend to perceive their social

environment more negatively than individuals without a diagnosis.

Intersection of ADHD and Overall Health

ADHD often is accompanied with various comorbidities that impact and alter an individual's overall health. Studies have shown that untreated ADHD is associated with poorer social functioning and positive self-concept compared to those with who have received ADHD treatment (Harpin et al., 2016). Understanding the intersections of ADHD and the implication of untreated ADHD is crucial in providing appropriate assessment, treatment planning and overall tailored approaches in ADHD treatment.

Comorbidities Associated with ADHD

The DSM-5 (American Psychiatric Association, 2013) has established common comorbidities associated with ADHD and symptoms, including the following: Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), Disruptive Mood Dysregulation Disorder (DMDD), Learning Disorders, Anxiety Disorders, Major Depressive Disorder (MDD), substance use disorders (SUD), and antisocial and various personality disorders. These comorbidities are consistent findings across studies including in a study conducted by Gnanavel et al. (2019) with findings of significant overlap and intricate interactions among these conditions. Considering the common psychiatric comorbidities that stem from ADHD, it suggests the complex nature in comprehending this disorder and how it presents. The comorbidities associated as behaviour disorders, ODD and CD, are characterized by antisocial, defiance and aggressive behaviour. These are named to frequently co-occur in children and adolescents with ADHD (Loe & Feldman, 2007). As a result, behaviours that coincide with disorders such as ODD and CD substantially affect the overall functionality individuals encounter socially and these also complicate treatment opportunities (Wilens et al., 2002).

Anxiety Disorders

Anxiety disorders are consistently prevalent amongst individuals with ADHD, and research has shown comorbidity rates of anxiety are estimated to range between 30-40% (Biederman et al., 1991). Specifically, this latter study considered generalized anxiety disorder (GAD), social anxiety disorder (SAD), and panic disorder. Kosheleff et al. (2023) found that individuals who experience anxiety tend to have vastly lower social connections and negative relational qualities. Further, the research describes that treating ADHD tends to subsequently improve anxiety features, emphasizing the importance of accurate diagnosis to lead to tailored treatment interventions. This demonstrates the overall need for comprehensive assessment to guide treatment aimed at addressing both ADHD and subsequently, anxiety disorders, effectively.

Mood and Personality Disorders

Studies have found that mood disorders, such as major depressive disorder (MDD) and bipolar disorder (BD) commonly coexist with ADHD (Chronis-Tuscano et al., 2013). The literature highlights that approximately 20-40% of individuals with ADHD experience elevated rates of depressive symptoms and episodes. Research further indicates that comorbid mood disorders are associated with increased risk of suicide attempts, hindered academic performance, and social and occupational difficulties (Forte et al., 2021). Studies have also considered the overlap of personality disorders such as borderline personality disorder (BPD) with ADHD, finding that in both disorders the more prominent symptoms tend to mirror each other, including impulsivity, emotional dysregulation, and interpersonal impairment (Weiner et al., 2019). The research indicates that emotional dysregulation tends to be the leading symptom across ADHD, mood disorders, and personality disorders. In adults, this is often due to symptoms being

expressed through internalization in contrast to the externalizing symptoms commonly associated with ADHD, such as hyperactivity, which is more frequently observed in children. These findings emphasize the intersections between ADHD, mood disorders, and personality disorders, revealing shared symptomatology suggesting areas of further research in order to strengthen assessment and interventions with ADHD.

Substance Use Disorders

Individuals with ADHD are at an increased risk of developing substance use disorders (SUD) (Zulauf et al., 2014). van Emmerik and associates (2020) conducted a meta-analysis of individuals seeking treatment for substance misuse and showed 23% had ADHD. Research discusses the complexities in defining the connection between ADHD and SUD but offers several potential contributing factors. Individuals with SUD tend to explain that the use of substances provides relief in regulating mood and sleep. Research has revealed the use of some substances, such as nicotine, influences attention and executive functioning improvements (Zulauf et al., 2014). The hypothesis suggested in the research indicates SUD is a form of self-medicating in order to alleviate and manage ADHD symptoms, stressing the importance of preventative measures such as early diagnosis for ADHD and thus appropriate treatment.

Impact on Overall Health

Research demonstrates the presence of comorbidities in individuals with ADHD is prevalent and poses consequential challenges to overall health and well-being. Comorbid diagnoses tend to intensify already present and underlying ADHD symptoms. Some of these symptoms include general daily functioning, social engagement, academic abilities, relationship with substances, and mental states (Biederman et al., 2008). Comorbidities that accompany ADHD complicate diagnosis, treatment and overall management as they hinder the root cause.

As ADHD goes left untreated, symptoms and potential towards developing concurrent disorders increase. This exacerbation of symptoms can weigh heavily on an individual, adding increased amounts of stress and reinforcing a sense of inadequacy (Zulauf et al., 2014).

Polyvagal Theory

"Polyvagal Theory suggests that social connectedness is a core biological imperative for humans, wired into our genetics." (Porges, 2022). Polyvagal Theory (PT), which was first developed by Dr. Stephen Porges in 1994, considers the recognition that emotions, behaviours and social engagement can be approached through the intersection of a neurobiological and physiological lens. Porges describes that when humans are at an internal state of safety, the nervous system can then promote restoration of healthy functioning and enable connection with others without threat. By considering the interaction of the nervous system and social behaviours, it can provide insight into how environmental stimuli affect our internal states and vice versa. It is through studying the autonomic nervous system (ANS) and survival responses of animals that Porges developed this theory, and how this affects both efficient and non-optimal functioning. This could provide insight to the consequence it poses for brain function and overall emotional experience. Polyvagal theory emphasizes the influence the ANS has on brain function (Porges, 2022).

The Autonomic Nervous System

The ANS and its function is an important component in understanding PT. The role of the ANS is to maintain internal stability throughout the body and initiate responses in order to appropriately respond to one's environment. The ANS is made up of “a neural network that coordinates the work of organs distributed throughout the human body”, aiming to balance homeostasis by “activating body systems to provide necessary resources to respond to challenges

and opportunities; and deactivating body systems when action is no longer performed" (Behnke et al., 2022, p. 132). Functioning cohesively, the ANS safeguards and responds to uphold environmental safety, often discussed as the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). Acting as alarm systems when danger presents, they become activated and recalibrate when the threat subsides. This understanding stems from observations of animal responses to peril, with Cannon (1987) terming them the "fight or flight" response. The theory offers insight for the interplay between autonomic processes and emotional regulation, offering potential avenues to healing emotional dysregulation.

Role of the Vagal Complexes in Emotional Regulation

Conroy and Perryman (2022) explain the dorsal vagal complex (DVC) as responsible for the freeze response based on life-threatening circumstances. It increases pain tolerance and slows down body movement. The ventral vagal complex (VVC) is responsible for more of a social and responsive balance. This response supports the function in the body to allow more of a hyperarousal response to threat and does this by essentially the opposite of DVC: instead, it increases blood flow and heart rate. VVC provides humans with the physiological response to be significantly present and have an active reaction to danger. Porges (2022) explains the VVC as influencing the neural structures in balancing the social engagement system. How this is described to work is through the balance of the neural regulation of visceral status, supporting equilibrium of facial expression and the receptive and expressive elements in communication. Therefore, VVC supports a more revealing element within the ANS function and constitutes balancing reactions when danger is occurring.

Sympathetic Nervous System

The SNS, when activated by a threat, contributes to the fight or flight response. Sullivan

et al. (2018) describe this as a shielding to the danger that initiates metabolic energy to promote an active response to threat. It is done by increasing blood flow, muscle tone, and heart rate while decreasing gastrointestinal functioning. As it relates to survival, an example that resembles this is a human face-to-face with a tiger; the internal function responds with hyperarousal, increased blood flow, the alarm bells go off, and the human runs away (flight) or alternatively seeks a weapon for combat (fight). It is important to note that when the SNS is activated and is the prominent response, it impacts the availability of other resources such as the VVC (Sullivan et al., 2018). In summary, the logical areas of the brain that control things such as balancing and processing communication are offline and inaccessible during these moments. The SNS can be beneficial in the case of life-or-death moments as the function naturally propels individuals toward responding to eventually get to safety.

Sympathetic Nervous System Dysregulation in ADHD

Individuals with ADHD often exhibit dysregulation in the SNS, as evidenced by heightened reactivity to perceived threats. This can result in exaggerated responses that further lead to challenges with emotional regulation and impulse control (Geiss et al., 2023). The state in which the SNS is more frequently activated in real-life situations may lead to displays of exaggerated or inappropriate responses to both real and perceived dangers. Prolonged exposure in a state of hyperarousal may manifest itself in behaviours such as impulsivity, restlessness, challenges with modulating between emotions and increased challenges with sustaining attention (Hinshaw, 2002). Furthermore, the overactivation of the SNS can lead to adverse effects and further health implications (Sohn & Jenei-Lanzl, 2023). This means that individuals with ADHD may face challenges to sustain a balanced arousal state due to the differences in SNS activation. As a result, this further draws attention to the ongoing challenges individuals with ADHD face in

being able to regulate emotions and effectively communicate with ease.

Practical Applications and Implications

Voss and Raz's (2017) book *Never Split the Difference: Negotiating as if Your Life Depends on It,* discusses the power of mirroring nervous system states in moments of threat, particularly negotiating in hostage situations. This text highlights a unique perspective with modulating individuals' responses to threat in order to down-regulate an individual during a threat, using examples of talking down offenders during crisis moments using vocal and mirroring subtleties. This is connected to the VVC as it triggers expressive responses and aims to stabilize communication flow, potentially aiding in stress management effectively.

Neuroception

Neuroception is a term introduced by Porges (1995) describing the unconscious experiences within the nervous system of continually evaluating safety and threat cues within the environment. Unlike perception, a term more commonly understood to operate largely in conscious awareness, neuroception functions in a much more discrete and innate manner. Neuroception is explained to influence physiological responses, behaviours and emotions (Porges, 2003). Through the use of neuroception, there is a consistent monitoring of the environment by subtle cues, including facial expressions, body language and sound (Porges, 2022). As this scan of the environment happens, the information received through neuroception will continuously determine whether the environment is appraised as safe or dangerous (Porges, 2011), thereby guiding the nervous system's response. Research on neuroception has shown the relationship between its function and the influence it has on social interactions, emotional regulation and stress responses. Poli et al. (2022) highlights how when the environment is deemed safe, neuroception facilitates the social engagement system (SES), however, when

neuroception interprets danger, it relies on the SNS and/or the DVS. This process allows for ideal adapted survival responses to accurately address the current threat. However, further studies have looked into potential deficits in the neuroception function, naming trauma or adverse experiences as potential risk factors. Kozlowska et al. (2015) describe the impact trauma has on an individual, indicating how each defense response exhibited has its own apparent neural patterns, which conveys an action to the threat. This research continued to examine the residual impact threat has on humans versus what animals inherently are able to do, return to baseline. It was found that animals were commonly able to return to their neutral functioning after the threat was no longer present. In contrast, humans who have experienced danger can find themselves stuck in a similar state, similar to when the original danger was legitimately occurring. As such, this new state can impact the restoration of original neuroception function, leaving the individual unable to accurately assess and address danger.

Neuroception and Emotional Dysregulation

Understanding how neuroception and ADHD intersect can elevate the way in which we consider how ADHD is impacted. Studies suggest that individuals with ADHD, especially females, have the potential to exhibit alterations in neuroceptive patterns, relating to neurobiological aspects of the disorder (Cortese et al., 2012). Females have numerous contributing factors as a result of the effects of how they have historically been socialized. Females with ADHD face heightened sensitivity to environmental stimuli, further leading to challenges in deciphering safety threat cues (Quinn & Madhoo, 2014). The implications of a heightened neuroception response may allude to emotional dysregulation and an overall hypersensitivity. Considering additional influences such as how adverse experiences and trauma play into the neuroception ability could further dysregulate and impair adaptive coping

mechanisms (Kozlowska et al., 2015).

The Window of Tolerance

The term “window of tolerance” refers to the ideal arousal range to which an individual can effectively manage their stressors and engage in adaptive responses (Siegel, 1999). When an individual is operating within their window of tolerance, they can modulate their emotions and continue an internal state of safety. However, individuals with ADHD face unique challenges with managing emotions, and particularly females may experience difficulty in maintaining arousal levels (Beauchaine et al., 2017). The experience of dysregulation and inability to modulate emotions is considered being outside the window of tolerance. Often, the dysregulation can manifest as impulsivity, emotional lability, and difficulty with alternating focus and sustaining focus (Moukhtarian et al., 2018). According to Polyvagal theory, the ANS plays a critical role in regulating the arousal levels and therefore determining an individual's window of tolerance (Porges, 2011). Specifically, the VVC is responsible for the promotion of feelings of safety and social engagement while the SNS and DVC activate perceived threats (Beauchaine, 2015; Porges, 2011). Considering the challenges those with ADHD face in emotional regulation and the dysregulation of the ANS, this can lead to ongoing struggles to modulate arousal levels and remaining within the window of tolerance. Interventions that are targeted to enhance emotional regulation and encourage self-regulation, such as mindfulness-based work may provide beneficial approaches for individuals with ADHD and those working with this population (Quinn, 2005; Sullivan et al., 2018).

Applying Polyvagal Theory to ADHD

Polyvagal Theory provides a neurophysiological framework in understanding the nervous system’s role in modulating social engagement and emotional responses (Porges, 2003). More

recently, research has surfaced looking at how Polyvagal Theory can enhance our understanding of ADHD and treatment. Traditionally, a majority of the research pertaining to ADHD considered a more cognitive and behavioural approach. Insight from how PT could be used to understand ADHD may provide a more unique perspective in treatment.

Previous research has looked at autonomic dysregulation using PT in individuals with ADHD. Beauchaine and Thayer (2015) considered a model proposing that vagal tone as measured by heart rate variability could play a significant role in managing attention processes and impulse control. According to this research, when there is reduced vagal tone, as seen by a decreased ability in the parasympathetic response, this could lead to impacts on executive functioning abilities. This aligns with some of the deficits of ADHD, alluding to further challenges such as abilities to inhibit and sustain attention. Further, various studies have acknowledged the changes in heart rate variability in comparison to typical development where ADHD is not present (Graziano & Derefinko, 2013). Therefore, this argument suggests there is underlying autonomic dysfunction in those with ADHD which highlights the need for targeted interventions that consider the ANS.

Polyvagal Theory, ADHD and Females

Research has begun to acknowledge the significance of gender-specific ADHD symptoms and comorbidities that occur as a result (Quinn, 2005). This emphasizes the need for gender-specific treatment and further research for women with ADHD. Quinn (2005) addresses the disparity in treatment by stating, “[ADHD] treatment regimens are usually composed of recommendations established by those experienced in treating elementary school–aged boys' ' (p. 582). Polyvagal theory attempts to consider the neurobiological and neurophysiological aspects that could tailor treatment to more accurately address the symptoms. One of the main theme’s

women with ADHD face with symptoms is the increased nature of experiencing internalization of their symptoms. Diagnoses women end up receiving as a result of internalizing their emotions tend to be anxiety and depression. Research suggests this may be linked to differences in the autonomic function and emotional regulation (Biederman et al., 2008). Polyvagal-informed interventions, such as heart rate variability biofeedback training or mindfulness-based approaches, could assist females with ADHD in cultivating effective emotion regulation techniques and enhancing their executive functioning abilities.

Sullivan et al. (2018) suggests a framework for supporting self-regulation and targeting common symptoms females with ADHD face using neuroscience and polyvagal influenced approaches. This model proposes using the traditional practice of yoga integrated with the scientific research and principles of PT to enhance emotional regulation and improve overall well-being in women with ADHD. In a study conducted by Payne and Crane-Godreau (2013), the effects of Movement Meditation (MM), an integration of physiological movement and attunement into the body's current state were reviewed, showing positive effects in treating anxiety and depression. The study indicated one of the main benefits MM provided was the stimulation into interoceptive and proprioceptive sensations. The study indicates how with regular practice MM influences “a variety of positive and complex inner sensations” (p. 9) and further elaborates on how interoception is significant in the “affective and cognitive function” (p. 9). This research suggests how MM can offer substantial benefits for addressing anxiety and depression, particularly by enhancing interoceptive and proprioceptive sensations, resulting in better affective and cognitive functioning.

Integrative Approaches for Women with ADHD

The research introduced in Chapter 2 will influence the direction of Chapter 3, as it aims

to integrate neuroscience and polyvagal theory into a practical workshop tailored specifically for females with ADHD. Titled "Embracing the Mind-Body Connection: ADHD in Women," the workshop will incorporate the principles of yoga and movement meditation to enhance emotional regulation and foster empowerment. This will be done by combining elements of traditional practices with scientific research. The workshop aims to provide females with an ADHD diagnosis or similar presentations effective resources for managing common challenges. Through a more targeted approach focusing on interoceptive and proprioceptive sensations, participants will begin the work toward cultivating a deeper awareness of their body's responses and enhancing their affective and cognitive functioning.

Limitations

One of the prominent limitations faced in synthesizing the literature is the historical focus on male-dominated samples in ADHD research, insisting challenges in the generalizability of findings to females. Through the research examined it is found that females with ADHD exhibit their symptoms differently. This further leads to comorbidities that present differing profiles between females and males (Quinn, 2005). The limitations of sufficient representation of women in clinical trials suggests a lack of viable research to measure the unique impact females with ADHD face. Many of the studies examining ADHD in females are cross-sectional or retrospective in nature, therefore, this limits the ability to establish causal relationships and longitudinal trajectories of the disorder. From a research standpoint, the reliance on self-report measures and recall may indicate biases in the data collection, and as a result impact the validity and reliability of the findings (Biederman et al., 2008).

Limitations of Polyvagal Theory

Polyvagal theory provides unique insights into the influence of the ANS in emotional

regulation and social behaviour, yet there are limitations that are relevant to discern. Primarily, polyvagal theory can be utilized as a framework for understanding physiological processes, however they have the potential to fail to provide specific predictions or mechanisms for how they manifest in various contexts (Porges, 2011). Limitations have further argued that Polyvagal theory oversimplifies the association of the ANS, emotions and social behaviour. This is a critique as it has the potential to neglect and discount other crucial factors that contribute to these complex processes (Beauchaine, 2015). Nevertheless, this theory remains a valuable framework in understanding the neurophysiological and neuropsychological basis of emotional regulation and social behaviour. Future research could consider addressing the limitations discussed, while exploring how the theory incorporates applicability across diverse populations and contexts in order to enhance our understanding.

Summary and Synthesis

In summary, the research presented throughout chapter 2 introduces the importance of gender-specific symptoms and comorbidities associated with ADHD and emphasizes the necessity for tailored treatment approaches. Quinn (2005) brings forth the disparity females face with seeking ADHD treatment, naming the conventional regimens as unfitting due to the fact that they were originally developed to treat elementary school-aged boys. The research presented acknowledges the gap in supporting females with ADHD, while recommending the need for further research to consider gender-specific interventions that address the unique needs of females with ADHD. Polyvagal theory offers a promising framework toward understanding the neurobiological and neurophysiological aspects of ADHD symptoms, particularly insight to the internalization of symptoms and emotional experiences (Biederman et al., 2008). Polyvagal-informed interventions, such as the heart rate variability and mindfulness-based approaches

demonstrate possible viable strategies for helping females with ADHD. Specifically, the integration of these approaches supports a framework to cultivating increased effectiveness in emotional regulation skills and executive functioning abilities. Research has considered integrating principles from neuroscience and Polyvagal theory with traditional practices like yoga offers a model toward supporting self-regulation which could be a transformative approach for this demographic (Sullivan et al., 2018). Further, Payne and Crane-Godreau's (2013) study on MM supports this approach, demonstrating the efficacy of integrating physiological movement and attunement into the body's current state for treating anxiety and depression. The work of MM focuses on enhancing interoceptive and proprioceptive sensations that are shown to effectively improve cognitive function and self-regulating abilities. Overall, these findings highlight the significance of incorporating mind-body interventions that are informed by Polyvagal theory to address the unique aspects females with ADHD face that will guide the work outlined in chapter 3: Embracing the Mind-Body Connection: ADHD in Women.

Chapter 3: Discussion, Workshop and Conclusion

In the preceding chapter, research was presented that demonstrated a gap in the mental health field and the nuanced manifestations associated with ADHD in females. Much of what was discussed signalled to the challenges of identifying and addressing their unique symptoms, highlighting a great need for tailored treatment. Chapter 3 will build upon this foundation by providing a comprehensive overview integrating neuroscience and the principles of Polyvagal theory into a framework for a workshop: "Embracing the Mind-Body Connection: ADHD in Females". The workshop's overarching goal is to empower both mental health professionals and their clients by bridging the gap between conventional ADHD treatments and the holistic needs unique to females. Chapter 3 will include discussion, the workshop and concluding segments that expand on the groundwork established in previous chapters. By merging the research findings with actionable steps, the work of chapter 3 will attempt to facilitate a seamless transition from theoretical understanding to practical application. Further, the framework developed in this chapter seeks to offer diverse approaches to addressing the needs of females with ADHD and thereby contributing to the advancement of gender-sensitive mental health care practices.

The following chapter will present a workshop proposal outline comprising a four-part psychoeducation series. Each session is set up to be approximately 90 minutes and conducted within a group therapy framework. The intention of this workshop is to highlight the gender disparity in how ADHD presents differently in females, therefore, the participants would essentially identify with this topic. The intention of this workshop is to highlight the gender disparity in how ADHD presents differently in females. It's important to note that while the term "female" is used for clarity as gender theory and neuroscience are discussed, there is no exclusionary criteria based on biological gender or gender presentation. If an individual

identifies with the workshop's content and objectives, they will benefit from the work. Open discussions around gender inclusivity will be encouraged and facilitated during the initial session to ensure a supportive and inclusive environment for all participants and to establish a safe therapeutic environment.

Workshop Outline

Workshop Title

"Embracing the Mind-Body Connection: ADHD in Females"

Overview

This workshop is designed for both mental health professionals and clients to explore the impact of masked and internalized ADHD symptoms in females and the impact it has on their mind-body connection and overall health. The hope is to expand the client's capacity and autonomy in their own lives by incorporating psychoeducation and somatic practices as a form of treatment for ADHD related symptoms. The psychoeducation portion will be influenced by current research in neurobiological aspects to how ADHD impacts an individual, highlighting the challenges to emotional regulation, communication and processing abilities. Further, the psychoeducation aspect will incorporate the gender specific implications that are seen in females with ADHD. Lastly, understanding the ANS and the role it has in modulating emotional responses and safety will be included and informed by the work of Stephen Porges and Polyvagal theory.

The participants in this workshop will be encouraged to reflect on their own experiences and challenges, and in doing so will begin to elicit self-awareness and compassion for oneself. It is through this application of the research and reflective exercises that individuals will begin to turn their understanding into actionable strategies for managing ADHD symptoms and

promoting self-compassion. There will be an incorporation of real-life scenarios and definitions of emotional experience and to do so the structure of the workshop will include psychoeducation, collaborative learning, self-reflective exercises, and experiential somatic practices facilitated by a mental health professional.

Goals of Workshop

The overall goal of the workshop is to provide females with ADHD and/or the presentation of ADHD-like symptoms a unique and tailored approach to treatment. The specific aims of this workshop are broken down into six core objectives:

- **Increasing Understanding of the Unique Presentation of ADHD Symptoms in Females.** The beginning stage of this workshop looks to lay the framework in understanding what ADHD is, the unique symptomology related to females and provide a space for the participants to initiate a reflective practice. The goal is to stimulate conversations for participants to build skills around understanding their own experiences to continue on after the workshop has concluded. In doing so, this will enhance their understanding of how ADHD manifests in females, highlighting the distinctiveness of the presentation that is often overshadowed by misconceptions.
- **Empowering Participants to Recognize and Address Internalized Symptoms of ADHD.** For some participants, this might be the first time they are considering their experience through a lens of ADHD. Therefore, emotions are likely to arise during the reflective practice, with grief often emerging at the forefront. Incorporating a sense of empowerment is important in order that the participants identify and confront the internalized symptoms. This goal will ideally support participants with the tools and strategies to challenge the internalized symptoms and feel a sense of autonomy while

balancing self-compassion and self-advocacy.

- **Providing Practical Strategies for Managing ADHD-related Challenges and Enhancing Overall Well-being.** One of the primary goals of this group is to lay the foundation for understanding ADHD, enabling participants to subsequently incorporate useful and tangible tools that support their symptoms. So, practicality and efficacy are a central aim for the workshop. The use of evidence-based techniques and coping strategies will be incorporated to introduce resourcing. Specific examples of this might look like time management, organization, emotional regulation and awareness of internal states.
- **Fostering a Supportive and Inclusive Environment for Sharing Experiences and Challenges.** For this workshop to be effective, it is extremely important that it is conducted in a supportive and inclusive environment, and that participants' experience is such. The workshop implies layers of vulnerability through its reflection and potentially revelation for some who have yet to consider some of these topics. In order to create a supportive and inclusive environment, it is important that safety is established so that even the most vulnerable participant feels safe enough to raise concerns with the facilitator. Group expectations and safety planning is essential to be collaboratively addressed at the beginning of the workshop and continually revisited throughout. The facilitator should provide and encourage active listening skills, reflection and empathy.
- **Promoting the Integration of Mind-Body Techniques for Improving Emotional Regulation and Self-care.** The intention for this workshop is for participants to walk away feeling more autonomous in their experiences and have a better sense of their *internal needs.* The approach taken in this workshop is to not only encourage self-care but to help participants understand what *is* self-care. This goal is unique; it requires the

foundations of reflective practice to be present and aims to shift participants towards gauging their internal state. The idea is for participants to be able to think about themselves first in scenarios, or more intentionally, which might be a first for some. This starts with checking in with ones' self, understanding how you are feeling and then moving into the need. Instead of throwing self-care specific activities, such as baths, going for walks, listening to music, etc., the idea is to encourage participants into visualizing their capacity, their need, and their comfort or discomfort in any given situation to then respond correctly. In other words, self-care might simply involve having the power to say yes or no.

- **Educating Therapists on Gender-specific Interventions for Working with Females with ADHD.** This workshop recognizes professional development as a key component of the overall objectives and aims to equip mental health professionals with specific tools to effectively support females with ADHD. The goal is to initiate conversations regarding the gap in gender-specific ADHD diagnosis and support, and then suggest alternative methods such as this workshop. Through a more adaptive treatment lens, mental health professionals working with this population will ideally feel more equipped.

Target Audience

The workshop is designed to support various individuals who are interested in understanding and addressing how ADHD impacts females. More specifically, this might include:

- **Females with ADHD.** The primary targeted audiences for this workshop are for females with ADHD or present with similar symptoms yet have not received a formal diagnosis. This participant demographic would provide these individuals with personal insights,

practical strategies and a supportive community to explore their unique experiences.

- **Mental Health Professionals.** The workshop is also designed for mental health professionals working within this field. Those who engage with this material could benefit by strengthening their skillset and confidence in working with this population. Further, having mental health professionals who participate in these workshops could potentially expand future research and treatments for females with ADHD.
- Other targeted audiences may include: Parents or caregivers of females with ADHD, school and community groups, advocates and support groups.

Considerations for Implementation

The expertise and skill of the facilitator greatly influences the group's overall experience and outcomes. It is an important consideration for the facilitator to ensure expertise in ADHD, incorporating a gender-sensitive approach, clinical experience, and group facilitation skills. Lastly, utilizing a trauma informed lens throughout the workshop makes for best practice and supports the establishment of safety within the group.

Ethics

The ethical considerations related to this workshop is an essential aspect facilitator should consult and incorporate throughout the workshop duration. Specifically, the ethical considerations greatly impact how safe the environment feels for participants, allowing for sensitive topics to be discussed. Incorporating this framework will in turn, support the facilitator in navigating ethical dilemmas if any were to arise. Some things for the facilitator to note regarding ethical considerations are ensuring the adherence to ethical guidelines in place from their own professional body (example: BC Association of Clinical Counsellors). Maintaining confidentiality and respect for participants' individual autonomy is foundational to the workshop

setting and therapeutic work. Further, the ethical responsibilities the facilitator should also be aware of is their own power and influence within the group context and how that is being utilized.

Recruitment

How the group is created plays a powerful role towards the overall group experience and efficacy. In order to appropriately structure the group, effective recruitment strategies should be considered with the goal of assembling a diverse and representative group of participants. There are various ways to approach recruitment, some being; mental health clinics, support groups, educational school settings, and referrals. In the attempt to provide a wide cast of channels for recruitment, the opportunity for individuals to access this group with differing backgrounds help to accurately reflect the purpose and objectives of the workshop.

Informed Consent

Informed consent should be part of anything done within the therapeutic realm and this workshop is no exception. Prior to commencing this workshop, all participants must provide informed consent where they acknowledge their understanding of the workshop goals, objectives, activities and potential risks. This communication relies on the facilitator to ensure the participants comprehension of informed consent. To do so, it is recommended that informed consent is provided both written and verbally, allowing the participant to ask any clarifying question, while also allowing the counsellor to assess the participants' understanding. Within the informed consent clause, confidentiality should be emphasized as it pertains to everyone in the group.

Fee

This workshop is designed for accessibility; there is no current requirement to which

setting it should be primarily delivered and/or a fee associated with it. Meaning, this workshop could potentially be administered within the public sector or subsequently in a private practice mental health context. If there is a fee associated with participating in the workshop, the facilitator must indicate the fees and payment with transparency during the recruitment process.

Managing Dysregulation

During the preliminary period of setting up this workshop, it is highly recommended safety planning is discussed and prepared prior to commencing the group. If this workshop is being provided through multiple facilitators, the facilitators and the co-facilitators should set aside time to contemplate what to do when a participant exhibits dysregulation in the moment and what is the follow-up protocol. Some suggestions to consider with managing dysregulation within the group is for the facilitator to keep safety and well-being of the participants as paramount. The facilitator should utilize their training in recognizing signs of dysregulation and the use strategies of mirroring the participants feelings (example: “I hear you feel *emotion/feeling* because _____”). It is important the facilitator reflect on their own regulation skills and demeanor in order to appropriately address the need in the moment. This may involve providing a calm tone of voice, ensuring a safe environment, supporting a “pivot” or alternative exercise in the conversation to de-escalate.

Follow-Up

If an instance of dysregulation or escalation occurs within the group setting and the facilitator attends to it at the moment, it is also important for the facilitator to conduct a follow-up with the participant outside of the session. In doing so, this will help determine if the participant requires additional support or alternative interventions. Continually, it would be a good idea for the facilitator to assess the impact the situation had on the group as a whole and

implement adjustments as needed.

Duration of the Group

The workshop is set out to span a six-session time frame, with each session lasting for approximately 1.5 hours. The duration of the sessions is intended to strike a balance between providing essential psychoeducational content and meaningful engagement among participants. According to an article by Ezhumalai et al. (2018), group interventions that run on a once-a-week schedule are most effective with a 90-minute duration. This is likely to support optimal participation, engagement and the overall workshop outcomes.

The six-session format supports the exploration of ADHD in females and covers key topic areas related to ADHD in females. It is a consideration that this workshop could expand beyond this proposed framework to deepen the outcomes and provide participants with more time to engage in the therapeutic environment. Research by Burlingame et al. (2018) shares that longer group interventions are correlated with stronger group cohesion, overall participant sense of achievement and positive outcomes. This highlights the potential for the workshop to expand and adapt as gaps are identified.

Session Outline

The workshop is structured into six sessions, with topics and goals related to each one. Each session is intentionally planned to provide psychoeducation and therapeutic exploration. Subsequently, the facilitator can refer to the detailed lesson plan outlined in Appendix A for further guidance. See Appendix B for supplemental handouts intended to accompany this workshop.

Part 1: Understanding ADHD in Women

- ADHD historically has evolved over many decades, and as new information arises, it

continues to shift. For instance, the name, attention deficit hyperactivity disorder has had several name changes since it was first discovered. The first diagnosis noted in research was given in 1798 by a Scottish physician where he was one of the few at this time to take an interest in "mental diseases" (Lange et al., 2010). At the time, they did not have a lengthy understanding of what was occurring in the patients they observed with ADHD, and therefore diagnosed these patients with an explanation of their symptoms and challenges with attention and regulation.

- Emotional regulation is commonly cited as one of the most impairing difficulties with ADHD. Part of what research has identified why this is the case is the structural differences in brain size, growth and impairments. Research shows through the use of brain scans that those with ADHD have 3% slower brain growth compared to those without ADHD (Shaw, 2013). Through evolution, brains grow in a hierarchical manner, meaning back to front. The front hemisphere of the brain, known as the prefrontal cortex, is the last to grow and therefore the most impacted. The prefrontal cortex is responsible for executive functioning such as the organization of tasks, making choices, memory for tasks, expressing personality, regulating social interactions, and managing speech and language functions. This ultimately plays an essential role in overall cognitive control and decision-making skills (Shaw et al., 2006).
- Comorbidities linked to ADHD often include diagnoses such as anxiety disorders, depression, and mood disorders. Females, in particular, may receive diagnoses of anxiety or depression as manifestations of ADHD, leading to a focus on treating these symptoms as the primary concern. This approach often results in addressing

only the surface-level symptoms, akin to addressing the tip of the "iceberg", while the underlying ADHD remains unaddressed. Consequently, females with undiagnosed or untreated ADHD may find themselves continually facing the same issues, with perpetuating symptoms resembling anxiety and depression.

- Internalization of emotions is a common experience for those with ADHD, often experienced in females. Part of the theories behind this comes from gender-based expectations. Ongoing research considers the differences men and women face when it comes to "societal norms", finding that females tend to have greater social consequences versus males. Research also highlights the inequalities females encounter concerning societal thresholds and collective acceptance, which tend to favour males.

Part 2: Exploring the Mind-Body Connection to Emotional Well-being

This section looks to focus on the neurobiological and neurophysiological aspects of emotional well-being and understanding. The intention is to begin to introduce the mind-body connection, while being influenced from Polyvagal theory. The session will consist of psychoeducation, introduction between mental and physical health while incorporating interactive activities such as discussion, and opportunities to explore mindfulness and movement inspired by yoga. Subsequently, the facilitator can refer to the detailed lesson plan outlined in Appendix A for further guidance. See Appendix B for supplemental handouts intended to accompany this workshop.

- The Autonomic Nervous System (ANS) role is to maintain internal balance throughout the body while also responding appropriately to external stimuli to accurately react and ideally adapt the internal function temporarily. The ANS is made up of a complex

network of nerves that regulates the activities of various organs across the body. Its main objective is to uphold homeostasis by triggering bodily systems to allocate resources in response to challenges and opportunities, and by halting these processes once the need for action ceases (Behnke et al., 2022, p. 132). When we are feeling "optimal" the overall functioning is ideal. However, when things such as trauma, dysregulation, inability to accurately decipher between real danger or not can leave individuals with ANS challenges.

- The window of tolerance was first established by Dan Siegel as a framework to explain an individual's arousal states including hyper, hypo and optimal (Siegel, 1999). The window of tolerance highlights that one is able to modulate their emotions effectively while within it. The application of this framework towards individuals' lives gives a sense of the impact dysregulation has toward changes in impulsivity, emotional lability, and difficulty with alternating focus and sustaining focus (Moukhtarian et al., 2018).
- Polyvagal theory focuses on the ANS and how this influences behavioural responses as an adaptive approach to survival. Polyvagal theory researches survival responses in humans, but has also been heavily influenced by the survival responses in animals. Polyvagal theory includes the role of the vagus nerve, social engagement system and the "fight and flight" responses. Neuroception is a term introduced by Porges (1995) that explains the unconscious and innate scanning of environments to evaluate safety and threat cues.
- Mindfulness movement: A study conducted by Payne and Crane-Godreau (2013) examined the impacts of Movement Meditation (MM), a practice blending

physical movement with awareness of the body's present condition. Their findings revealed positive outcomes for participants in alleviating symptoms of anxiety and depression. The study emphasized the MM method's emphasis on internal bodily sensations, including interoceptive and proprioceptive awareness.

- Note to facilitator: At this part of the session, it would be a good place to introduce a mindful activity, starting with a body scan. A few things to note when doing mindfulness and yoga techniques is incorporating a trauma informed lens, approaching each direction as an "invitation" (example: "I invite you to close your eyes or soften your gaze, or whatever feels most comfortable") and allowing participants to join physically at their comfort and preference level. It is also good practice to provide options for seating such as chairs, cushions, yoga mats, etc. Other things to note when considering a trauma-informed lens is the environmental space; while mirrors can be helpful for correction in a "modern" yoga class, they can be intimidating and disrupt the effectiveness of the therapeutic work. Embodying this approach assists the participants in sharing that same consideration toward themselves.

Part 3: Managing Internalized Symptoms

Session three is Managing Internalized Symptoms, where the focus is for participants to begin to recognize and address their internalized symptoms and how this relates to ADHD. The added layer of this work will encourage and empower participants to consider some of the symptoms they may have faced but previously overlooked as it relates to females' unique experiences with ADHD. Subsequently, the facilitator can refer to the detailed lesson plan outlined in Appendix A for further guidance. Some specific topic areas for the facilitator to consider are:

- Identifying and challenging internalized beliefs
- Low self-esteem
- Perfectionism
- Imposter syndrome
- Rejection sensitivity dysphoria

Part 4: Creating an Internal Connection for Effective Self-Care

Session four, Creating an Internal Connection for Effective Self-Care, shifts the focus towards fostering a deeper understanding of self-care. The facilitator can refer to the detailed lesson plan outlined in Appendix A, and Appendix B for supplemental handouts.

- Shift in Focus: The session shifts the focus from surface-level self-care practices to internalizing the concept of self-care, emphasizing the importance of tuning into one's own needs and preferences. To do this, the facilitator should consider the promotion of self-awareness. This can be done through encouraging the participants to explore their internal experiences, emotions, and bodily sensations to gain deeper insights. Asking participants questions like, “How does that feel talking about that?”, “Where do you notice it in your body?”, and “Does it feel good or bad?” Some individuals have a difficult time making this connection, as it is a big jump, so it can be helpful as a facilitator to provide examples for the participants such as, “Sometimes people who have experienced_____ notice a feeling of tension in their chest, like someone is sitting on it or _____”. Allowing examples subsequently can support participants' own reflective practices.

Part 5: Cultivating Self-Regulation Through Yoga

The fifth session, Cultivating Self-Regulation Through Yoga, introduces participants to

movement and how the physiological states influence internal states by considering interoception and proprioception. The participants will be introduced to various forms of movement and sensations, and encouraged to reflect on their experiences which will strengthen their own internal relationship. Subsequently, the facilitator can refer to the detailed lesson plan outlined in Appendix A for further guidance, and to Appendix B for supplemental handouts intended to accompany this workshop. Some suggestions for the facilitator:

- Guided yoga sessions and breathing exercises to provide participants with practical tools for managing ADHD-related challenges and promoting overall well-being.
    - **Alternate Nostril Breathing:** Sit comfortably and place your left hand on your left knee, palm facing up. Sit comfortably with your left hand on your left knee. Bring your right index and middle fingers to your forehead, between your eyebrows. Close your right nostril with your right thumb and inhale through your left nostril. Close your left nostril with your ring finger, release your thumb, and exhale through your right nostril. Inhale through your right nostril, then close it with your thumb and exhale through your left nostril. Repeat for several rounds.
    - **Box Breathing:** Inhale through your nose for a count of 4 seconds. Hold your breath for 4 seconds. Exhale through your nose for 4 seconds. Hold your breath for another 4 seconds. Repeat this cycle.

Part 6: Creative Expression and Closing Reflection

Finally, the workshop will conclude with a session on “Creative Expression and Closing Reflection”. The hope is for participants to celebrate their engagement with the workshop and experience closure. Part of this session will include art therapy as a creative and therapeutic way for individuals to express their emotional insights surrounding their ADHD journey. This session

would be best suited in a sharing circle, where participants can reflect on their artwork and/or experiences as a group. Subsequently, the facilitator can refer to the detailed lesson plan outlined in Appendix A for further guidance. See Appendix B for supplemental handouts intended to accompany this workshop.

Capstone Summary and Conclusions

The gap in ADHD diagnosis and treatment is glaring for females. Despite advancements in our understanding of ADHD over the years, particularly in its presentation among different genders, significant disparities persist, leaving many females undiagnosed or inadequately supported. Research has shown the prevalence of ADHD is approximately 5.5% of children with a 3:1 ratio of males to females. Those with ADHD are 75% more likely to have one or more psychiatric comorbidities. Based on the theories as to why females experience diagnostic differences, these are explained to be the differences in presentation: females are less likely to exhibit hyperactive behaviours but are more likely experiencing inattentive symptoms, making it harder to diagnose (Skogli et al., 2013). Research also highlights that females with ADHD are more likely to attempt suicide and engage in self-harming behaviours (Swanson et al., 2014). Despite ongoing research and awareness, the disparities continue to hinder effective intervention and highlight the urgent need for targeted strategies to address the unique challenges faced by females with ADHD.

In conclusion, taking a holistic approach in understanding the presentation of ADHD in females requires attention to the nuances, such as the impact of gender to societal norms. However, in doing so, it can open the door toward new insights in how we approach mental health conditions as a whole. As we continue to navigate the challenges of gender disparity in ADHD diagnosis and treatment, the insights from this capstone project offer a hopeful avenue

for bridging existing gaps, guiding future research, and, more importantly, ensuring that females receive the support they need rather than suffering in silence.

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Appendix A

Embracing the Mind-Body Connection: ADHD in Females Workshop: Lesson Plan

Lesson Plan: Session 1	
Topic:	Understanding ADHD in Females
Lesson Objectives/Goals:	Introduce participants to the unique symptoms and challenges faced by adult women with ADHD.
Materials:	● Presentation slides on the overview of ADHD in females ● Handouts summarizing key points discussed
Overview of ADHD in Women:	Discussion of common symptoms and experiences specific to adult females. Explore societal misconceptions and challenges in diagnosis and treatment.
Interactive Activity:	Personal Symptom Reflection ***Instructions:*** ● Provide participants with a list of common ADHD symptoms in women, such as difficulty with organization, time management, impulsivity, etc. ● Ask participants to individually reflect on their own experiences and identify which symptoms resonate with them the most. They can do this by marking or highlighting the symptoms on the list. ● After reflection, encourage participants to share one or two symptoms they find most challenging or relevant to their own experiences with the group. ● Facilitate a discussion around these shared symptoms, allowing participants to explore commonalities, differences, and coping strategies. ● Conclude the activity by emphasizing the importance of self-awareness and self-compassion in managing ADHD symptoms.
Homework Assignment:	Ask participants to reflect on their own ADHD journey and jot down any questions or topics they'd like to explore further in the next session.
Considerations for facilitator:	● Collaboratively set group norms and expectations. Begin to lay the foundation of a safe and inclusive environment. ● Allow space for various emotions to arise during the session, fostering an environment of openness and acceptance. ● Inform participants that throughout the week they may notice shifts in their awareness or perception of their ADHD symptoms as they engage with the material and reflect on their experiences.

Lesson Plan: Session 2	
Topic:	Exploring the Mind-Body Connection
Lesson Objectives/Goals:	Introduce participants to the science behind the mind-body connection and its relevance to ADHD.
Materials:	● Presentation slides on the Science of the Mind-Body Connection ● Handouts summarizing key points discussed ● Guided Mindfulness Meditation script
Presentation:	***The Science of the Mind-Body Connection:*** ● Explain the concept of the mind-body connection and its implications for emotional regulation and well-being. ● Introduce neuroscience and polyvagal theory in understanding ADHD symptoms. ***Key points:*** ● Highlight the bidirectional relationship between mental and physical health. ● Discuss how practices like mindfulness can positively impact ADHD symptoms.
Interactive Activity:	***Guided Mindfulness Meditation:*** ● Lead participants through a mindfulness meditation session focusing on awareness of breath and bodily sensations.
Reflection:	Allow time for participants to share their experiences and insights from the meditation practice. Encourage participants to incorporate mindfulness habits into their daily routine. ***Homework***: Mindful teeth brushing activity
Lesson Plan: Session 3	
Topic:	Managing Internalized Symptoms
Lesson Objectives/Goals:	To help female participants identify and manage internalized symptoms of ADHD.
Materials:	● Handouts on common internalized symptoms of ADHD ● Whiteboard or flipchart ● Markers ● Notepads and pens for participants

Introduction:	Explain the importance of recognizing and addressing internalized symptoms of ADHD for overall well-being.
Discussion: *Understanding Internalized Symptoms*	● Facilitate a discussion on common internalized symptoms of ADHD, such as low self-esteem, perfectionism, self-doubt, anger, lack of emotional control and imposter syndrome. Encourage participants to share their own experiences and insights regarding internalized symptoms.
Group Discussion:	● Brainstorm strategies for managing internalized symptoms as a group. Use the whiteboard or flipchart to list potential coping strategies, such as practicing self-compassion, setting realistic expectations, seeking support from others, and challenging negative self-talk.
Homework Assignment:	● Encourage participants to choose one or two coping strategies discussed during the session to implement in their daily lives. Invite participants to journal about their experiences with implementing these strategies and any insights gained.
Lesson Plan: Session 4	
Topic:	Creating an Internal Connection for Effective Self-Care
Lesson Objectives/Goals:	To help participants develop a deeper understanding of self-care by fostering an internal connection and advocating for their own needs.
Materials:	● Whiteboard or flipchart ● Markers ● Handouts on self-care strategies ● Journaling materials (notebooks, pens)
Introduction:	● Welcome participants and introduce the topic of creating an internal connection for effective self-care. ● Discuss the importance of moving beyond surface-level self-care practices to cultivate a deeper understanding of one's own needs and preferences.
Understanding Internal Connection:	● Facilitate a discussion on the concept of internal connection in the context of self-care. ● Define internal connection as the ability to tune into one's own thoughts, feelings, and bodily sensations in order to identify and respond to personal needs.

Exploring Personal Needs:	● Lead a guided mindfulness exercise to help participants connect with their internal experiences in the present moment. Encourage participants to notice any thoughts, emotions, or bodily sensations that arise without judgment. ● After the exercise, invite participants to reflect on any insights or needs that emerged for them during the practice.
Challenging Self-Care Myths:	● Discuss common misconceptions about self-care, such as equating it solely with external activities like bubble baths or exercise. ● Emphasize that true self-care involves listening to and honouring one's own needs, even if they don't align with societal expectations or norms.
Identifying Personal Self-Care Practices:	Guide participants through a brainstorming activity where they identify self-care practices that resonate with them on a deeper level. Encourage participants to consider activities that nourish their mind, body, and spirit in a holistic way.
Journaling Exercise:	Provide time for participants to journal about their personal self-care needs and preferences. Encourage reflection on how they can incorporate these practices into their daily lives to promote well-being and balance.
Action Planning:	● Encourage participants to create a personalized self-care action plan based on their reflections and insights from the session. ● Encourage them to set realistic goals and commitments to prioritize their self-care moving forward.
Closing:	● Invite participants to share any insights or commitments they've made regarding their self-care practice. ● End the session with a brief mindfulness exercise to anchor participants in the present moment and promote a sense of calm and grounding.
Lesson Plan: Session 5	
Topic:	Cultivating Self-Regulation Through Yoga
Lesson Objectives/Goals:	Teach participants yoga techniques for enhancing emotional regulation and relaxation.
Materials:	● Yoga mats or comfortable seating ● Handouts or visual aids demonstrating yoga poses and breathing exercises

Introduction:	Recap previous sessions and reinforce the importance of self-awareness and self-regulation.
Yoga Session:	Lead participants through a series of gentle yoga poses and breathing exercises aimed at promoting relaxation and emotional balance. Encourage modifications to accommodate individual needs and abilities.
Group Discussion:	● Recap previous sessions and reinforce the importance of self-awareness and self-regulation. ● Facilitate a discussion on how the yoga session affected participants' mood, stress levels, and overall well-being. Encourage sharing of insights and experiences.
Homework Assignment:	● Encourage participants to incorporate simple yoga practices into their daily routine. ● Prompt participants to journal about their experiences with yoga, noting any changes in mood, stress levels, or overall well-being.
Lesson Plan: Session 6	
Topic:	Creative Expression and Closing Reflection
Lesson Objectives/Goals:	Provide participants with a creative outlet for self-expression and reflection on their ADHD journey.
Materials:	● Art supplies such as paper, paints, markers, colored pencils, glue, and scissors ● Optional: Music playlist for ambiance during the art therapy activity
Art Therapy Activity:	● Welcome participants and set the intention for the creative expression session. ● Engage participants in a guided art therapy activity (e.g., painting, drawing, collage) focused on expressing emotions and thoughts related to ADHD. Encourage participants to explore their feelings and experiences freely through their chosen medium.
Group Sharing and Reflection:	● Facilitate a sharing circle where participants can discuss their artwork and insights gained from the creative process. ● Encourage active listening and support within the group as each participant shares their reflections.
Gratitude Exercise:	Lead a closing gratitude exercise where participants express appreciation for themselves and each other. Invite participants to reflect

	on the strengths and qualities they've observed in themselves and their peers throughout the workshop.
Conclusion and Feedback:	Thank participants for their participation and openness throughout the workshop series. Invite feedback on the overall workshop experience, including what worked well and any suggestions for improvement. Reiterate the importance of ongoing self-reflection and self-care in managing ADHD symptoms.

Appendix B

Embracing the Mind-Body Connection: ADHD in Females Workshop Handouts

Embracing the Mind-Body Connection: ADHD in Females Workshop

WEEK ONE: UNDERSTANDING ADHD IN FEMALES

Overview of ADHD in Women:

- ADHD in females is often underdiagnosed and misunderstood due to differences in symptom presentation compared to males.
- Common symptoms experienced by adult women with ADHD include difficulties with organization, time management, impulsivity, and emotional regulation.
- Societal misconceptions, such as the belief that ADHD only affects hyperactive boys, can contribute to delayed diagnosis and inadequate treatment for females with ADHD.

Symptom Reflection Checklist: Understanding ADHD in Females

Please take a moment to reflect on your own experiences and identify which symptoms of ADHD resonate with you the most. Check the box next to each symptom that you have experienced, either currently or in the past.

1. **Forgetfulness or absent-mindedness:**
   - Difficulty remembering appointments, deadlines, or commitments
   - Frequently misplacing or losing items (e.g., keys, phone, wallet)
   - Forgetting to complete tasks or follow through on responsibilities
2. **Difficulty with organization and time management**
   - Struggling to maintain an organized living or work space
   - Feeling overwhelmed by clutter or disorganization
   - Procrastinating on tasks or projects until the last minute
3. **Impulsivity and difficulty with impulse control**
   - Acting without thinking or considering the consequences
   - Difficulty resisting temptations or urges
   - Making impulsive decisions that later lead to regret
4. **Emotional dysregulation**
   - Mood swings or emotional outbursts that seem disproportionate to the situation
   - Difficulty managing intense emotions such as anger, frustration, or sadness
   - Feeling easily overwhelmed or overstimulated by sensory input
5. **Trouble with attention and focus**
   - Difficulty sustaining attention on tasks or activities, especially those that are not inherently stimulating or interesting
   - Frequently becoming distracted or sidetracked by external stimuli or internal thoughts
   - Struggling to follow through on instructions or complete tasks due to difficulty maintaining focus
6. **Hyperactivity or restlessness**
   - Feeling restless or unable to sit still for extended periods of time
   - Frequently fidgeting or tapping hands or feet
   - Difficulty relaxing or winding down, even when tired
7. **Other symptoms (please specify):** _____
   - _____
   - _____
   - _____

Additional Reflection: Take a moment to reflect on any insights or observations that arose for you while completing this checklist. Consider how these symptoms impact your daily life and well-being, and any strategies you currently use to manage them.

Embracing the Mind-Body Connection: ADHD in Females Workshop

WEEK TWO: EXPLORING THE MIND-BODY CONNECTION

Today's Topic: In today's session, we focus on the science behind the mind-body connection and its relevance to ADHD.

The Mind-Body Connection:

- The mind-body connection refers to the intricate relationship between our thoughts, emotions, and physical well-being.
- Understanding this connection is crucial for managing emotions and enhancing overall health, particularly for individuals with ADHD.

Neuroscience and Polyvagal Theory:

- We explored the neuroscience behind the mind-body connection, including concepts such as polyvagal theory.
- These theories help us understand how our nervous system responds to stress and influences our emotional and physical states.

Bidirectional Relationship:

- Mental and physical health are deeply interconnected, with each influencing the other in a continuous feedback loop.
- By nurturing both our mental and physical well-being, we can better manage ADHD symptoms and improve overall quality of life.

Mindfulness Practices:

- Mindfulness practices, such as meditation and deep breathing exercises, can positively impact ADHD symptoms.
- These practices promote present-moment awareness, emotional regulation, and stress reduction.

Interactive Activity: Guided Mindfulness Meditation:

- During the session, we engaged in a guided mindfulness meditation focused on cultivating awareness of breath and bodily sensations.
- Mindfulness meditation is a powerful tool for developing present-moment awareness and enhancing emotional regulation.

Mindful Teeth Brushing Activity:

As homework, we invite you to incorporate mindfulness into your daily routine by practicing mindful teeth brushing.
Pay attention to the sensations, tastes, and rhythms involved in brushing your teeth, bringing your focus fully to the present moment.

Embracing the Mind-Body Connection: ADHD in Females Workshop

WEEK THREE: MANAGING INTERNALIZED SYMPTOMS

Today's Topic:
In this session, we explore the internalized symptoms often associated with ADHD and strategies for managing them effectively.

Key Objectives:

1. **Identifying Internalized Symptoms:**
   - Understand common internalized symptoms of ADHD, such as low self-esteem, perfectionism, self-doubt, anger, lack of emotional control, and imposter syndrome.
2. **Understanding the Impact:**
   - Recognize how these internalized symptoms can affect overall well-being and daily functioning.
3. **Developing Coping Strategies:**
   - Learn practical coping strategies to manage internalized symptoms and promote resilience.

Discussion Highlights:

- Identifying Symptoms: Participants shared their experiences with internalized symptoms, fostering understanding and empathy within the group.
- Group Brainstorming: We collectively brainstormed strategies for managing internalized symptoms, emphasizing self-compassion, realistic goal-setting, seeking support, and challenging negative self-talk.
- Homework Assignment: Participants were encouraged to choose one or two coping strategies to implement in their daily lives and journal about their experiences.

Your Next Steps:

1. Self-Reflection: Take time to reflect on the internalized symptoms discussed during the session and how they may resonate with your own experiences.
2. Choose Your Strategies: Select one or two coping strategies that you feel will be most beneficial for managing your internalized symptoms.
3. Implement and Journal: Incorporate these strategies into your daily routine and journal about your experiences. Note any insights, challenges, or improvements you observe.

Gratitude Reminder Activity:
To cultivate a mindset of gratitude and shift focus away from internalized symptoms by acknowledging and appreciating the positive aspects of life.

Start with setting aside time each day (morning work great for supporting a positive day) to come up with 1 (or more) things you are grateful for. Super suggestion: set a reminder in your phone or place a phsyical reminder on your bathroom mirror!

Embracing the Mind-Body Connection: ADHD in Females Workshop

WEEK FOUR: CREATING AN INTERNAL CONNECTION FOR EFFECTIVE SELF-CARE

Today's Topic:
In this session, we will explore the concept of creating an internal connection for effective self-care.

Key Objectives:

Understanding Internal Connection:
- Learn to tune into your thoughts, feelings, and bodily sensations to identify and respond to personal needs effectively.

Challenging Self-Care Myths:
- Recognize and challenge common misconceptions about self-care, emphasizing the importance of authentic self-care practices.

Identifying Personal Self-Care Practices:
- Discover self-care practices that resonate with you holistically, nourishing your mind, body, and spirit.

Journaling Exercise:
- Reflect on your personal self-care needs and preferences, considering how to incorporate them into your daily life.

Action Planning:
- Create a personalized self-care action plan based on your reflections, setting realistic goals and commitments to prioritize self-care.

Your Next Steps:
1. Self-Reflection: Take time to reflect on the internalized symptoms discussed during the session and how they may resonate with your own experiences.
2. Choose Your Strategies: Select one or two coping strategies that you feel will be most beneficial for managing your internalized symptoms.
3. Implement and Journal: Incorporate these strategies into your daily routine and journal about your experiences. Note any insights, challenges, or improvements you observe.

Take-Home Activity: The "Cup of Self" Exercise:

Set aside quiet time: Find a quiet and comfortable space where you can reflect without interruptions. Visualize your Cup of Self: Close your eyes and visualize a cup in front of you. This cup represents your "Cup of Self."

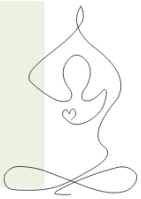
Assess your current state: Imagine your cup filled with water, where the water level represents your current state of well-being and energy. Reflect on how full or empty your cup feels right now.

Practice self-compassion: Take a moment to offer yourself words of kindness and understanding, regardless of how full or empty your cup feels. Remind yourself that it's okay to prioritize your own needs and well-being.

Identify your boundaries: Think about situations or commitments that may drain your energy or fill your cup. Consider whether saying yes to these things aligns with your values and priorities.

Practice saying no: Identify one thing that you've been considering saying no to but have hesitated. It could be a social invitation, a work task, or any other commitment that doesn't serve your well-being. Practice saying no to this thing, either mentally or out loud.

Notice your feelings: Pay attention to how you feel after practicing saying no. Notice any feelings of relief, empowerment, or discomfort that arise. Remember that prioritizing your own needs is an act of self-care and self-compassion.



Embracing the Mind-Body Connection: ADHD in Females Workshop

WEEK FIVE: CULTIVATING SELF-REGULATION THROUGH YOGA

Today's Topic:
In this session, we will explore how yoga techniques can enhance emotional regulation and relaxation.

Key Information Discussed:

- Yoga Techniques for Emotional Regulation: Participants learned and practiced gentle yoga poses and breathing exercises aimed at promoting relaxation and emotional balance.
- Importance of Self-Awareness and Self-Regulation: We reinforced the significance of being aware of our emotions and regulating them effectively for overall well-being.

Take-Home Info:

- Incorporating Yoga Into Daily Routine: Encourage participants to incorporate simple yoga practices into their daily routine to continue benefiting from its effects on emotional regulation and relaxation.
- Journaling About Yoga Experience: Prompt participants to journal about their experiences with yoga, noting any changes in mood, stress levels, or overall well-being that they observe.

At-Home Activity:

- **Daily Yoga Practice:** Set aside a few minutes each day to practice yoga at home. Focus on gentle poses and breathing exercises that promote relaxation and emotional balance.
- **Journaling:** After each yoga session, take a few moments to journal about your experience. Reflect on how the practice made you feel and any changes you noticed in your mood or stress levels.

Optional Yoga and Loving-Kindness Meditation Activity:

Begin with gentle yoga: Start by practicing a few gentle yoga poses to relax your body and calm your mind. Focus on poses that promote openness and ease, such as Child's Pose, Cat-Cow Stretch, and Gentle Seated Twists.
Settle into a comfortable position: After your yoga practice, find a comfortable seated position for meditation. Sit with your back straight and your hands resting gently on your lap.
Take a few deep breaths: Close your eyes and take a few deep breaths to center yourself and bring your awareness to the present moment.
Focus on yourself: Visualize yourself sitting in front of you. Repeat the following phrases silently or out loud, directing them towards yourself:

- May I be happy.
- May I be healthy.
- May I be safe.
- May I live with ease.

Expand to others: After a few minutes, expand your focus to include loved ones, friends, acquaintances, and eventually all beings. Repeat the same phrases, substituting "I" with "you" or "they":

- May you be happy.
- May you be healthy.
- May you be safe.
- May you live with ease.

End with gratitude: Take a few moments to express gratitude for yourself, your practice, and the opportunity to cultivate compassion and kindness.

Embracing the Mind-Body Connection: ADHD in Females Workshop

WEEK SIX: CREATIVE EXPRESSION AND CLOSING REFLECTION

Today's Topic:
In this session, we will provide you with a creative outlet for self-expression and reflection on your ADHD journey.

Key Information Discussed:

- **Creative Expression:** Participants engaged in a guided art therapy activity to express emotions and thoughts related to ADHD through creative means.
- **Group Sharing and Reflection:** A sharing circle allowed participants to discuss their artwork and insights gained from the creative process.
- **Gratitude Exercise:** The session concluded with a gratitude exercise, expressing appreciation for oneself and others.

Take-Home Info:

- Utilize Creative Outlets: Encourage participants to explore creative outlets at home as a means of self-expression and reflection.
- Practice Gratitude: Incorporate gratitude exercises into daily routines to foster a positive mindset and appreciation for oneself and others.

At-Home Activity:

- Creative Expression: Set aside time at home to engage in creative activities such as painting, drawing, or writing. Use these outlets to explore and express emotions related to ADHD.
- Gratitude Practice: Start a gratitude journal where you write down three things you're grateful for each day. Reflect on these moments of appreciation to cultivate a positive outlook.

Optional At-Home Activity: Mindful Coloring:

Choose a Coloring Page: Select a coloring page that resonates with you. You can find free printable coloring pages online or use a coloring book you already have at home.
Create a Relaxing Environment: Find a quiet and comfortable space where you can focus on coloring without distractions. Consider playing calming music or lighting a candle to enhance the ambiance.
Focus on the Present Moment: As you color, focus your attention on the sensations of coloring—the movement of your hand, the texture of the paper, and the colors you're using. Allow yourself to fully immerse in the present moment.
Notice Your Thoughts: If your mind starts to wander, gently bring your focus back to the coloring page. Notice any thoughts or emotions that arise without judgment, and then return your attention to the coloring.
Express Yourself: Use the colors and patterns to express your emotions and creativity. There are no rules or expectations—simply let your intuition guide you as you color.
Reflect: After you finish coloring, take a few moments to reflect on your experience. Notice how you feel physically, mentally, and emotionally. Acknowledge any sense of relaxation or calm that you may have cultivated.
Integrate Mindful Moments: Consider incorporating mindful coloring into your daily routine as a way to unwind and de-stress. Set aside a few minutes each day to engage in this simple yet effective practice.