MIND PAD

NOTES D'IDÉES

CANADA'S STUDENT PSYCHOLOGY PUBLICATION
PUBLICATION CANADIENNE SUR LA PSYCHOLOGIE ÉTUDIANTE

Mind Pad has two mandated goals:

1. It aims to provide a professional newsletter that is writtenand reviewed by students of psychology who are affiliates of the Canadian Psychological Association. The content of the newsletter should be of interest to all who are practicing and studying psychology, but the primary audience of the newsletter is students of psychology.

2. It aims to offer studying psychology researchers and writers an opportunity to experience a formal submission process, including submission, review, and resubmission from the points of view of both submitter and reviewer/editor.

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1. Fournir un bulletin professionnel rédigé et évalué par les étudiants en psychologie qui sont membres affiliés de la Société canadienne de psychologie. Le contenu devrait être d'intérêt à tous les praticiens et étudiants en psychologie, mais les étudiants en psychologie sont les lecteurs cibles.

2. Fournir aux étudiants en psychologie l'opportunité de connaitre le processus formel de soumission y compris la soumission, la révision, et la resoumission du point de vue d'auteur et d'évaluateur/rédacteur.

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Neurobiological and Neuropsychological Changes in the Developmental Trajectory of Autism Spectrum Disorder

Isabella J. Sewell / BSc, University of Waterloo

Abstract

Autism spectrum disorder (ASD) presents itself differently, both across individuals and across the developmental timeline. Previous reviews highlight the heterogeneity of the neurobiology and symptomatology of ASD, but few reviews explore these areas from a developmental neuropsychology perspective. This review explores the neurobiology of ASD across development and how it may facilitate the onset of clinical and cognitive symptoms. Findings show that ASD is associated with abnormal neurodevelopment and reduced interhemispheric connectivity. Clinical and cognitive symptoms of ASD are most prominent in childhood and persist into adulthood. Structural disparities and impaired functional connectivity in specific brain regions may contribute to deficits in social cognition, executive functioning, and central coherence in ASD. These neurobiological and neuropsychological disparities across the developmental timeline have important implications in the treatment of ASD. Future research should develop interventions that target not only the symptoms of ASD, but also the underlying neurobiology.

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and interaction, as well as restrictive and repetitive behaviours (American Psychiatric Association, 2013). The pathophysiology of ASD is complex, involving abnormalities in both functional connectivity and neuroanatomy (Penn, 2006; Velikonja et al., 2019). ASD symptomology is widely heterogeneous and its underlying neurobiology and neuropsychology both change across the developmental timeline (Seltzer et al., 2004).

Current behavioural and pharmacological treatment options for ASD target symptoms such as stereotypic behaviours, communication skills, and hyperactivity (Masi et al., 2017). These interventions are more established in children than adults (Murphy et al., 2016). This review aims to encourage the development of interventions that target the underlying neurobiology of ASD while also considering how ASD manifests differently across the lifespan. This paper will explore the neurobiological and neuropsychological changes in the developmental trajectory of ASD. Specifically, the paper will highlight the most relevant changes in the functional connectivity, neuroanatomy, and neuropsychology of individuals with ASD as they progress through childhood, adolescence, and adulthood.

Functional Connectivity

Due to the heterogeneous manifestation of symptoms in ASD, deficits likely arise due to impairments in functional connectivity within the white matter structures of the brain (Anderson et al., 2011). That is, rather than a single brain region being responsible for ASD symptomatology, its symptoms likely arise due to the integration of abnormalities across various brain regions. This section will address interhemispheric functional connectivity across the corpus callosum. Later sections will discuss the neural activity of specific brain regions as it pertains to cognition and behavioural symptoms of ASD.

Corpus Callosum

The corpus callosum is the largest white matter structure in the brain and has an important role in the communication between cerebral hemispheres (Frazier & Hardan, 2009). Reduced volume and atypical white matter morphology of the corpus callosum are key features of ASD (Valenti et al., 2019). Early atypical development of the corpus callosum microstructure in children with ASD leads to persistent differences across the lifespan (Travers et al., 2015).

There is converging evidence in the literature highlighting reduced interhemispheric resting state functional connectivity in ASD (Yao et al., 2021). Anderson and colleagues (2011) also detected reduced interhemispheric functional connectivity in specific brain regions among both children and adults with ASD. In fact, the brain regions that were most impacted were functionally relevant to social processing, which is commonly impaired in ASD, including the anterior insula and the superior temporal gyrus (Anderson et al., 2011). Interhemispheric functional connectivity between homologous brain regions in the two hemispheres has been associated with social impairments in ASD (Li et al.,

2019). Therefore, ASD symptomatology may arise in part due to impairments in integrating information between cerebral hemispheres and across various brain regions.

Neuroanatomy

ASD has been linked to abnormal patterns of neurodevelopment (Osipowicz et al., 2015). Neuroanatomical abnormalities are most common in childhood and become less apparent with age

(Ecker, 2017). Specific regional neuroanatomical abnormalities will be discussed later in the paper in the context of their role in ASD symptomatology. This section will describe two periods of atypical neurodevelopment, common among individuals with ASD: early brain overgrowth and cortical thinning (Wallace et al., 2010).

Early Brain Overgrowth

Between the ages of 1 and 4, children with ASD experience abnormal rates of brain development, known as early brain overgrowth (Courchesne et al., 2001; Hazlett et al., 2005; Schumann et al., 2010). A longitudinal study that utilized magnetic resonance imaging (MRI) among toddlers with and without ASD showed that between the ages of 1.5 and 5 years, children with ASD had overgrowth in grey and white matters (Schumann et al., 2010). This resulted in nearly all brain regions developing at abnormal rates (Schumann et al., 2010). Although there are robust findings for larger brain volumes among younger children with ASD, this group difference is not apparent in children older than 5 years (Courchesne et al., 2001; Hardan et al., 2009; Murphy et al., 2012). Therefore, since early brain overgrowth occurs between 2 to 4 years of age when ASD is typically diagnosed, this abnormal neurodevelopment may facilitate the onset of early symptoms of ASD (Courchesne et al., 2007; Zwaigenbaum et al., 2013).

Cortical Thinning

Abnormally slowed growth follows early brain overgrowth in ASD (Courchesne et al., 2011). In normal development, cortical thickness (a measure of grey matter) increases in early childhood and decreases in adolescence, a period known as cortical thinning (Shaw et al., 2008). Cortical thinning is elevated in ASD, where increases in cortical thinning are related to a proportionate increase in symptom severity (Hardan et al., 2009). Furthermore, a large cross-sectional analysis among individuals with ASD (ages 7 to 64) showed that increasing age was associated with greater decreases in grey matter volume (Osipowicz et al., 2015). Cortical thinning in regions of the frontal, temporal, and parietal lobes has been linked to ASD symptomatology such as deficits in social cognition and recognizing facial expressions (Hadjikhani et al., 2006; Wallace et al., 2010). Therefore, cortical thinning is an important consideration in the neurodevelopmental trajectory of ASD.

Neuropsychology of ASD Symptomatology

It has been well-documented that ASD symptomatology changes over time and that the symptoms manifest differently across the lifespan (Pellicano, 2012a). Even though ASD is considered a chronic disorder, some symptoms and neuropsychological deficits diminish with age (Seltzer et al., 2004). This section will discuss the developmental trajectory of social-cognitive and frontal-lobe deficits typical among individuals with ASD. Functional connectivity and neuroanatomical abnormalities as they pertain to neuropsychological deficits will also be highlighted in this section.

Social-Cognitive Deficits

Accompanying features of ASD include deficits in social cognition, such as theory of mind, joint attention, face

perception, and empathy (Penn, 2006; Velikonja et al., 2019).

Theory of Mind

Theory of mind is the ability to attribute mental states (e.g., beliefs and emotions) to others and use this to predict their behaviour (Penn, 2006). Children with ASD show deficits in theory of mind, which likely contributes to the core deficits in social communication in ASD (Pellicano, 2010). Following similar patterns of normal development, theory of mind seems to improve over the ASD lifespan (Lever & Geurts, 2016). A longitudinal study among children with ASD demonstrated that improvements in theory of mind can be apparent in a period as short as 3 years (Pellicano, 2010). Improvements continue throughout adulthood and deficits are not typically apparent in adults over 50 (Lever & Geurts 2016). These improvements may contribute to social communication and interaction skills that ameliorate across the ASD developmental timeline (Pellicano, 2012a).

The superior temporal sulcus (STS) has an important role in social-cognitive processes, such as theory of mind (Boddaert et al., 2004). Neuroanatomical abnormalities in the STS, such as reduced grey matter volume, have been detected among older children and adults with ASD (Boddaert et al., 2004; Hyde et al. 2010; McAlonan et al. 2005). Structural abnormalities in the right posterior STS in adults with ASD were associated with poorer eye fixation time in a task by Hotier et al. (2017) that required

participants to infer the mental state from the eyes of faces. Performance on this task was meant to reflect theory of mind abilities and facial emotion perception. Therefore, structural disparities of the STS across the ASD lifespan may also contribute to social deficits in ASD (Hotier et al., 2017).

Functional connectivity abnormalities could also explain social-cognitive deficits among children and adults with ASD. Along with its characteristic role in sensorimotor functions and balance, the cerebellum is also partially involved in social cognition (Hodge et al., 2010). Abnormalities within the functional circuitry connecting the cerebellum to regions of the cerebral cortex are present among children, adolescents, and young adults with ASD (Van Overwalle et al., 2014; Van Overwalle et al., 2015). Atypical patterns of connectivity among children and adults with ASD are also present in the default mode network, a network of regions involved in higher-order social-cognitive processes, including theory of mind (von dem Hagen et al., 2013; Wiggins et al., 2011).

Therefore, theory of mind deficits among individuals with ASD could be caused by neuroanatomical and functional connectivity abnormalities in brain regions, such as the STS, the cerebellum, or the default mode network.

The Role of the Amygdala

Both structural and functional abnormalities of the amygdala are associated with symptoms of ASD, such as emotional face processing and joint attention (Greimel et al., 2013; Monk, 2008). Among preschool-aged children, Shen and colleagues (2016) found that children with ASD showed weaker resting-state functional connectivity between the amygdala and brain regions associated with social-cognitive processes. Functional connectivity abnormalities in the amygdala have also been shown to persist into adulthood (Gibbard et al., 2018). Along with disparities in functional connectivity, the amygdala is also typically enlarged among young children with ASD (Monk et al., 2008; Mosconi et al., 2009; Schumann et al., 2009). Amygdala size among young children with ASD is significantly cor-

related with the severity of social and communication deficits (Mosconi et al., 2009; Schumann et al., 2009).

Taken together, it is likely that both structural and functional abnormalities of the amygdala could explain impairments in emotional perception and joint attention apparent among individuals with ASD.

Frontal Lobe Deficits

Executive Functions

Executive functions are higher-order cognitive processes that take place in the frontal lobe (O'Hearn et al., 2008). Although executive functions are not globally impaired in ASD, younger children may show deficits in planning, set shifting, inhibition, or cognitive flexibility (Pellicano, 2010; Pellicano, 2012b). By using a measure of executive functioning in everyday life, van den Bergh and colleagues (2014) found that among children with ASD, problems with inhibition were most common among the youngest group (6 to 8-year-olds) and problems with cognitive flexibility were the least common in the oldest group (15 to 18-year-olds). Deficits in executive functions in ASD may arise due to abnormalities in the frontal lobe or cerebellar circuitry (Just et al., 2007; Van Overwalle et al., 2014). Although executive functions improve with age, deficits still exist among adolescents and adults with ASD (Brady et al., 2017).

Central Coherence

Central coherence is the tendency for individuals following normal development to favour processing the bigger picture (i.e., global properties) (Lee et al., 2007). Individuals with ASD demonstrate weak central coherence as they tend to focus on smaller details (i.e., local properties) (Lee et al., 2007). This was demonstrated in a functional MRI (fMRI) study where during a task

of central coherence, children with ASD had reduced activation of brain regions involved in global processing (Lee et al., 2007). Findings of weak central coherence may explain some social deficits since communication involves interpreting the global context (Nuske & Bavin, 2011).

A longitudinal study by Pellicano (2010) assessed changes in theory of mind, executive functions, and central coherence in young children with ASD over a 3-year period. At the 3-year follow-up, children with ASD demonstrated significant changes in theory of mind and executive functions, but not central coherence (Pellicano, 2010). Therefore, weak central coherence has been found to persist throughout the ASD lifespan (Pellicano, 2010; Jolliffe et al., 2001; Manjaly et al., 2007).

Conclusion

This review provides evidence that abnormalities in functional connectivity, neuroanatomy, and neuropsychology exist among individuals with ASD, and that these abnormalities show significant changes across the lifespan. Neurobiological findings suggest that ASD symptomatology may be a function of reduced interhemispheric functional connectivity across the corpus callosum, as well as abnormal neurodevelopment. Neuropsychological findings suggest that structural disparities and impaired functional connectivity of the amygdala, superior temporal sulcus, cerebellum, and default mode network may contribute to the social-cognitive deficits of ASD, while abnormalities in the frontal lobe may lead to weak central coherence and deficits in executive functions, including inhibition and cognitive flexibility.

These findings have important clinical implications in the treatment of ASD across the developmental timeline. Understanding how neurobiological and neuropsychological abnormalities change across the lifespan is important in the development of more tailored treatments for ASD. The current interventions for ASD target the behavioural and clinical symptoms, rather than the underlying neurobiology. With the increased interest in neuromodulation treatments for ASD (Khaleghi et al., 2020), this review should inspire future work to explore how to better target the neurobiological abnormalities of ASD at different developmental stages.
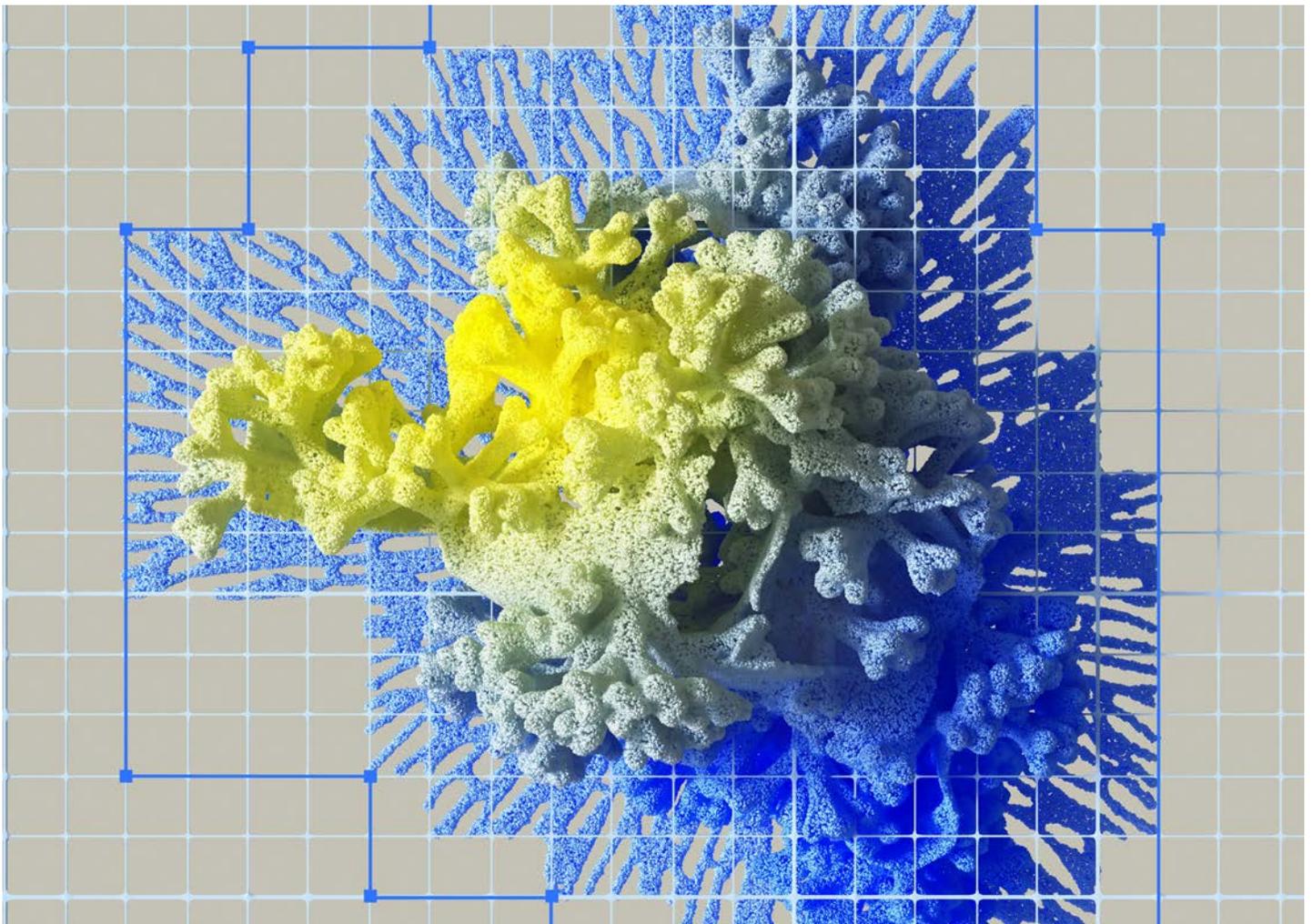
Canada's Forgotten Youth: A brief overview of on–reserve Indigenous youth mental health factors

Malcolm C. Disbrowe / BA., University of Manitoba

Abstract

Exploring the experiences of Indigenous Canadian youth on reserves involves understanding poverty, unemployment, inadequate housing, social programming deficits, and educational disparities. These factors draw attention to the impact of inequity on the mental health of Indigenous youth, as illustrated by exposure to toxic stress, changes in brain development, and elevated mental distress. Furthermore, the adverse effects of unemployment on Indigenous youth's life satisfaction are essential in understanding existing inequities related to mental health. Inadequate housing is also a significant challenge for Indigenous youth, with many living in overcrowded and unfit homes, which can significantly impact their mental health. The impact of social programming deficits and educational disparities on Indigenous youth's well-being is ongoing. Addressing the disparities faced by Indigenous youth and incorporating Indigenous perspectives in creating solutions involves collaboration with Indigenous communities. Outlining factors contributing to mental health disparities in this population will help formulate solutions to complex and interrelated issues, thus working towards a sustainable and holistic approach to improving on-reserve youth mental health.

This overview of mental health factors will elucidate how Indigenous youth on reserves are disadvantaged, and experience decreased mental health: poverty, (un)employment, inadequate housing, social programming deficits, and educational disparities are only a few of the many inequities examined herein.

A Brief Overview

Poverty results in poorer mental health outcomes. This deprivation plagues Indigenous youth as mental health services tend to be less accessible to this population. This barrier to mental health continues to be exacerbated by the long-lasting impacts of forced assimilation programs that were historically mandated by the Canadian government. Assimilation involved cultural upheaval and gross mistreatment (Kim, 2019; Walls & Whitbeck, 2012). Furthermore, mental health issues in childhood become more apparent in development (Knifton & Inglis, 2020). Moreover, unemployment also negatively impacts youth mental health outcomes. In a 2012 study, researchers found that unemployment had an independent effect on mental distress (Backhans & Hemmingsson, 2012). When considering Indigenous youths' emotions, unemployment is a factor in understanding mental health in Indigenous youth. Housing shortages also affect mental health as "First Nations on reserve are more likely to live in crowded housing" and "just over half of Inuit Nunangat-Nunavut specifically- live in crowded housing" (Melvin, 2022, pp. 3-8). This is highly problematic given that home should be a place where people are able to relax rather than be stressed. Social support is also an important factor contributing to the mental health of Indigenous

youth because adequate social support decreases mental health stressors through companionship and assistance (Lakey & Cohen, 2000). Indigenous youth often cannot get this support due to location, time, or financial burden (Nguyen, 2020; Kim, 2019). The following sections delve deeper into the aforementioned factors to offer a better understanding of the problematic disparities in mental health outcomes for Indigenous youth.

Poverty

The 2016 census found that the on-reserve child poverty rate is nearly three times the national rate (17.6%) (Canadian Press, 2019). Mental health issues have economic implications contributing to adverse mental health outcomes in Indigenous youth. Moreover, poverty elevates mental health disparities with inadequate resources to address them (Kim, 2019; Lund et al., 2011). Poverty results in exposure to chronic forms of toxic stress that follow those living in an unhealthy environment. These living environments are associated with adverse changes in brain development that form a vicious cycle: toxic stress can compromise areas of the brain important in emotional regulation, resulting in decreased mental health and well-being (Francis et al., 2018).

Well-being is essential to the human experience, and youth are especially susceptible to making unsafe choices. In conjunction, geographical distance from trained professionals and facilities intertwines with mental health outcomes because it accelerates poverty-associated behaviours, like substance use (Nguyen et al., 2020). The stigmatizing nature of poverty is associated with individuals having a lower sense of self-efficacy (Corrigan & Rao, 2012). Research indicates that higher self-efficacy and self-esteem are positively correlated, and having self-esteem is essential as it fosters healthy coping practices and serves

as a protective factor against mental health problems. Developing a solid self-belief and positive self-worth can lead to better psychological well-being and resilience when facing life's challenges (Henriksen et al., 2017; Hajloo, 2014).

Nevertheless, substance use occurs in Indigenous communities where colonialist ideas, like capitalism, circulate and impose unfamiliar ideologies that impose poverty. Capitalism and poverty are associated with substance use amongst Indigenous youth on reserves. Despite government efforts to address substance use, reservation poverty accelerates it, making strategies ineffective (Wendt et al., 2019). The government's creation,

the residential school system, and the current reserve system reduce the opportunities for youth to leave home, leading to suicide rates that nearly doubled among Indigenous people (McQuaid et al., 2017). Statistics Canada found that in a cohort from 2011 to 2016, First Nation males aged 15 to 24 were nearly 600% to 900% (95% confidence interval) more likely to complete suicide than First Nation males not on reserve. Females on a reserve of the same age were also among the highest in Canada (Kumar & Tjepkema, 2019). The residential school system causes intergenerational effects like poverty and can lead to suicide. Poverty is one of many factors that Indigenous youth on reserve overcome through resilience.

(Un)employment

Employment and job satisfaction are associated with life satisfaction (Unanue, 2017). However, Indigenous youth on reserves have limited opportunities to find meaningful work because of isolation. A study collecting data from 2007 and 2019 found that Indigenous peoples have higher unemployment rates and lower wages (Durand-Moreau et al., 2022). Indigenous

youth on reserves are susceptible to decreases in mental health because of higher unemployment rates. There are many reasons for this; one is unpaid labour (e.g., homemaking, babysitting, and caring for an elderly family member). Unpaid labour often impedes job attainment and causes stress responses (Lundberg, 1996). Another reason is that Indigenous youth on reserves have lower educational attainment and socioeconomic status, both associated with unemployment (Kim, 2019). These stress responses are common even when people are present in their own homes.

Low-income work reduces life satisfaction (Mani et al., 2013). Historically, Indigenous peoples have been excluded from education, leading to a reliance on social assistance, which diminishes self-sufficiency (Cronin, 2020). Colonialism and the resulting reserve system have prevented Indigenous youth from accessing meaningful job opportunities because of social and health inequities due to modern and systemic racism (Richmond & Cook, 2016). As a result, Indigenous peoples face significant challenges because of forced displacement and the Canadian government's former aim to eliminate Indigenous culture (Boska et al., 2015). Federal policies push Indigenous peoples outside traditional territories to make use of the land, causing displacement (Walls & Whitbeck, 2012). In Alberta, researchers found that Indigenous peoples have lower employment rates (Kolahdooz et al., 2015). Addressing unemployment requires recognizing disparities and incorporating Indigenous perspectives to create meaningful work relevant to indigenous communities' goals and strategies.

Housing/Home Ownership

Housing is crucial for an individual's well-being and links to positive mental health outcomes because the home provides protective functions (Rolfe et al., 2020). There are social, psychological, and cultural factors in home ownership because a home offers control, autonomy, and socialization sites, all of which provide a social identity and status (Rolfe et al., 2020). All the stated factors help reduce anxiety. Additionally, mental health factors and their severity can affect other life factors like control and autonomy, which youth may experience before adulthood as it is a part of functioning independently. However, as it will be discussed, not having a home and control or autonomy diminishes mental health outcomes greatly. Being unhoused plays a significant role in the elevated suicide rates of Indigenous people. A study with 330 unhoused people found that childhood or adult homelessness lasting longer than six months is associated with suicidal ideation (Eynan et al., 2002). Lived experiences with being unhoused offer insights into how housing can provide protective functions against mental health challenges.

Homeowners in overcrowded and lower-quality homes that require significant repairs and have more people living in them may lose the protective function of a home. In contrast, homeowners with proportionate and quality homes do not experience this because chronic stressors, including physical hazards, are absent (Hernández, 2014). The government's interventions and systemic inequality factors affect housing on reserves because reserves are in isolated areas. However, healthy relationships with family and connectedness are associated with fewer negative mental health symptoms (Alegría et al., 2018).

Social Programming & Accessibility

Indigenous youth on reserves continue to face issues of inaccessibility to social programming (Nguyen et al., 2020). One of these barriers is language; many Indigenous peoples only speak their native language, which makes it difficult for providers to render services if they do not also have Indigenous language translators. Furthermore, although there have been slight improvements, one cannot conclude that physical accessibility is no longer an issue. Physical distance affects Indigenous peoples' mental health because it is a barrier to accessing healthcare and mental health services. Many Indigenous communities are in isolated areas with no access to hospitals, mental healthcare, or emergency services (Nguyen et al., 2020). Moreover, Indigenous youth and parents lack support in accessing social programming on reserve because of physical-social environments and knowledge, making knowledge a barrier to accessibility due to a lack of trained service providers in community-specific care.

Ethical care and accessibility to social programs are imperative (Nguyen et al., 2020). Indigenous peoples, in general, face unique barriers to accessing mental health support (Goetz et al., 2022). These barriers include factors formerly mentioned, such as unemployment, which causes financial strain, and access to programs that are further out of reach, perpetuating harmful cycles (Goetz et al., 2022; Nguyen et al., 2020). Along with mistrust in government, some Indigenous peoples may mistrust mental health providers due to histories of trauma. Indigenous youth have been at the brunt of historical traumas (e.g., the residential school system). There is ongoing trauma with the child welfare system, and many Indigenous youth in Canada have noted that the child welfare system is assimilationist and perpetuates violence in their communities (Navia et al., 2018).

Education

Attaining higher education can help develop effective coping mechanisms. However, a study of historical data suggests that demanding adolescents to remain in academia may deteriorate their mental health (Avendano et al., 2017). For example, Wexler (2011) found that physical barriers, systematic racism, and settler colonialist visions obstruct Indigenous youths' educational opportunities. Another study found that Indigenous youth seek to reconnect with their traditional cultures (Liebenberg et al., 2019). Therefore, there is a need to include Indigenous and relational understandings of mental health and Indigenous knowledge to address mental health and other educational outcomes (Boivin et al., 2023). Including Indigenous knowledge-informed perspectives on mental health can effectively reinvigorate Indigenous youth to partake in education in an environment heavily influenced by colonial values.

Moreover, social isolation deteriorates mental health (Lakey & Cohen, 2000). There have been improvements, but there are still challenges in Indigenizing education, which involves creating spaces for and with Indigenous students. Creating Indigenous-friendly spaces would help elevate Indigenous education rates to match their non-Indigenous counterparts (Pidgeon, 2016). This finding is essential for Indigenous psychology scholars. It has far-reaching implications for all social sciences because it introduces perspectives psychological science has ignored due to racism and colonialism. New knowledge with Indigenous perspectives allow for new ideas and solutions to develop that can generate new and previously overlooked theories or research methodologies. Historic tokenization in education and checklists undermine Indigenous

education (Pidgeon, 2016); education is multifaceted with many factors, and emphasizing Indigenous perspectives may be the solution.

Moving Forward

Understanding the complex physical, socioeconomic, and governmental factors contributing to decreased mental health in Indigenous youth living on reserves is crucial because it aids in developing interventions that support communities and improve mental health outcomes in youth (Kim, 2019). Further, exposing large-scale movements in scholarship that increase the visibility of Indigenous youth would foster awareness and cultivate

interventions that support Indigenous sovereignty while supporting the mental health needs of youth living on reserves.

In a 2021 study, researchers found, "To date, there are no reviews that analyze the engagement of Indigenous young people in the development and evaluation of digital mental health interventions" (Povey et al., 2021, p. 2), illustrating how Indigenous youth are rarely included in discussions when developing mental health interventions for Indigenous youth. Training Indigenous professionals who have lived on reserves can support the dissemination of knowledge and ongoing strategies that aid youth with relevant experience and formal training. Social programming, including access to housing, mental health services, and employment, would be more successful if trained professionals evaluated and implemented these programs through a decolonized lens (Browne et al., 2016). Funding from governmental entities can optimize support programs that educate at-risk youth, provide counselling services, and prevent youth suicide (Bean & Baber, 2011). More research and outreach are imperative for researchers and practitioners to find specific solutions that work with and on reserves.

Conclusion

The Canadian government has neglected to address these issues that continually harm Indigenous youth and have exacerbated mental health disparities in Indigenous communities. Poverty, employment, housing, social support, and education are indicators contributing to mental health outcomes. Experiencing systematic racism and social stigma is associated with reduced life satisfaction and poor health, creating barriers to addressing ongoing harm. Provincial and federal governments must implement mental health policies prioritizing mental health initiatives for Indigenous youth and training for mental health professionals working with Indigenous communities. Government policymakers should work with Indigenous communities to enhance existing programs/policies and establish new ones to support on-reserve youth, as there are still significant disparities on Indigenous reserves.

Highlighting the Need for Improved Suicide Training in Psychology Programs

Deanna Walker

Abstract

Patient suicide is a prevalent concern for mental health service providers, so much so that it has been deemed an "occupational hazard" for the psychology profession. Psychology trainees experience greater negative effects when encountering suicidal patients compared to more experienced clinicians; however, despite the impact of suicide on both established psychologists and students-in-training, training in suicide assessment and prevention continues to be limited in the context of psychology training programs. The current paper highlights the implications of limited suicide training for clinicians, and expands upon key competencies required for more thorough integration into psychology training programs. The current discussion highlights the importance of enhancing early training in suicide assessment and intervention for vulnerable psychologists, and the impact for not only clinicians-in-training, but also for the safety of at-risk patients.

Globally, one person will die by suicide every 40 seconds, accounting for nearly 800,000 deaths by suicide annually (World Health Organization [WHO], 2014). In Canada, suicide is the second leading cause of death for people between the ages of 10 and 34 (Government of Canada, 2019). These rates are expected to be even higher due to the frequent underreporting of suicide as cause of death (often due to religious or social attitudes), and these rates will continue to rise in the next 15 years (Ritchie et al., 2015; WHO, 2014). Recent data suggest that the number of Canadians who have expressed suicidal thoughts and behaviours since the COVID-19 pandemic has more than doubled (Canadian Mental Health Association, 2020; Mental Health Commission of Canada, 2020). Given that 45% of those who completed suicide had met with mental health service providers in the month prior to their death (Isometsa et al., 1995; Luoma et al., 2002), providing care to high-risk patients is a critical practice for psychologists.

Given the prevalence of patient suicide within the mental health profession, many have described losing a patient to suicide as not an if, but a when (Chemtob et al., 1989; Kleepsies et al., 2011; Sandford et al., 2020). Nearly all clinicians (97%) report that patient suicide is their greatest fear (Pope & Tabachnick, 1993). Thus, it is critical for psychologists to develop competency in assessing suicidal patients. However, despite calls for improved training over decades (e.g., Rosenberg, 1999), competency in suicide assessment continues to be overlooked in the academic training setting (Schmitz et al., 2012). The current paper will briefly review the implications of continued

limited access to suicide training, and explore key competencies for consistent implementation within psychology training programs.

The Current Nature of Suicide Training in Psychology Programs

Incorporating formal suicide training into psychology training is fundamental (Mackelprang et al., 2014; Oquendo & Bernanke, 2017). However, a significant proportion of trainees describe their suicide education prior to graduating as insufficient (Feldman & Freedenthal, 2006; Gibbons et al., 2019; Melton & Coverdale, 2009). In fact, fewer than half of the pre-doctoral clinical settings provide formal training on suicide assessment in the practicum setting, with only 16% of students reporting having received suicide training, and only 20% reporting have received clinical supervision focused on suicide assessment (Dexter-Mazza & Freeman, 2003; Liebling-Boccio & Jennings, 2013; Mackelprang et al., 2014). When offered, training is typically limited to an average of three hours of "vague" lecture content (Melton & Coverdale, 2009; Ruth et al., 2012). Of even greater concern, a high percentage of trainees do not receive any suicide training in their clinical practicum settings prior to working with high-risk patients (Dexter-Mazza & Freeman, 2003). Thus, despite the prevalence of suicide, early clinicians receive limited training and are consequently ill-equipped to work with suicidal patients.

The Impact of Suicide on Psychology Trainees

Exposure to suicidal patients begins early for psychology graduate students. Almost all psychology trainees will treat at least one patient who expresses suicidal ideation and/or behaviours (Dexter-Mazza & Freeman, 2003). Similarly, 25% of trainees will encounter a patient who attempts suicide

during their clinical training (Chemtob et al., 1989; Foley & Kelly, 2007; Kleepsies et al., 1990, 1993).

Patient suicide has a significant impact on psychologists both personally and professionally. Trainees report more severe reactions to the loss of a patient compared to those whose careers are more advanced (Kleepsies et al., 1990, 1993; Ruskin et al., 2004). These reactions can include feelings of sadness, shock, and self-blame (Hendin et al., 2000; Lafeyette & Stern, 2004; Sandford et al., 2020; Trimble et al., 2000). Clinicians who have encountered patient suicide also report feeling overwhelmed with professional self-doubt and decreased perceived competency, increased hypervigilance to suicide-risk cues, increased anxiety and helplessness, and a profound sense of failure (Finlayson & Simmonds, 2016; Foley & Kelly, 2007; Foster & McAdams, 1999). In some cases, psychologists who encounter patient suicide may be at an increased risk of suicide themselves (Castelli Dransart et al., 2014; Kleepsies et al., 2011).

Improving Clinical Training in Suicide Assessment

It is critical that academic institutions incorporate more thorough suicide training to better prepare trainees. Integrative evidence-based workshops have demonstrated significant and positive effects on students' competency in case formulation and suicide assessment (Cramer et al., 2013; Fenwick et al., 2004; McNiel et al., 2008). This may include a structured model that incorporates evidence-based methods (e.g., role-playing, sample report documentation, group discussions, self-assessment, case studies, videotaped/live assessments with mock clients, regular feedback) (Cramer et al., 2013). To guide the improvement of training, several core competencies will provide the basis for the current discussion surrounding areas that should be consistently implemented across psychology training programs.

1) Developing Insight into Beliefs About Suicide

Prior to engaging with patients, trainees must spend time reflecting on their personal experiences, biases, and beliefs surrounding suicide (Cramer et al., 2013; Finlayson & Simmonds, 2016). Trainees should prepare a reflective self-assessment and acknowledge their personal beliefs and boundaries when discussing suicide (Rudd, 2006). This competency relates to the Canadian Code of Ethics for Psychologists (Canadian Psychological Association [CPA], 2017), whereby clinicians have a responsibility to "evaluate how their own experiences, attitudes, culture, beliefs, values, individual differences, specific training, external pressures, personal needs, and historical, economic, and political context might influence their activities and thinking" (III.9).

2) Developing Competency in Assessing Evidence-Based Risk, Protective, and Cultural Factors

Suicidal thoughts and behaviors are difficult for patients to disclose with their healthcare providers (Levi et al., 2008; Levi-Belz et al., 2013), and findings suggest that 50% of individuals who died by suicide were assessed for suicide within two days of their death (Berman, 2018). Developing rapport is particularly important for eliciting honest responses and developing an effective safety plan with patients (Rudd, 2006; Shea, 2012; Simon, 2012). It is critical to collaborate with patients in developing insight into risk and protective factors, while fostering an open conversation and normalizing suicidal ideation (Ellis et al., 2012; Sommers-Flanagan & Shaw, 2017). This involves a detailed focus on the frequency, duration, and intensity of the client's suicidal thoughts and behaviours (Sullivan & Bongar, 2012). Trainees must also be familiar with integrating and analyzing clinical information to conceptualize acute (e.g.,

sleep disturbances, social withdrawal, access to means) and chronic (e.g., history of attempts, developmental trauma) risk factors (Bryan & Rudd, 2006; Chu et al., 2015).

Given the diversity of factors that influence suicide (e.g., genetic, environmental, cultural), suicide assessment involves a comprehensive and continuous process of identifying risk and protective factors (Simon, 2012). This includes incorporating diverse resources such as structured and unstructured interviews, reviews of pertinent records, information from external sources, and self-report assessments (Sommers-Flanagan & Shaw, 2017; Sullivan & Bongar, 2012). Using these data, clinicians must make the most informed clinical judgments when assessing for suicide (Berman & Silverman, 2014).

Risk and Protective Factors

To practice competent clinical judgment, trainees should be well-versed in evidence-based risk factors associated with suicide (Cramer et al., 2013; Van Orden et al., 2010). The World Health Organization (WHO, 2014) identified a five-level system for considering risk factors for suicide: individual (e.g., gender, family history, substance use), relationships (e.g., isolation), community (e.g., trauma), society (e.g., media, stigma), and broader health systems (e.g., barriers to accessing care) (WHO, 2014). For example, findings have suggested that 98% of those who die by suicide meet the criteria for a diagnosable mental illness (Bertolote & Fleischmann, 2002), and that 30% of patients who report suicidal ideation go on to attempt suicide in their life (Hubers et al., 2018; Jobes & Joiner, 2019). Trainees should also be aware of the protective factors in a client's life (e.g., social support, adaptive coping, problem-solving skills) (Cramer et al., 2013; Public Health Agency of Canada, 2016). Trainees' ability to assign clinical weight to the distinct and dynamic

risk and protective factors is important in developing a comprehensive assessment that is unique to the individual patient (Bertolote & Fleischmann, 2002; Björkstén et al., 2009; Simon, 2012; Sullivan & Bongar, 2012).

Cultural Factors

Understanding cultural factors associated with suicide in marginalized groups is critical when assessing for both risk and protective factors (Chu, Goldblum, et al., 2010; Chu, Buchman-Schmitt, et al., 2017). Marginalized groups are nearly four times more likely to experience

suicidal thoughts and behaviors (Mental Health Commission of Canada, 2018), and it is likely that this number is underreported given different expression across cultures (Morrison & Downey, 2000; Tzeng & Lipson, 2007; Willis et al., 2003). Despite this knowledge, cultural factors in suicide assessment are often overlooked (Chu et al., 2017; Colucci, 2006). People in marginalized groups have reported worsened symptoms, heightened minority stress, increased social disconnection, and reduced access to services that could otherwise reduce risk (Chu et al., 2013; Gunnell et al., 2020). Data suggest that Indigenous peoples, racialized groups, 2SLGBTQ+ individuals, and those with low income, previous mental illness, and disability are nearly four times more likely to experience suicidal thoughts compared to the general population (Canadian Mental Health Commission of Canada, 2020). In contrast, factors such as spiritual beliefs, religious affiliations, and family and community ties may act as protective factors in reducing suicide risk (Chandler & Lalonde, 1998; Fowler, 2012; Pescosolido & Georgianna, 1989). Thus, cultural competency in suicide training (i.e., understanding minority stress, expression of suicide, and cultural sanctions), is essential (Chu et al., 2010; Granello, 2010; Leenaars, 2008).

3) Developing a Collaborative and Comprehensive Evidence-Based Safety Plan

Suicide cannot be adequately epitomized by a single assessment technique (Eyman & Eyman, 1991; Sullivan & Bongar, 2012). Research examining suicide decedents found that relying on commonly used screening tools or client disclosure alone often led to inaccurate assessment (Berman, 2018). In fact, 72% of suicide decedents responded "NO" to broad suicide screening questions (Louzon et al., 2016; Simon et al., 2013). With the complexity and diverse factors associated with suicide, using a battery of tests, as well as asking the patient directly about suicide, increases the reliability of assessment and reduces the likelihood of both false positives and false negatives (Meerwijk et al., 2016; Sullivan & Bongar, 2012). However, it should be noted that there is no "perfect" way of predicting suicide risk on an individual level, particularly given that risk will fluctuate over time (Fowler, 2012; Rudd, 2006).

Although identifying risk and protective factors is important to suicide assessment, there is no "one-size-fits-all" approach (Berman & Silverman, 2014; Ritchie et al., 2015; Sommers-Flanagan & Shaw, 2017). In fact, categorizing patients as "high" or "low" risk of suicide is often ineffective (Berman, 2018; Large & Ryan, 2014; Large et al., 2016). Trainees must develop competency in consistently, collaboratively, and comprehensively assessing risk on a continuum (Cramer et al., 2013; Flanagan & Shaw, 2017; Jobes & Chalker, 2019). Safety planning is critical in responding to suicidal ideation "upstream" to reduce the risk of suicide death (Mackelprang et al., 2014; Jobes & Joiner, 2019). Safety planning should be tailored to the individual, and incorporate numerous levels of interventions (i.e., individual, community). Trainees should be familiar with cop-

ing strategies that can help the patient to stay safe in the future (e.g., having a safe place or person, journaling when they feel suicidal ideation, recognizing reasons for living; Cramer et al., 2013; Sommers-Flanagan & Shaw, 2017).

4) Debriefing and Self-Care

Beyond client care, personal self-care during clinical training is key for trainees to prioritize their well-being and enhance resilience when encountering suicidal patients (Barnett & Cooper, 2009; Callan et al., 2021; Cramer et al., 2013; Elman & Forrest, 2007; Fouad et al., 2009). Self-care activities are associated with reduced stress, increased self-compassion, and decreased burnout (Colman et al., 2016; Callan et al., 2021), and are now identified as a core competency for psychologists (Clay, 2020).

Trainees who have lost a client to suicide report that key factors in their ability to cope with the loss included having a strong support system (e.g., supervisors, peers), participating in case reviews, and receiving thorough suicide education and training (Ellis & Patel, 2012;

Finlayson & Simmonds, 2016). Trainees who used these supports and engaged in self-care behaviours more frequently showed significantly reduced rates of stress and burnout over time compared to those who did not (Callan et al., 2021). Consulting with colleagues and supervisors was identified as the most helpful response, followed by recognition that suicide is a possible outcome over which clinicians have limited control (Finlayson & Simmonds, 2016; Sandford et al., 2020). Thus, it is critical for programs to foster a training culture where trainees are encouraged to consult with colleagues and supervisors (Callan et al., 2021; Zahniser et al., 2017), and to develop a self-monitoring plan for balancing the demands of clinical work (e.g., personal psychotherapy; James, 2019).

Conclusion

Client suicide is a prevalent concern for mental health service providers, so much so that it has been deemed an "occupational hazard" for the profession (Chemtob et al., 1989). This paper highlighted the current limitations of training in suicide assessment within psychology training programs, and highlighted core competencies in this area: insight into beliefs about suicide, assessing evidence-based factors, collaborative and comprehensive evidence-based safety planning, and debriefing and self-care. The need for improved suicide training is long-standing, and it is critical to take steps towards improving the current system for the safety of both clinicians and high-risk patients. Ultimately, the goal moving forward should be to develop consistent training and education focused on suicide assessment prior to trainees' engagement with at-risk patients in the clinical setting.
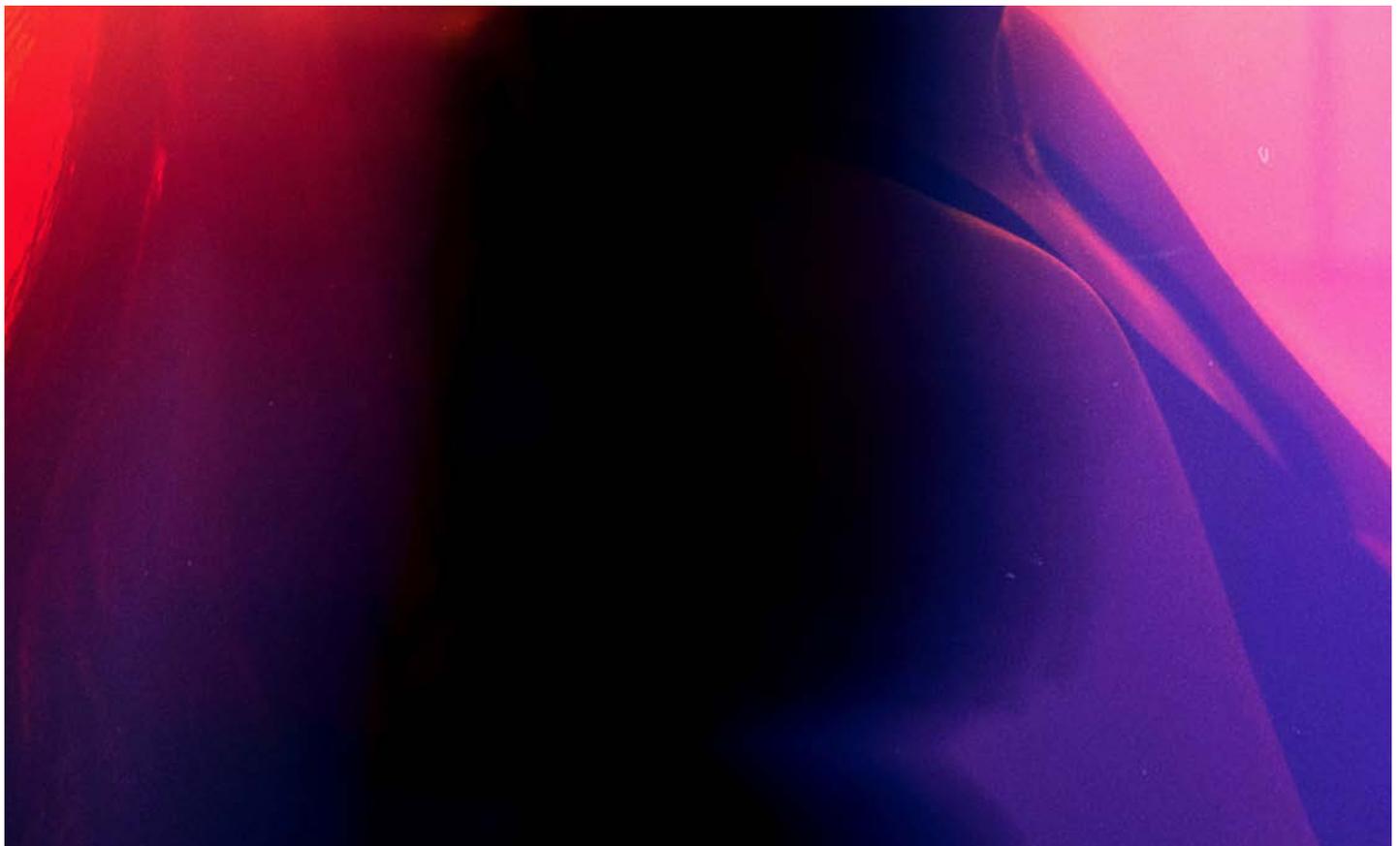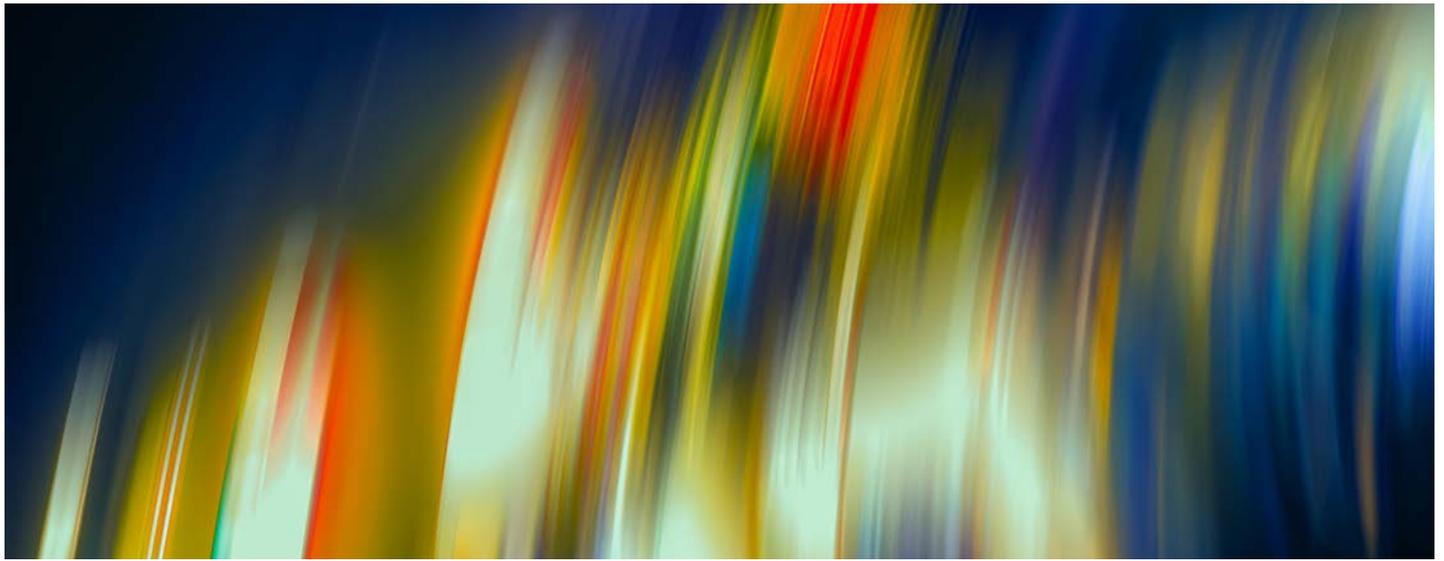
Remembering the Past and Imagining the Future in Clinical and Subclinical Anxiety: A Brief Literature Review

Erik Allen / BA., Ontario Tech Insitution, **Megan Booth /** BA, Ontario Tech Insitution

Abstract

Anxiety disorders are one of the most common mental health problems amongst Canadians, and the COVID-19 pandemic has only exacerbated symptomatology. Accordingly, researchers and clinicians must continue to examine anxiety-related dysfunctions and refine treatment measures. This review synthesizes research exploring the relationship between anxiety and biases in remembering the past and imagining the future. Individuals who experience clinical or subclinical levels of anxiety tend to inhibit positive past-oriented memories while either disinhibiting or enhancing negative past-oriented memories, compared to those who do not experience such anxiety levels. Similarly, negative future simulations appear more readily accessible. How-ever, it is unclear whether anxiety distinctively hinders positive future simulations. These general trends appear relatively consistent regardless of sample type or clinical status, yet further research is needed to discern the conditions under which these biases may operate. We briefly discuss methodological considerations, potential clinical implications, future research directions, and proposed theoretical explanations.

According to the Canadian Mental Health Association (CMHA), anxiety disorders are the most common mental health problem, affecting approximately 4.6% of the Canadian population (CMHA, 2016, 2021). The self-reported percentage of Canadians experiencing high to extremely high levels of anxiety quadrupled (from 5% to 20%) since the onset of the COVID-19 crisis (Dozois & Mental Health Research Canada, 2021). Anxiety is a natural and understandable response that can facilitate survival strategies during difficult and/or dangerous situations (e.g., following public health recommendations due to anxiety about getting sick; Gutiérrez-García & Contreras, 2013). However, elevated anxiety levels can lead to long-term negative outcomes, such as maladaptive coping measures (e.g., substance use), that can cause further physical and social health detriments (Dozois & Mental Health Research Canada, 2021).

An important point about terminology, the American Psychiatric Association's (2013) Diagnostic and Statistical Manual of Mental Disorders (DSM-5)

distinguishes between anxiety and non-clinical anxiety using a binary, discrete model (i.e., present or absent); however, other researchers characterize anxiety as existing on a continuum, wherein the distinction between clinical anxiety and high levels of subclinical anxiety is quantitative rather than qualitative (Mitte, 2008). Further, trait anxiety refers to the likelihood that someone will experience anxiety across multiple situations and time, reflecting a stable disposition across the lifespan, whereas state anxiety occurs in a specific moment in response to an adverse event (Saviola et al., 2020). Research exploring cognitive models of anxiety has found attentional and interpretation biases; for instance, individuals who experience anxiety more readily attend to threatening environmental information and interpret ambigious environmental cues as more threatening than indivdiuals who do not experience comparable anxiety levels (MacLeod & Mathews, 2012). However, the presence and nature of anxiety-related memory biases remain somewhat unclear (Herrera et al., 2017).

Studies investigating anxiety-related memory biases (e.g., selective recall) and accompanying cognitive theories often incorporate encoding and retrieval phases (e.g., Moscovitch et al., 2018; Nuñez et al., 2017). Encoding signifies the automatic or effortful processing of incoming information into memory storage, whereas retrieval describes the act of accessing stored information and bringing it into conscious awareness through recall or recognition (Goldstein, 2015). Moscovitch and colleagues (2018) discussed two competing hypotheses regarding anxiety and memory biases. The enhanced encoding hypothesis argues that individuals with anxiety encode events more negatively than non-anxious populations, leading to more negative recall; the enhanced retrieval hypothesis argues that these

individuals continuously rehearse and strengthen negative components of memories (Moscovitch et al., 2018). Alternatively, the retrieval competition hypothesis posits that individuals with anxiety possess a blunted ability to access positive memory representations and thus, negative memory representations are more readily accessible (Brewin, 2006). Nuñez and colleagues (2017) proposed that anxiety-provoking stimuli are strategically avoided (i.e., vigilance-avoidance hypothesis) or hyperfocused on (i.e., decreased inhibitory performance hypothesis); both can lead to sustained anxiety through avoidance or rumination by way of different encoding and/or retrieval strategies. This brief literature review, primarily focused on retrieval, considers the above-mentioned theories and synthesizes current findings surrounding anxiety-related biases when remembering the past and imagining the future; both processes involve activation of a common memory-based brain network and depend on similar retrieval pathways (Schacter et al., 2012). Given the importance of retrieval in psychological wellbeing (Schacter et al., 2008), this review aims to detail the current state of knowledge on anxiety-related memory biases and highlight research areas that remain unclear.

Anxiety and Remembering the Past

The relationship between anxiety and remembering the past is supported across various paradigms with reasonable consistency, whereby individuals with high anxiety tend to demonstrate reduced inhibition of negatively valenced memories. Notably, the retrieval-induced forgetting (RIF) paradigm suggests repeated rehearsal strengthens memory representations and hinders the retrieval of unpracticed (but related) representations (Anderson et al., 1994). This cognitive process offers adaptive benefits for emotional wellbeing, particularly when positive memories reign over aversive competing

memories during normative forgetting (Marsh et al., 2019). Research suggests that individuals with high-trait anxiety (Saunders, 2012), SAD (Amir, 2001), and generalized anxiety disorder (GAD; Kircanski et al., 2016) lack RIF for threatening stimuli but not neutral stimuli. However, Nuñez et al. (2017) found that individuals with heightened state anxiety demonstrated RIF for both threatening and neutral words. Kenny and Bryant (2013) observed RIF for trauma-related words but not neutral words among individuals with post-traumatic stress disorder (PTSD). Additionally, the think/no-think (TNT) paradigm measures individuals' ability to intentionally suppress memory retrieval by presenting cues that signify to-be-forgotten information (Anderson & Green, 2001). Studies using the TNT paradigm found that individuals with high-trait anxiety (Marzi et al., 2014) and PTSD (Catarino et al., 2015) exhibited significantly compromised retrieval suppression for aversive stimuli. That is, they experienced difficulties inhibiting negative target items that had been associated with a specific cue. Research employing the RIF and TNT paradigms supports the general trend that anxiety impairs individuals' inhibition of negatively valenced memories; however, this finding is not supported for state anxiety (Nuñez et al., 2017) and appears mixed within PTSD (Catarino et al., 2015; Kenny & Bryant, 2013).

Other research shows that individuals with anxiety demonstrate enhanced recall of negatively valenced memories (e.g., Saunders, 2013). The mnemic neglect (MN) paradigm considers individuals' selective memory biases, whereby they exhibit poorer memory for negative self-threatening information (Saunders, 2013). Research suggests that individuals with high-trait anxiety (Saunders, 2013) and SAD (Zengel et al., 2015) generate self-threatening memories, thus lacking MN. Moscovitch and colleagues

(2018) found similar results by asking healthy controls and individuals with SAD to recall autobiographical memories of social experiences. They found that SAD increased the likelihood that individuals recalled negatively valenced details for aversive social events with greater episodic detail (Moscovitch et al., 2018). In another study, Toffalini et al. (2015) presented participants with images of causal antecedents followed by emotionally valenced outcomes. Anxious participants produced false memories for inferential negative emotional events, unlike healthy controls; in other words, high-trait anxiety enhances elaboration of aversive emotional material, representing gap-filling errors (Toffalini et al., 2015). However, Gorlin and colleagues (2019) found that individuals with heightened state anxiety reported greater episodic memory for emotional autobiographical experiences, irrespective of valence. Taken together, the extant literature demonstrates that high-trait anxiety (Saunders, 2013; Toffalini et al., 2015) and SAD (Moscovitch et al., 2018; Zengel et al., 2015) facilitate recall of aversive past-oriented memories, yet state anxiety enhances recall of emotional memories more generally (Gorlin et al., 2019).

Further, anxiety appears to diminish one's ability to recall positive past-oriented memories. In studies where participants were asked to give impromptu speeches, those with high levels of social anxiety (SA) recalled feedback less positively over time (e.g., Cody & Teachman, 2010; & Glazier & Alden, 2019), while healthy controls displayed a positivity bias (Cody & Teachman, 2010). Toffalini and colleagues (2015) also found that participants with heightened trait anxiety lacked a normative positivity bias, as they reported fewer mistaken positive memories for positive events. When participants were asked to hold a negative self-image in their minds during a speech, those with high levels of SA reported greater levels of state anxiety

and rated their performance as worse both before and after (Stopa & Jenkins, 2007). In another study, those with heightened SA demonstrated greater directed forgetting for positive social words compared to healthy controls (Liang et al., 2011). Other studies have shown that participants who are more socially anxious report poorer memory for positive social experiences generally (e.g., del Palacio-Gonzalez & Berntsen, 2020; Romano et al., 2020). Contrarily, Edwards et al. (2003) found no significant difference between SA and control participants when they recalled positive speech evaluations. In summary, anxiety appears to inhibit access to positive memories, and in conjunction with studies examining negative memories, retrieval of aversive information is enhanced and/or disinhibited (i.e., retrieval competition account).

Anxiety and Imagining the Future

Other research has investigated the relationship between anxiety and imagining the future, finding that individuals with heightened anxiety demonstrate enhanced imagination of negative future events (e.g., Muris & van der Heiden, 2006; Raune et al., 2005). Raune and colleagues (2005) asked participants to rate the likelihood that various negative events would occur and list reasons why they would happen (i.e., 'pro' reasons) and would not happen (i.e., 'con' reasons). They found that participants with heightened state anxiety were quicker to identify 'pro' rather than 'con' reasons and generated more 'pro' than 'con' reasons (Raune et al., 2005). Research also finds that participants with heightened state anxiety (MacLeod & Byrne, 1996) and panic disorder (MacLeod et al., 1997) exhibit increased anticipation of negative future events compared to those with depression and healthy controls. Similarly, individuals with high-trait anxiety show an elevated expectan-

cy for negative future events related to social concerns when prompted with negatively valenced information (Cabeleira et al., 2014). In other studies, participants with high-trait anxiety predicted poorer outcomes for self-referent negative events compared to other-referent negative events (e.g., Eysenck & Derakshan, 1997; Muris & van der Heiden, 2006). Maner and Schmidt (2006) found that trait anxiety was associated with pessimistic perceptions of future events, wherein individuals with higher levels of anxiety viewed adverse outcomes as more probable and severe. Contrarily, Notebaert and colleagues (2019) presented participants with emotionally neutral words representing a valenced future event; they found that participants with heightened trait anxiety did not exhibit enhanced memory for targets associated with negative, relative to neutral or benign, future events (see also Montijn et al., 2021). Nonetheless, current research suggests heightened state and trait anxiety enhance memory for stimuli that explicitly represent negative future events.

Despite consistencies regarding the retrieval of negative future events, findings surrounding the relationship between anxiety and positively valenced future events are mixed; it is unclear whether anxiety reduces the normative positivity bias. In some studies, individuals with subclinical anxiety reported fewer positive future simulations (e.g., del Palacio-Gonzalez & Berntsen, 2020; Marsh et al., 2019). Similarly, Steinman and colleagues (2013) analyzed expectancy biases across the lifespan and found that individuals with high-trait anxiety demonstrated diminished positive outlooks compared to healthy controls, irrespective of age. Another study reported that high-trait anxiety was associated with lower positive expectancy for future events of physical concern (Cabeleira et al., 2014). Contrarily, earlier research suggested that, rather than anxiety,

depression plays a primary role in dampening positive future simulations, as only depressed individuals displayed a reduced capacity to imagine positive future events (MacLeod & Byrne, 1996; MacLeod et al., 1997); note, anxiety and depression are highly comorbid and frequently share symptoms (Pollack, 2005). Ramsgaard et al. (2019) and Wu et al. (2015) also found that individuals with anxiety disorders imagined future scenarios consisting of more positive than negative events, yet to a lesser extent than healthy controls. Further, positive future simulations did not get easier over time for individuals with anxiety, though this effect was observed in healthy controls (Wu et al., 2015). Another study found that individuals with subclinical anxiety recalled positive future events at similar rates to negative future events but lacked the emotional-memory enhancement demonstrated by healthy controls (Montijn et al., 2021). Overall, the capacity of individuals with anxiety to imagine positive future events appears to remain somewhat functional, but research demonstrates that they experience hindrances in recall compared to those without clinical/subclinical levels.

Discussion and Future Directions

There is sufficient evidence indicating that anxiety is associated with memory biases, particularly enhanced recall and/or disinhibition of self-threatening past-oriented information, supporting the enhanced retrieval account and decreased inhibitory performance hypothesis, respectively. Research has found support for reduced inhibition of negative past memories in those with clinical (Amir, 2001; Kircanski et al., 2016) and subclinical (Saunders, 2012) anxiety, while other research has reported enhanced recall of such memories in comparable sample types (Moscovitch et al., 2018; Saunders, 2013; Toffalini et al., 2015; Zengel et al., 2015). However, these findings do not extend to state anxiety (Gorlin et al., 2019; Nuñez et al., 2017) and are less consistent within PTSD (Catarino et al., 2015; Kenny & Bryant, 2013), suggesting that the biased retrieval of negative past memories might not be generalizable to all anxiety types. Further, similar research has found support for diminished recall of positive past memories, specifically within individuals with subclinical anxiety (Cody & Teachman, 2010; & Glazier & Alden, 2019). On the other hand, subclinical anxiety and panic disorder bias imagining of the future through enhanced negativity (Muris & van der Heiden, 2006; Raune et al., 2005), while the extent to which clinical or subclinical anxiety might impede positive imagining of the future remains unclear (del Palacio-Gonzalez & Berntsen, 2020; Marsh et al., 2019; Ramsgaard et al., 2019). Overall, further research is needed to discern the implications of anxiety, particularly clinical levels, on future simulations.

Given our exclusive focus on retrieval, we cannot form conclusions surrounding the potentially interdependent role of encoding. It also must be noted that this review was non-exhaustive and without explicit selection criteria. Future studies should aim to clarify the relationship between selective forgetting and valence, as numerous studies found inconsistent results with neutral stimuli and failed to include positive stimuli with comparable intensity and specificity to negative stimuli (e.g., specific fear-inducing experiences are likely more impactful than generically positive experiences). In addition, some studies failed to control for comorbid depressive symptoms that might be confounding relationships and contributing to contradictory findings (e.g., Steinman et al., 2013), leading to difficulties parsing the effects of anxiety. The research into imagined future events raises concerns about generalizability, given that it is heavily reliant on undergraduate participants (e.g., Cabeleira et al., 2014;

Maner & Schmidt, 2006) and limited primarily to non-clinically anxious samples rather than those with anxiety disorders (e.g., Cabeleira et al., 2014; Montijn et al., 2021). Considering the various types of anxiety, future research might benefit from exploring whether differential memory biases are associated with specific fear-inducing stimuli (e.g., negative evaluations by others in those with SAD; Moscovitch et al., 2018) versus generally threatening stimuli (e.g., negative outcomes during everyday events in those with heightened trait anxiety; Toffalini et al., 2015).

Recent research suggests that future-oriented positive mental imagery might result in positive memories (Devitt & Schacter, 2018) and reduce anxiety (Landkroon et al., 2021; Pile et al., 2021). Thus, further research is needed to explore whether clinical approaches should aim to enhance positive memory representations rather than exclusively target negative ones; this could include therapeutic techniques that capitalize on the content of positive memories to facilitate fear extinction through memory processing practice (Contractor et al., 2020). Moreover, positive imagery practice could inhibit anxiety-provoking negative imagery (Tallon et al., 2020) and encourage experiences of coping with adverse situations (Maier et al., 2020), serving therapeutic potential. In addition, clarifying the relationship between future-oriented imagining and anxiety might guide approaches for addressing elevated health anxiety (HA) during the COVID-19 pandemic, specifically among those with heightened HA who experience distressing imagery of contracting the virus (Benke et al., 2022). Ultimately, further investigation of anxiety and memory biases may inform cognitive-behavioural therapeutic interventions for Canadians in need of mental health support.
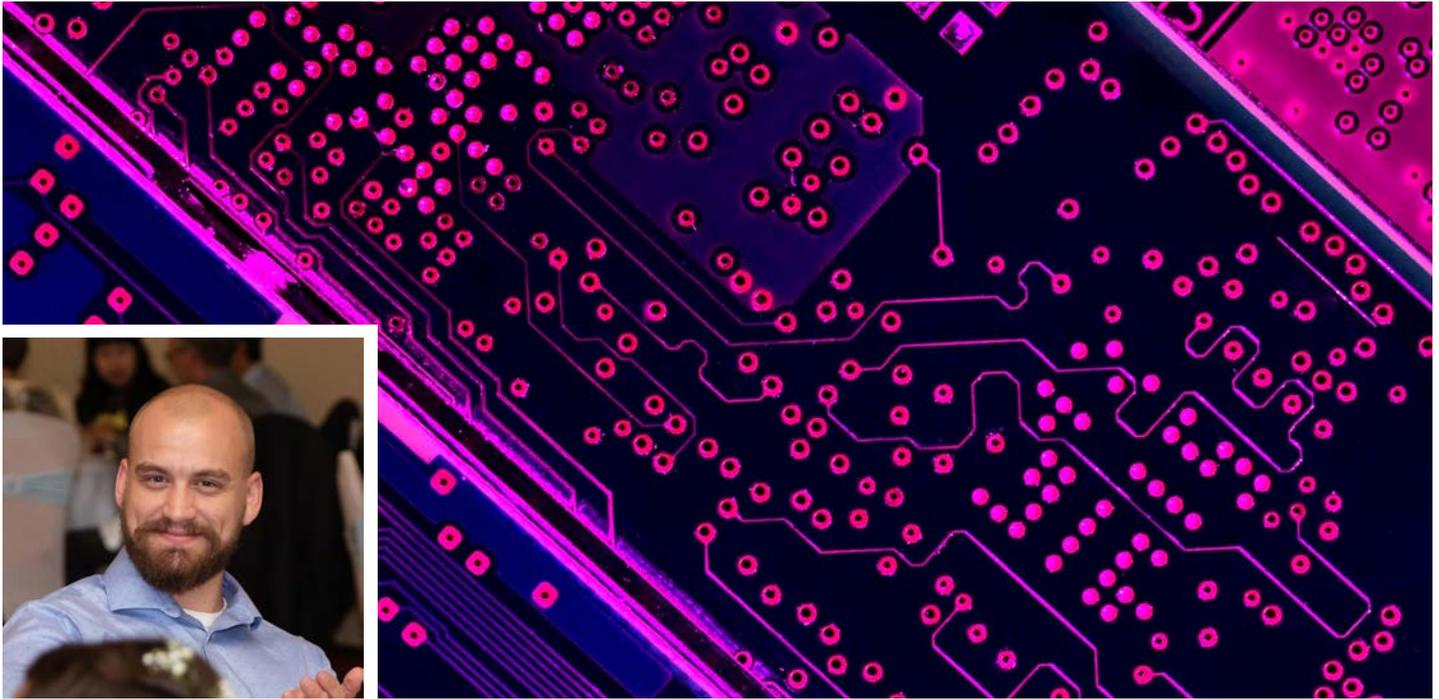
Dude, Where's My Citations? ChatGPT's Hallucination of Citations

Jordan MacDonald / BA., MSc. Candidate, Trent University

Abstract

ChatGPT, an artificial intelligence model that is capable of preparing entire academic essays in under a minute, is generating significant media coverage (Holmes, 2023; Huang, 2023) and alarming post-secondary institutions across the world because of potential plagiarism (Alkaissi & McFarlane, 2023; Kortemeyer, 2023; Rudolph et al., 2023; Schieman et al., 2010; Willems, 2023). The present study explored ChatGPT's ability to produce real citations, which AI has struggled with (Alkaissi & McFarlane, 2023) and is an important element of academic papers. ChatGPT was asked to provide fifty references for six subfields of psychology (religion, animal, social, clinical, personality, and neuropsychology). False citation rates, by subfield, ranged from 6% to 60%. Most notably, the fabricated citations frequently contained legitimate researchers involved in the respective subfield, properly formatted DOIs, and legitimate peer-reviewed journals, with volume/issue numbers matching the year of the citation. The implications of these findings are discussed.

ChatGPT, an artificial intelligence (AI) model that is publicly available and capable of writing entire academic essays in seconds is generating widespread media attention (Holmes, 2023; Huang, 2023) and becoming a concern for universities (Alkaissi & McFarlane, 2023; Kortemeyer, 2023; Rudolph et al., 2023; Willems, 2023). While many are concerned about the negative implications, including plagiarism (Kortemeyer, 2023; Rudolph et al., 2023; Willems, 2023), some are optimistic about its use as a learning tool (e.g., teaching students how to harness its abilities; Kasneci et al., 2023). Identifying ways to detect ChatGPT's writing is challenging, given the complex nature of the AI model and students' ability to reformat, rewrite, and rephrase the content produced to seem "more human". One flaw, likely overlooked by students or researchers looking to take a shortcut in paper writing and that would require more work to fix than to write the paper, are fake or hallucinated citations (Alkaissi & McFarlane, 2023). Hallucinated citations are inherently risky for academic research and post-secondary education, including published research referring to non-existent literature or conferring degrees to individuals who have evaded plagiarism detection.

Hallucinated citations are citations that AI seemingly makes up on its own, constructing them from various legitimate elements (e.g., legitimate authors, DOIs, and journals; Alkaissi & McFarlane, 2023). This hallucinated information often results from more advanced chat generation software, such as ChatGPT, which is often trained on "large amounts of unsupervised data" (Alkaissi & McFarlane, 2023, p. 3). In other words, hallucinated information, including academic references, is the result of AI language models (e.g., ChatGPT) learning from massive amounts of data without supervision to ensure it is accurately interpreted (Alkaissi & McFarlane, 2023). This has important implications for plagiarism in student papers, manuscripts submitted to journals for publication, and other academic writing that requires citations.

Academic writing, from undergraduate essays to top-tier journal publications, typically requires reference to past peer-reviewed literature. The use of AI to generate essays or research papers may be a valuable aid in learning (Kasneci et al., 2023) but can be detrimental if not used appropriately (Alkaissi & McFarlane, 2023; Day, 2023; Gravel et al., 2023; Holmes, 2023). Currently, hallucinated citations indicate AI-generated papers or references (Alkaissi & McFarlane, 2023; Day, 2023; Gravel et al., 2023). Students and researchers who use ChatGPT to prepare their papers, whether they are aware of the hallucinated citations or not, would have to spend a significant amount of time finding and replacing the hallucinated citations with legitimate citations to avoid detection. These hallucinated citations pose a risk for the foundation that academia places itself, building upon past literature.

The Present Study

While ChatGPT is a relatively new service, research concerning hallucinated citations is already published in other fields, including medicine (Gravel et al., 2023) and geography (Day, 2023). The findings of these studies are consistent with one another – chatbots (e.g., ChatGPT) frequently create deceiving yet false citations (Day, 2023; Gravel et al., 2023). Citation hallucination has yet to be explored within the field of psychology. The present study examined the specifics of ChatGPT's citation generation in psychology to see how often it hallucinates information, what that hallucination looks like, and how well it interprets legitimate research. Given the novelty of the subject, no hypotheses were formed. The present study explored three research questions: (1) What are the rates at which ChatGPT produces hallucinated citations? (2)

How accurately does ChatGPT interpret legitimate citations? (3) What elements of ChatGPT's hallucinated citations are legitimate (e.g., authors, DOIs, titles, journals)?

Method

Citations

ChatGPT 3.5 was asked to prepare 50 citations on each of the six subfields of psychology: religion, animal, social, clinical, personality, and neuropsychology. This number of citations was chosen because past literature on the same topic has used similar numbers (Gao et al., 2022). However, the subfields chosen were not based on any reasoning. ChatGPT was asked, "Please provide 50 references for [insert subfield]." The data used for this study can be found on Open Science Framework (OSF; https://osf.io/32vez/).

Analyses

The citations were individually tested to determine if they were legitimate through two methods. First, the DOI was followed using doi.org/[DOI] for each citation. The DOI links that redirected to legitimate research were

noted. Next, two legitimate DOIs and two hallucinated citations (those which contained non-existent DOIs) from each subfield were randomly selected for closer analysis. Here, legitimate DOI citations were defined as citations whose provided DOI redirected to legitimate published research (note: legitimate DOIs do not necessarily mean valid citations, which is why a closer analysis was conducted). Hallucinated citations were defined as citations whose provided DOI redirected to a "DOI Not Found" webpage. The closer analysis consisted of exploring the individual citation elements (authors, journals, titles) as well as ChatGPT's summary of citations.

Results

Fifty citations for each of the six subfields were produced by ChatGPT (N = 300). The total hallucinated citation rate across all subfields was 32.3% (n = 97). Hallucinated citations were found in each subfield at varying rates, summarized in Table 1 below.

Table 1

Citation Hallucination Rate by ChatGPT		
	Citations	
Field of Psychology	Found*	Hallucinated (%)
Personality	38	12 (24)
Religion	20	30 (60)
Neuropsychology	47	3 (6)
Animal	29	21 (42)
Social	30	20 (40)
Clinical	39	11 (22)
Total	203	97 (32.3)

Note: "Found" citations refer to citations whose DOIs referred to a webpage other than a "DOI Not Found" webpage.

Further Analysis

Twelve legitimate DOI citations and twelve hallucinated citations were selected for a more detailed analysis. Two of each type of citations were

randomly selected from each subfield of psychology (see Table 2 for a list of DOIs; a list of full references is available on OSF).

Table 2

DOIs Selected for Further Analysis		
	Subfield	DOI
Found*	Personality	10.1111/j.1467-6494.2009.00584. 10.1002/per.1941
	Religion	10.1111/j.1468-5906.2010.01526.x 10.1002/ejsp.2584
	Neuropsychology	10.3758/BRM.41.4.1149 10.1016/j.neuropsychologia.2013.01.012
	Animal	10.1037/a0030529 10.1016/j.anbehav.2013.10.019
	Social	10.1037/a0036615 10.1037/a0025126
	Clinical	10.1037/a0019388 10.1037/a0025602
Hallucinated	Personality	10.1002/j.1556-6676.2001.tb00074.x 10.1007/s11031-012-9284-4
	Religion	10.1080/07347332.2015.1013135
	Neuropsychology	10.1037/0033-2909.125.6.801 10.1016/j.neuropsychologia.2014.03.026
	Animal	10.1037/0735-7036.120.1.16 10.1037/0735-7036.116.2.141
	Social	10.1037/0033-2909.136.2.187 10.1037/0022-3514.96.2.245
	Clinical	10.1037/0022-006X.74.3.459 10.1037/0033-2909.131.4.581

Note: "Found" citations refer to citations whose DOIs referred to a webpage other than a "DOI Not Found" webpage.

Legitimate DOI Papers

ChatGPT was asked to provide full APA-style references for each legitimate DOI selected. None of the references provided by ChatGPT matched the DOIs. In other words, even the legitimate DOI citations contained hallucinated data.

Authors. The authors that ChatGPT referenced were involved in the appropriate subfield. However, none had produced any papers with these titles. For example, the DOI

"10.1111/j.1468-5906.2010.01526.x" directed to a study by Schieman et al. (2010) on the topic of religious involvement, beliefs about God, and the sense of mattering amongst older adults. ChatGPT referenced this DOI as "The effect of self-affirmation on the self-regulation of prejudice: Implications for the goal theory of motivation and cognition" by Kubota, J. T. and Li, J. Both of these authors have published in similar subfields of psychology, but not a paper with this title. Further, the journal referenced by ChatGPT, Social Psychological and Personality Science, does not have a paper with this title, either. A similar trend was observed across all of the legitimate DOIs provided by ChatGPT.

Content. ChatGPT summarizes its citations with no hesitation. The previously mentioned legitimate DOI (with mismatching authors and topics) is summarized as though it exists. ChatGPT provided the following summary for the aforementioned paper by Kubota, J. T. and Li, J.:

The study conducted by Kubota and Li (2010) investigated the effect of self-affirmation on the self-regulation of prejudice. The authors used a sample of undergraduates and found that participants who were asked to complete a self-affirmation task prior to rating their attitudes towards minorities exhibited less implicit prejudice compared to those who did not complete the self-affirmation task. The results suggest that self-affirmation may be an effective strategy for reducing implicit prejudice.

However, this paper does not exist. When ChatGPT was asked to summarize the actual article the DOI refers to (i.e., by Schieman et al. (2010) and provided with a full APA reference, it appropriately summarized the following:

Schieman, Bierman, and Ellison (2010) investigated the relationships between religious involvement, beliefs about God, and the sense of mattering among older adults. The study used data from a national survey of Americans aged 60 and older and found that religious attendance and subjective religiosity were positively related to the sense of mattering.

A similar trend was observed across all legitimate DOI citations. ChatGPT "hallucinates" content based on its hallucinated citations and only provides meaningful summaries when fed a full, correct reference from the user. In other words, even seemingly legitimate citations from ChatGPT (read: those with legitimate DOIs) produce some hallucinated elements.

Hallucinated Citations

Authors. The authors cited by ChatGPT are legitimate and sometimes involved in the correct subfields. In some cases, the author and the title matched with a published paper, but the paper was unrelated to the subfield. For example, the DOI "10.1037/0735-7036.116.2.141" does not exist under the animal psychology subfield. ChatGPT produced the following reference:

Tennen, H., Affleck, G., Coyne, J. C., Larsen, R. J., & DeLongis, A. (1999). Paper and plastic in daily diary research: Comment on Green, Rafaeli,

Bolger, Shrout, and Reis. Psychological Methods, 4(1), 84-89.

This reference exists under a different DOI. ChatGPT's summary of this article differed from its own citation. This trend was seen amongst all other hallucinated references.

Content. When asked to provide a summary of the aforementioned DOI, ChatGPT provided the following:

The article by Tennen et al. (1999) addressed the issue of methodological choices in daily diary research, particularly the use of paper-and-pencil versus electronic diaries. The authors argued that the choice of diary format should be based on the research question and the characteristics of the participants. They provided an overview of the advantages and disadvantages of each format, and discussed factors such as compliance, data quality, and participant burden. The article concluded that both paper-and-pencil and electronic diaries have their own strengths and limitations, and researchers should carefully consider the trade-offs between them when designing a diary study.

This summary is accurate; thus, ChatGPT provided an accurate interpretation of the literature. However, it is associating a non-existent DOI with this research.

Discussion

ChatGPT is a language model that can provide solutions to many problems. However, it introduces other problems (Alkaissi & McFarlane, 2023; Kasneci et al., 2023; Kortemeyer, 2023; Rudolph et al., 2023; Willems, 2023). The goal of the present study was to evaluate ChatGPT 3.5's citation generation in the field of psychology to determine if it hallucinates citations and to what extent, what the hallucinated citations included, and how the citations provided by ChatGPT (both hallucinated and legitimate) were

interpreted by ChatGPT. The present study found that ChatGPT generates hallucinated citations at rates ranging from 6 to 60% in some fields of psychology. These hallucinated references often include actual authors, journals, and sometimes titles. However, ChatGPT typically matches random authors from a particular subfield to a title and journal. ChatGPT then fabricates the content of the study. At times, ChatGPT generates legitimate DOI references and can interpret the literature accurately. Overall, ChatGPT is unable to produce references that are consistently true and accurate.

This knowledge might be useful in identifying suspected cases of student plagiarism. Many cited works by ChatGPT are hallucinated, and when ChatGPT cites legitimate work, it is often represented as something else unless it is given a real academic reference. For example, if the user provides ChatGPT with a list of references and asks for interpretation, it provides a reasonable interpretation. If a user provides ChatGPT with one of its own references, it usually provides inaccurate information. Those responsible for marking student papers can check if a student has used ChatGPT by spot-checking references and their DOIs. It is unlikely that students will provide references that consist of both legitimate and inaccurate information in a similar way to ChatGPT without actually using ChatGPT. Checking references in student papers for these qualities can serve as an additional indicator of AI-assisted writing, in conjunction with other typical flags for plagiarism (e.g., paper distinct from student's writing style).

The findings of the present study have implications for the field of psychology and academia as a whole. The research seeks to build on previous findings, utilizing what has already been observed to anticipate new observations, form and test new hypotheses, and lead to useful findings. If published

peer-reviewed research becomes plagued with hallucinated citations, the outcome can be detrimental to all fields of science. If research begins to incorporate hallucinated citations and that research is published, future research will base itself on findings built upon hallucinated citations. This can present an even bigger issue within the social sciences, which have been grappling with the "file drawer" issue for decades, referring to the reluctance or unwillingness of researchers or journals to publish null findings (Rosenthal, 1979). In the context of ChatGPT and hallucinated citations, researchers may begin forming hypotheses and conducting research based on hallucinated citations or studies that were based on hallucinated citations. Following this logic, the only research (resulting from these hallucinated citations) that is likely to be published is significant research. In other words, ChatGPT may hallucinate citations, leading researchers to build on fake assumptions, which will likely be stuck in the "file drawer" unless significant. These potentially fake publications could lead to the misuse of many research resources (grants, researchers' time and efforts, etc.) if honest researchers base their hypotheses on dishonest publications.

Researchers should be able to distinguish between a legitimate citation and a hallucinated citation when forming their own hypotheses. ChatGPT's hallucinated citations and abstracts have been identified at a rate of around 70% by researchers (Gao et al., 2022). While researchers are not perfect at picking up on generated abstracts and citations, the findings by Gao and colleagues (2022) are promising. However, if student papers, generated by ChatGPT, are able to go undetected, future researchers may not meet the same standards as current researchers. The undetected use of ChatGPT across academia, both in journals and the classroom, poses a risk to the future of research.

Suggestions for Reviewers and Educators

The presented study identified an indicator of the use of ChatGPT (or other AI models) in academic writing. ChatGPT hallucinated DOIs in each selected subfield of psychology. These hallucinated DOIs did not exist. Of the DOIs that did exist (referred to as "legitimate DOIs"), none were interpreted by ChatGPT adequately. The only time ChatGPT summarized literature accurately was when the full APA reference and DOI was provided to it by the user. Given this information, reviewers and educators wanting to check for author use of ChatGPT can do so by checking DOIs. If a DOI leads to a "DOI Not Found" webpage, it is possible ChatGPT was used. It is important to note that DOIs do not change (Crossref, 2023), and unless a typo is made, a "DOI Not Found" webpage is highly suspicious. As a preventative measure, educators can request annotated bibliographies or abstracts for students' citations, which may deter the use of

ChatGPT. While these methods should not be considered a perfect solution, they can be a tool to detect plagiarism.

Future Directions

While the present study provides novel information on ChatGPT in the field of psychology, future researchers can improve the methods or expand on the findings. Future researchers can use a larger citation sample than the present study to improve accuracy and include more subfields of psychology or even other fields of science and social science. Future researchers can also test newer ChatGPT models, which may produce different results.

Limitations

It should be noted that DOI redirection to any research was considered a "legitimate DOI" in Table 1, though further analyses were included to address this. It is possible that some of the research that ChatGPT's DOIs redirected to was not the same as what ChatGPT was claiming. Further analyses were conducted to consider this by being more critical of "legitimate" DOIs. The present study reflects the status of the DOIs as of May 1, 2023. It is possible, though unlikely, that the hallucinated DOIs in the present study will be claimed after this study is published.

Conclusion

ChatGPT can serve as a valuable tool but poses a risk to post-secondary education, academia, and the scientific community as a whole. Two major concerns arise from the present study: undereducated future researchers and undermining the structure of research. Future researchers who earn their degrees through dishonest practices, such as the use of AI, will not be suited to conduct or review research. This concern is compounded by the ripple effect that AI-

driven research may create. Dishonest researchers might use AI to generate hypotheses or summarize research (which may be hallucinated information). Following this, those who have significant findings (likely Type I errors) may publish their findings (hallucinated publications). Honest researchers may then develop and test hypotheses upon these hallucinated publications. These hallucinated publications are more likely to make their way through peer review if those reviewing are undereducated. This demonstrates just how easily AI language models may "infect" honest research through the dishonest practices of others, undermining the entire system. A well-known phrase in the scientific community, attributed to Isaac Newton, is "If I have seen further, it is by standing on the shoulders of giants" (Merton, 1985). This is a reference to building upon the knowledge of past scholars. Currently, ChatGPT is hallucinating its own giants. Adapting to the circumstances is an important step to ensure that ChatGPT does not undermine or infect research and education through the hallucination of data.
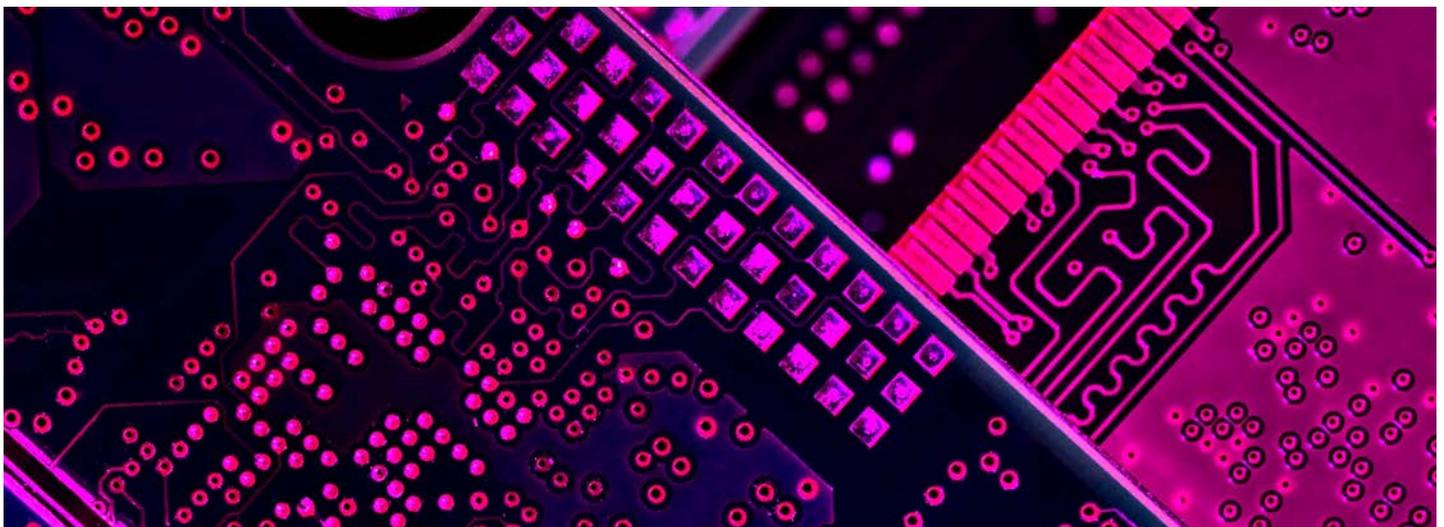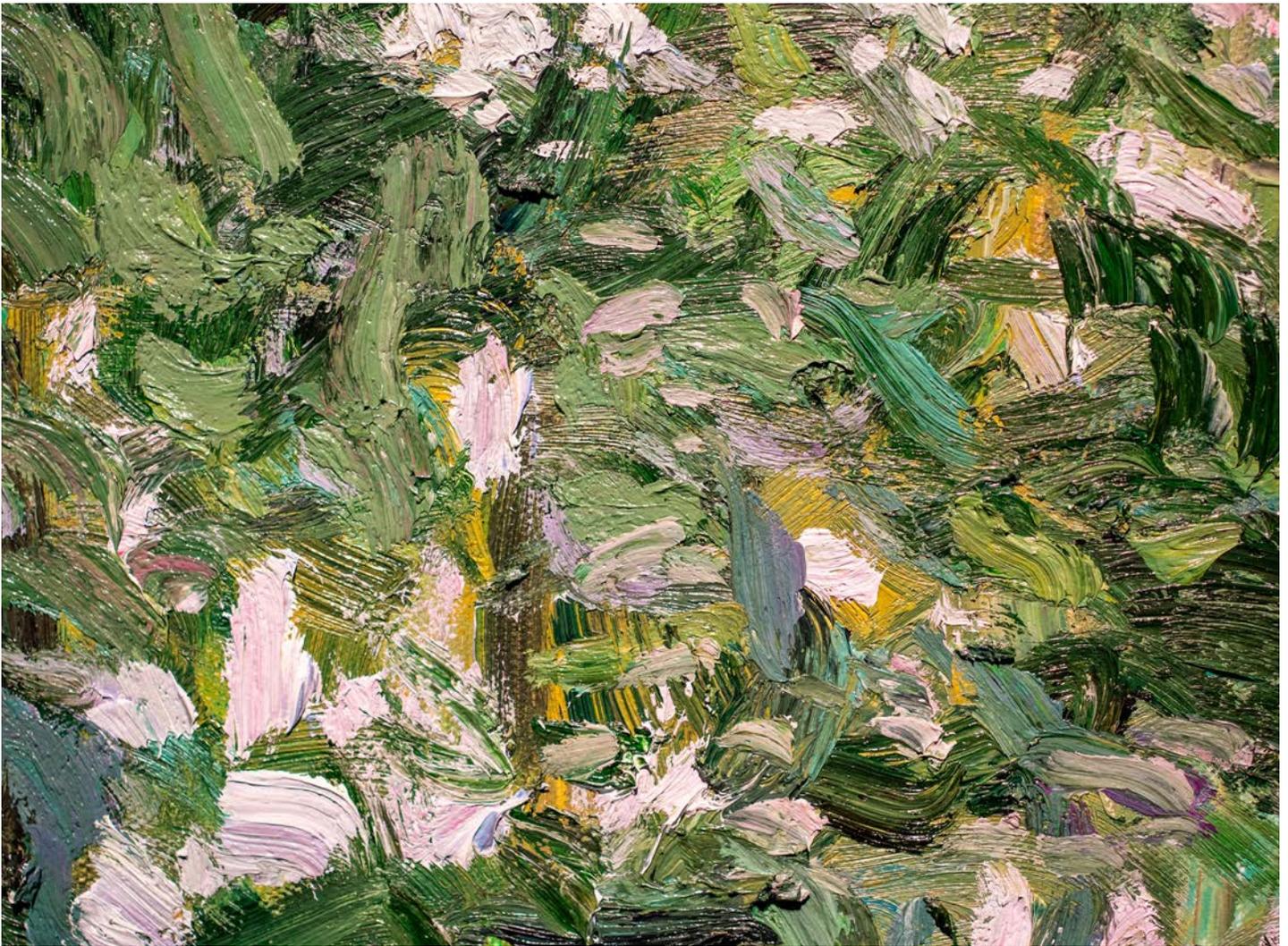
Daoism and the End of Mental Health Stigma

Hilary J.H. Tsui

Abstract

Mental health stigma is a common occurrence in China, with 170 million Chinese people suffering from untreated mental health issues (Yates, 2018). This is due to many religions believing that mental health issues are an indicator of poor societal decorum, ultimately causing its citizens to discriminate, ostracise, and negatively stereotype those with mental health issues. As such, many people refuse to seek help in fear of being isolated from society. Daoism is the only major societal influence that encourages mental health interventions (Lam et al., 2010), but its teachings are often pushed aside in favour of Confucianist, Buddhist, or folk religions' beliefs – all of which contribute to stigmatising mental health. By introducing Daoist beliefs in early adolescence, students can learn that healing their emotions is important when seeking to live a balanced and healthy life. This shift in worldview can change their beliefs about mental health and teach them the importance of mental health intervention, thus inspiring them to advocate for better mental health policies and influencing a change in societal beliefs.

Human beings do not think alike. Culture and upbringing experiences are major factors that influence one's worldview, their thought processes, and cognition (Nielsen et al., 2017). Religion is one of these factors – for both East Asia and the Western world, religion heavily influences how people interact with others, how they see themselves as individuals (Liddell & Williams, 2019), and how they see

themselves as members of the community (Clobert, 2021). Many Western values are derived from Christian values and influences, whereas East Asian values are predominantly influenced by East Asian religions – Confucianism, Buddhism, Daoism, and various folk religions (Clobert, 2021). While not as palpable as it is in the West, religion is heavily ingrained in East Asian society, with people following the teachings and values of multiple religions. East Asian communities adopt traditions and values from multiple religions as they view religion as a way to improve their emotional and cognitive well-being, whereas Western communities consider religion to improve their morals (Clobert, 2021).

This difference in opinion toward religion influences East Asian communities to blend different religious beliefs to best suit their life.

Confucianism, Daoism, Buddhism, and folk religions are the four primary influences in Chinese culture and society (Lam et al., 2010). Their influence affects most aspects of Chinese culture, from a community's interpersonal interactions to its beliefs and values (Liddell & Williams, 2019). While there is much overlap between these religions, much of which collectively influences Chinese society, they also have distinct differences. The teachings in Confucianism, Buddhism, and folk religions dictate that mental health issues should not be healed, whereas Daoist teachings say that mental health issues should be rectified (National Geographic, 2019). As Daoism is the only Chinese religion that advocates for mental health interventions (Lam et al., 2010), the Chinese education system should consider introducing its teachings and values to adolescents in junior secondary school in order to reduce mental health stigma in Chinese society.

Current Chinese societal norms

Societal Chinese norms, beliefs, and governmental policies are based on Confucianism, Buddhism, and folk religions, while Daoism mainly influences science (Mark, 2016) and culture such as astrology, yin and yang, and divination (Sekimori, 2018). As such, Chinese citizens tend to lead very religious lives, with this influence being seen in their values, morals, and behaviour (Scroope, 2017). For example, society's heavy emphasis on harmonious living influences Chinese people to be more tolerant of outgroups (Clobert et al., 2014). Chinese culture regularly employs multiple religious influences on society – this openness to polytheism ensures that they can choose the most harmonious life (Zhang, 2022). As such, people frequently implement other religions' teachings into their life as they can benefit from them. Achieving harmony is an important aspect of collectivist cultures– as seen in East Asian culture, everyone strives to develop deep interpersonal connections with their community and readily work to better the community (Nisbett, 2003). As such, people often sacrifice their own needs by putting the community first, which can be seen in their refusal to seek treatment for their mental health issues as they believe this is caused by their own mistakes. Nisbett (2003) describes this best: "If I am to fit in with the [community], I must root out those aspects of myself that annoy others or make their tasks more difficult" (p. 55). As mental health issues do not benefit the community and do not allow the individual to blend into the community, mental health issues can be considered one of these negative aspects that must be rooted out to preserve the harmony of the community.

Despite the similarities between these religions, their beliefs about mental health differ greatly. Confucianism discourages people from seeking help,

instead advising them to accept their mental health issues. Buddhist and folk religious teachings state that mental health issues are deserved punishments. However, Buddhism believes they are due to mistakes made in a previous life, whereas folk religions believes they are due to their ancestors' displeasure of their actions (Lam et al., 2010). With Daoism being the only religion to say otherwise, often, its teachings about mental health are not as widely known as the Confucianism, Buddhism, and folk religious teachings. As such, these religious teachings influence Chinese society to negatively view mental health issues and to stigmatise its existence.

The issue with mental health stigma

Stigma perpetuates the prevalence of untreated mental health issues in Chinese society as it causes the community to discriminate against those with mental health issues (Yin et al., 2020), which can deter those wanting mental health help from seeking treatment. This stigma comes from the belief that they will lose their reputation if they seek mental health help (Yin et al., 2020). Deva (2002) adds that mental health facilities are often located far away from cities and are rarely acknowledged by the community. This physical and ideological separation from society indicates that mental health issues are considered shameful and that those seeking help will be ostracised by the community, further perpetuating mental health stigma. Due to the influence from Confucianism, Buddhism, and folk religions, mental health issues are believed to be contagious, a sign that the individual is not a good person, or that their mental health issues are punishment (Yates, 2018). These beliefs portray people with mental health issues as dangerous, thereby giving people further reason to ostracise them. This in turn, urges people to keep their mental health issues private, which can negatively

impact their well-being (Lau & Wong, 2008). As such, researchers say that the stigma of mental health issues can be more harmful (Xu et al., 2018) than the mental health issues themselves.

This is due to the stigma of mental health issues in China being so prevalent that those with mental health issues refuse to seek treatment (Yin et al., 2020) as they believe it to be their punishment or destiny. This refusal has harsh consequences. For instance, an estimated 30% of the 27 million suffering from depression will complete suicide (Yip, 2008). This statistic shows that mental health stigma, which is perpetuated by Confucianist, Buddhist, and folk religious beliefs, have fatal consequences. This stigma not only affects suicide rates, but also it prevents individuals from finding employment (Yin et al., 2020) and having healthy interactions with others, further isolating them from their community (Xu et al., 2017) and preventing access to support systems. As collectivistic individuals view themselves as an interconnected part of the community (Nisbett, 2003), this isolation harms them greatly and can worsen their mental health issues. However, Daoist beliefs insist that mental health issues require healing, thus, their teachings may help improve mental health stigma.

The benefits of Daoism on mental health

Daoist teachings emphasize balance. The Daoist strive for a balanced life; too much happiness or sadness will disrupt the balance (Pan, 2003). With mental health issues like depression, the abundance of sadness means that there is little happiness – this unequal weighing of emotions means that this balance does not exist (Pan, 2003). This balance applies to both interpersonal relationships and nature as their life goal is to live a harmonious life (Scroope, 2017). They achieve this by "going with the flow" and respecting

the life that was given to them (Santee, 2019). "Going with the flow" does not exclude accepting their abnormalities, however, Pan (2003) notes that they believe in healing themselves whenever their emotions become unbalanced, because this means that their mind is no longer healthy. An unequal amount of sadness and joy can negatively impact a person's wellbeing; to regain harmony, those suffering from mental health issues must heal themselves to restore emotional balance and a healthy mind.

Daoism is an effective solution to improve mental health in Chinese society as it holds similar teachings to Confucianism, Buddhism, and folk religions – they all emphasize harmony, interpersonal connections, and collectivism (Lam et al., 2010). By introducing Daoist ideas and perspectives in Chinese education, students understand the importance of mental health and gain a different, but equally cultural, way of thinking about mental health. Discussing mental health in culturally religious terms can help the community accept this change as the teachings are already familiar to them. Additionally, by prioritising Daoist teachings and actively dispelling religious beliefs about mental health issues being a personal fault, society can learn to understand that mental health healing is important and not a punishment. Pan (2003) also notes that in Chinese culture, emotional health plays an important role in their life, and negative emotional health can affect their spirituality, connection to others, and harmony with society. As such, using their pre-existing views about emotional health to discuss the implications of mental health stigma can help communities understand why Daoist mental health healing is important.

Education as an influential factor

When changing beliefs, language plays a role in how new ideas are received. By framing new ideas in ways that seem legitimate (Apple, 2012), students can be more open to Daoist ideas and gain a new perspective about mental health. Bantebya et al. (2014) add that when these new ideas are given by authoritative figures, people are more willing to listen to them. As teachers are seen as authoritative figures, students will then also be more receptive of this new way of thinking. Education is an important first step in changing perceptions and attitudes as it is an institution that is easily accessible (Supples & Smith, 1995). As continuing education until the end of junior secondary school is compulsory in China (China Education Center, n.d.), the Chinese school system can provide students with a new perspective on mental health. Introducing Daoist teachings on mental health to junior secondary school-aged children is an effective age to target as studies determined that decision-making abilities in youth increase around age 13. This is due to changes in cognition (Moses-Payne et al., 2021) which allows them to begin developing perspectives and worldviews that differ from their parents. As youths develop the ability to think about different perspectives and apply their knowledge to different situations (Eccles, 1999), they will be more willing to listen to Daoist teachings, perspectives about mental health, and how it can benefit the community. By waiting until students are cognitively independent enough to accept and absorb new information that may not align with societal norms, Daoist teachings will have a better chance of adjusting the way students think about mental health and healing.

Education as a norm changer

Supples and Smith (1995) say that education precedes norms and culture. By changing the way how students think and perceive, the norms and beliefs of an entire community can shift. Thus, education has the power to change societal views merely by teaching people other perspectives of thinking. Apple (2012) adds that education has a lot of influence over society as it sets the guidelines on how to think, feel, and interact. After students leave school, they bring these Daoist perspectives of mental health and healing into the home and workforce.

Prentice (2018) acknowledges that while societal beliefs are hard to change due to how the community interacts with and experiences their world, it is not impossible; norms and beliefs are constantly changing. As such, when discussing Daoist teachings and beliefs about mental health, ensuring that the community hears about how this new perspective affects people's lives and well-being can allow them to be more open to change. Additionally, Prentice (2018) advises ensuring that changes are visible and open can encourage long-term change. Openly discussing Daoist teachings and changes in mental health stigma can be reduced as people are consistently receiving information about mental health, thus normalising its existence.

The trouble with relying on social change

However, social change takes decades (Voight & Spies, 2020); by relying solely on education to shift social norms, students may be expected to reach positions of power before being able to implement changes in mental health. In a study looking at education and social change, Voight and Spies (2020) notes that after 20 years of implementing girls' education in Pakistan, its citizens now understand and support girls having equal education opportu-

nities as boys. Considering the amount of deaths caused by suicide every day, twenty years is a significant period of time for mental health attitudes and policies to change. Researchers estimate that over 250,000 individuals completed suicide due to mental health issues within a single year (Phillips et al., 2002); if Daoist teachings about the need for mental health intervention needed 20 years to be completely implemented in society, 5,000,000 people would have died during that time. As such, education alone will not be sufficient to change Chinese society's attitudes toward mental health as it will require many years of change.

Education as a starting point

However, Yates' (2018) view on the notion that education is not enough to change societal attitudes varies from Voight and Spies' (2020) opinion that education is crucial in de-stigmatising mental health. Education, Yates (2018) says, is a starting point, not the end goal. By introducing these ideas and encouraging them to talk to their communities about it, change can occur. This is because in Chinese societies, community interventions are effective in creating change due to the shared connection between its members (Maddock et al., 2021). By developing an education curriculum that focuses on teaching Daoist beliefs and well-being, students will learn to understand the importance of this education and be empowered to advocate for policy change. Authoritative institutions can then develop educational resources to distribute it to the public. This change has been witnessed in South Korea, another collectivistic country, where educational initiatives in the form of standardised class material and television documentaries have led to a detectable change in Korean societal beliefs regarding mental health (Yip, 2008). By distributing standardised material discussing Daoism and mental health to Chinese students, they can learn about this alternate perspective

and discuss it with their community, thereby encouraging them to re-consider their stance on mental health.

Conclusion

Understanding Chinese cultural beliefs is important when it comes to changing cultures and values. This is to ensure that when changing society's minds to be more open to mental health issues, the factors and values of this change will be based on a religion they are familiar with. This familiarity will ensure their willingness to listen to this change and work to decrease this stigma. While Daoism is a main influencer on Chinese traditions and cultural symbols, its teachings about mental health and mental health healing are often pushed aside in favour of Confucianist or Buddhist teachings (Lam et al., 2010; Sekimori, 2018). As Confucianist, Buddhist, and folk religion beliefs see mental health issues as a punishment (Yates, 2018) and thus should not be fixed, mental health stigma is prevalent in Chinese society (Clobert, 2021). By incorporating Daoist beliefs about mental health in Chinese education systems, students will come to see mental health issues not as a punishment or as their "fate", but merely as an imbalance in their spirituality (Pan, 2003) an issue which can be fixed through healing. This implementation of Daoist beliefs can bring a newfound understanding of mental health issues to the community, changing how its citizens view mental health and the need for intervention. Thus, by both adhering to the Daoist view of mental health healing and working to change norms and perspectives in society through education, mental health stigma and societal well-being can improve.
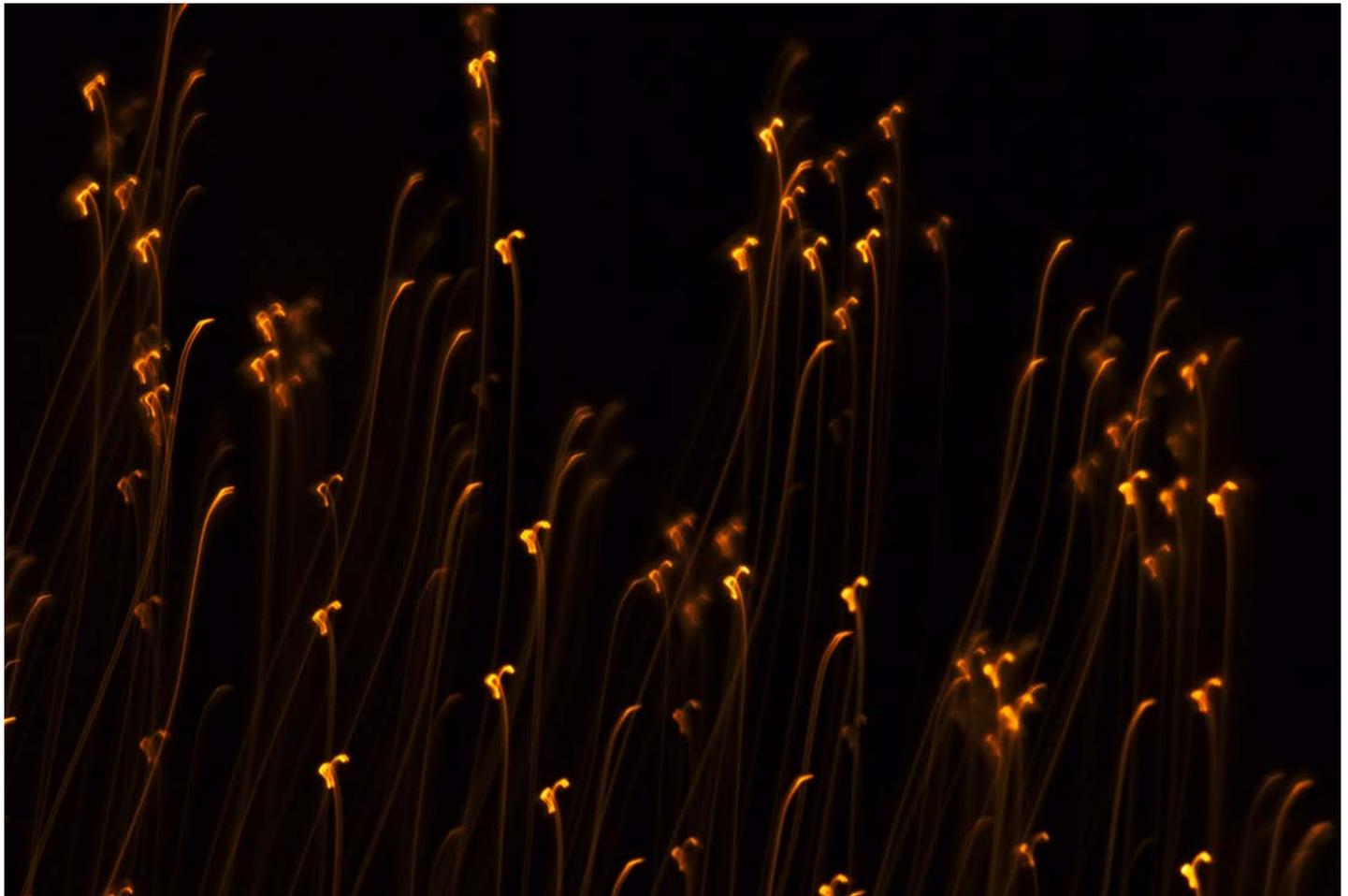
CBT Treatment and Adaptations for Adolescents with Depression

Alyssa Henderson, AH / *University of Guelph*

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by persistent deficits in social communication and social interaction (DSM-5- TR, 2022). Simonoff and colleagues (2008) suggest that psychiatric disorders are common in adolescents with ASD. In their small sample of 112 adolescents, approximately 70% had one comorbid psychiatric diagnosis, whereas about 41% had two or more diagnoses. In a large-scale community survey of 4343 ASD individuals aged 5-18, 11% of the sample had comorbid depression (Rosenberg et al., 2011). Individuals diagnosed with depressive disorders experience a sad, empty, or irritable mood, accompanied by related changes that significantly affect their capacity to function (DSM-5-TR, 2022).

Research studies have found Cognitive Behaviour Therapy to be an adequate treatment for typically developing children with depression (Beck et al., 2011; Keles & Idsoe, 2018). However, the majority of the research findings on evidence-based treatment options for adolescents are not generalizable to neurodiverse adolescents and ASD and comorbid depression (DeFilippis, 2018). Addressing this limited generalizability is vital to extend the utility and applicability of this knowledge to help neurodiverse adolescents with ASD and comorbid depression. The existing – though scant - research suggests that traditional CBT is an effective treatment for adolescents with ASD and comorbid anxiety (e.g., see White & Colleagues, 2018; McGillvray & Evert, 2014). It is important to note that the study conducted by McGillivray & Evert (2014) had a small sample size, and participants in the waitlist group also demonstrated a reduction in symptoms of depression, anxiety, negative and anxious self-talk, and stress, which may indicate the need for further investigation.

Furthermore, other researchers have suggested potential adaptations to CBT that address the symptoms of ASD when providing treatment for depression in young adults with ASD (e.g., Kerns et al., 2016; Weston et al., 2016; White et al., 2018). Alternative approaches– such as mindfulness-based interventions – may also provide more promising therapeutic benefits when compared to CBT (White et al., 2018). In summary, the efficacy of CBT treatment for ASD adolescents with comorbid depression needs to be further explored based on the mixed and limited findings of previous researchers. Therefore, the present review summarizes research articles focusing on CBT treatment and adaptations for adolescents with ASD and comorbid depression to understand its efficacy better.

CBT was developed by Aaron Beck in the early 1960s as a form of psychotherapy (Beck et al., 2011). The cognitive model suggests that dysfunctional thinking is common to all psychological disturbances. People's thoughts, behaviours, and emotions are shaped by their perceptions of the events they experience. Specifically, clinicians using CBT use a series of questions to help clients evaluate the validity of their unhelpful or inaccurate thoughts. CBT teaches clients to identify, assess, and respond to their dysfunctional thoughts and beliefs (e.g., underestimating ability to change, exaggeration, overgeneralization) to change their thinking, mood, and behaviour. Furthermore, CBT emphasizes collaboration by establishing active participation as the client. It is goal-oriented, structured and time-limited (Beck et al., 2011).

A few scholars investigating the effectiveness of CBT for treating various conditions among ASD individuals have also examined specific adaptations for CBT sessions. Firstly, Weston and colleagues (2016) suggested that common adaptations for CBT included using social stories, increasing the use of role-play, and increasing the involvement of family members. White et al. (2018) also suggested including the clients' unique interests and providing information visually (e.g., handouts). Similarly, Moree & Davis (2010) conducted a review that suggested specific modifications to CBT with ASD children with comorbid anxiety, such as concrete visual tactics, child-specific interests, and parental involvement. Next, the National Institute for Health and Care Excellence (2012) proposed similar adaptations for cognitive and behavioural interventions. They suggested using concrete and structured approaches with additional visual and written information, such as images and thought bubbles.

Furthermore, the language used during sessions should not be ambiguous, using metaphors or hypothetical situations. Lastly, Kerns et al. (2016) recommended that the starting point for CBT should include providing clients with scientific information about the prevalence, presentation, and properties of depression. This clear and concrete psychoeducational component may be essential for individuals with ASD in enhancing treatment responsiveness. Similarly, ASD individuals often display symptoms of rigidity (DSM-5-TR, 2022); thus, precise and concrete components in CBT therapy may best support this symptom.

Despite the adaptations, the meta-analysis from Weston and colleagues (2016) indicated that there are still concerns about the efficacy of CBT for ASD individuals when compared to alternative treatments. More recently, Spain and Happé (2020) suggested that very few studies focus on the moderating and mediating mechanisms of CBT for ASD clients with a wide range of comorbid conditions. Therefore, future researchers should consider comparing the efficacy of specific adaptations to CBT with both typical CBT and other treatment modalities to ensure ASD clients are receiving the best treatment for comorbid depression. A meta-analysis conducted by Menezes et al. (2020) compared CBT to other treatment modalities and approaches for treating depression among ASD individuals. However, the results have been inconsistent, and only one study in the meta-analysis utilized a randomized controlled trial study.

The meta-analysis also provided a brief overview of key modifications to treatment related explicitly to ASD. A limited number of studies on treating depression using CBT demonstrated that some clients experienced a decrease in depressive symptoms following treatment; however, the severity of depressive symptoms in the samples was not consistent across the (e.g., Loades, 2015; Santomauro et al., 2016; Wise et al., 2018). Although the modifications for CBT varied, common modifications included repetition of material, schedules and reminders, visual prompts, and the incorporation of specific interests (Menezes et al., 2020). Given the mixed findings, researchers and practitioners should use sound clinical judgment and remain well-informed of evidence-based practices when implementing CBT for ASD clients with comorbid depression. In fact, Menezes et al. (2020) suggested other treatment approaches (e.g., mindfulness-based therapy) may be more efficacious than traditional CBT for ASD clients with depression. Additionally, while researchers such as Morre & Davis (2010) suggested specific adaptations for the use of CBT for depression with ASD individuals, Spain & Happe (2019) indicated that it may be helpful for clinicians to utilize an individualized approach in the context of CBT and ASD. Given the scant research investigating the efficacy of CBT for people with ASD clients and comorbid depression, it is vital to continue increasing knowledge and contributing to the development of this area in the literature through ethical research.

In summary, previous researchers examining CBT for adolescents with ASD and comorbid depression is limited. The literature lacks controlled experiments that explore the impact of modified CBT on depression among ASD Autistic clients, as well as vital methodological components (e.g., sample size, external validity, randomized controlled trials) that may impact the rigour of some existing studies. There has been far less research on the treatment of comorbid depression when compared to the treatment of anxiety among ASD individuals (White et al., 2018). Specific to comorbid depression, a limited number of small studies have investigated adapted CBT for adolescents with ASD (Kerns et al., 2016; NICE, 2020; Weston et al., 2016; White et al., 2018). Spain & Happé (2020) highlighted a need to further explore CBT's effectiveness, acceptability, and utility and its specific adaptations for ASD individuals. Given that Menezes et al. (2020) found that other treatment modalities may be more efficacious than CBT for ASD clients, future researchers can consider exploring the efficacy of adaptations to CBT compared to other treatment modalities, such as mindfulness-based interventions.

Considering the increases in diagnoses of ASD (Zeidan et al., 2022) and comorbid depression globally (Simonoff et al., 2008; Rosenberg et al., 2011), researchers need to continue exploring how to better support individuals with ASD and depression. That is, researchers may consider asking about the lived experiences of ASD individuals with comorbid depression and their experiences with CBT treatment or other treatment approaches. Moreover, while research on the topic of comorbid depression in ASD clients is sometimes contradictory or limited, the importance of ethical research is of utmost importance. Thus, future researchers may guide their exploration of treating depression in ASD clients through an approach based on the saying, 'nothing about us without us.'
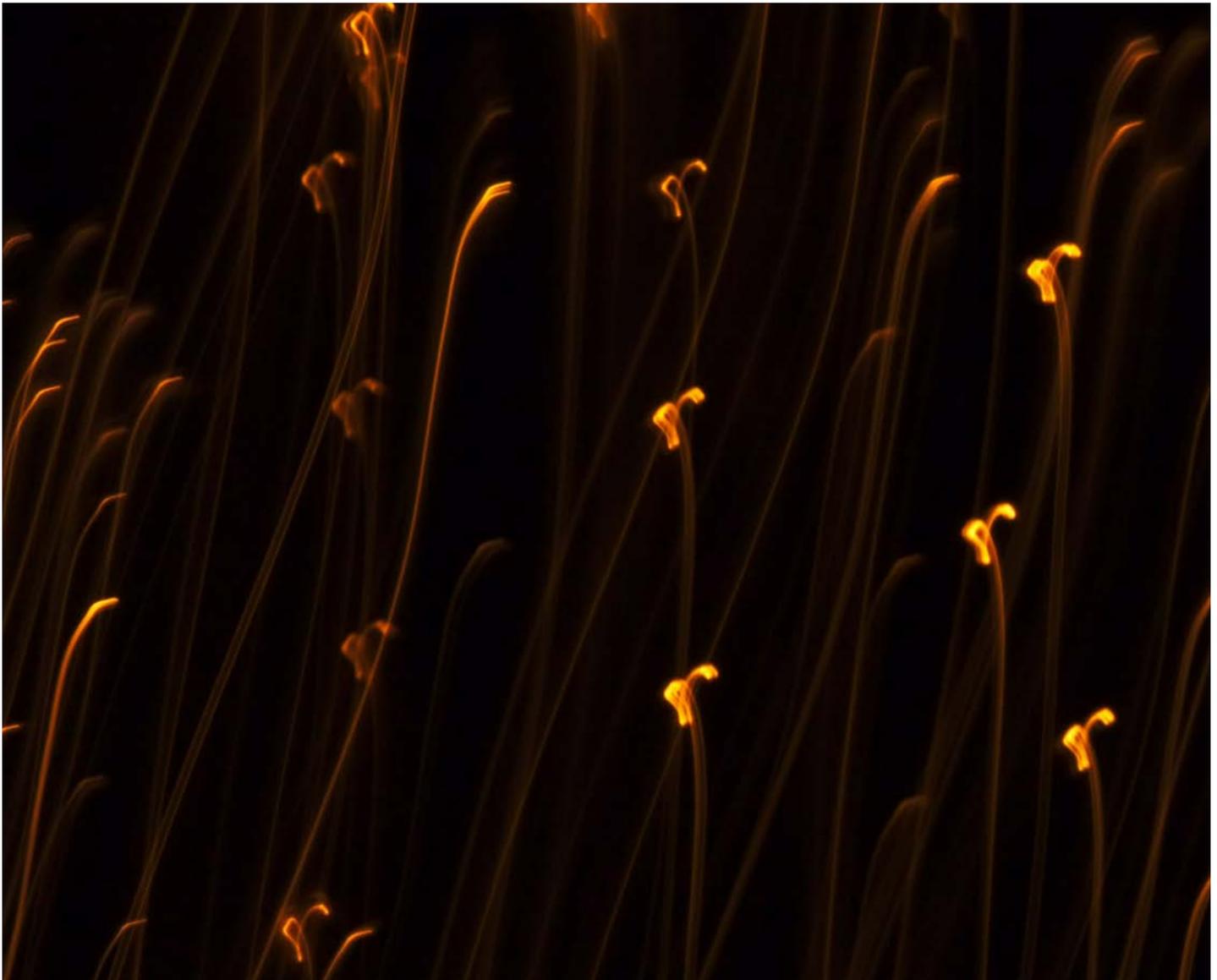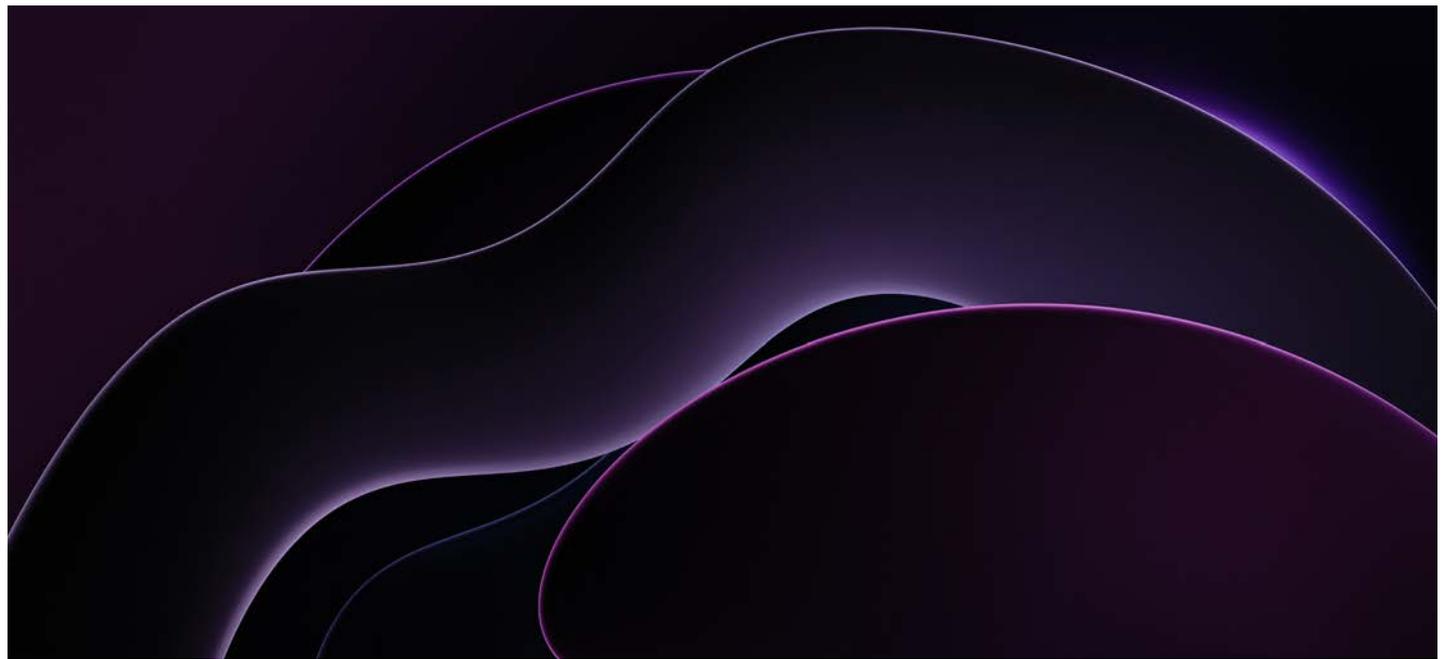
Avoid more, stress less: Academic behaviour moderates avoidant personality symptoms and stress in college students

Michelle McLean / MEd, University of Albert

Abstract

High rates of avoidant personality disorder (AVPD) symptoms are common in college student samples. Yet, how AVPD symptoms interact with an academic context is under-explored. This study examined whether avoidant academic behaviours moderate the relationship between AVPD symptoms and stress. One-hundred twenty three college students completed a survey measuring AVPD symptoms, types of avoidant academic behaviour, and perceived stress. Results demonstrated that academic behaviours, such as performance-avoid goal orientation (i.e., goal to avoid the demonstration of incompetence) and avoidance of help-seeking, moderated the association between AVPD symptoms and perceived stress, such that more avoidance was related to less stress. This moderation was not present for avoidance of novelty behaviour. Encouraging academic engagement for students with AVPD symptoms might increase stress, and has implications for teaching approach, student support, and student mental health. Helping people reduce avoidant behaviours they perceive as effective for managing stress must be handled with care.

Stress and avoidant personality disorder (AVPD) symptoms have been observed in high rates across college student samples. The American College Health Association (2019) surveyed 67,972 students at 98 postsecondary institutions. Students identified stress as the most frequent impediment to academic performance, with 58.8% reporting higher than average overall stress levels throughout the year and 87.4% feeling overwhelmed by their workload. Although moderate stress is adaptive, stress in excess has implications for student adjustment, including poor academic performance, mental health issues, and maladaptive coping (Bayram & Bilgel, 2008; Tavolacci et al., 2013). These negative outcomes demonstrate a need to understand factors contributing to student stress.

Prevalence estimates for clinical levels of AVPD fall between 1.5-2.5% (Lampe & Malhi, 2018), although both lower and higher estimates have been reported across various populations

(Coid et al., 2006; Quirk et al., 2017). Like other personality disorders, AVPD exists as traits on a dimension and can be present in normative or non-clinical populations or present at clinical levels (i.e., causing significant distress and/or impairment). Although clinical levels of AVPD are often not measured in college samples, high rates of AVPD symptoms have been observed in student populations (e.g., 39% in Cummings et al., 2013). AVPD involves persistent feelings of inadequacy, sensitivity to negative evaluation, and social inhibition and is linked to lower educational attainment and unemployment (Lampe & Malhi, 2018). College students are immersed in a highly evaluative setting, which is a model environment to intensify the insecurities associated with AVPD. Hallquist and Lenzenweger (2013) also reported that out of a large sample of college students (n = 250), almost 10% who initially did not meet criteria for AVPD developed clinical or near-clinical symptoms over four years in college. Thus, it is not only possible that AVPD symptoms make stressful academic environments difficult to function in, but these environments may also trigger emergence of the disorder in vulnerable students.

Despite academic settings often being a stressful experience, little is known about how AVPD symptoms interact with an academic context in the process of stress generation. As AVPD is characterized by avoidant coping, it is likely that this tendency manifests itself as avoidant academic behaviour in college contexts. Avoidant coping is linked to increased stress in non-AVPD samples (Bouteyre et al., 2007), but it is not understood how avoidant academic behaviour contributes to stress for those reporting AVPD symptoms especially since those with AVPD often avoid situations perceived to intensify stress (Lampe & Malhi, 2018). Of the avoidant academic behaviours examined in students

reporting AVPD symptoms, Taylor et al. (2004) surveyed two college student populations and found higher scores of AVPD symptoms were correlated with the avoidance of emotion and novel or challenging tasks (i.e., procrastination). The researchers hypothesized that negative beliefs about emotions might drive avoidance of any activity that elicits unpleasant affect, such as anxiety around a novel or difficult assignment. AVPD symptoms have also been linked to stress generation in a college student sample, where conflict management mediated the relationship (Cummings et al., 2013). While this study demonstrated an association between AVPD and stress in college students, it did not focus on specific academic behaviours as a potential contributor to stress generation.

Additionally, avoidant behaviour in non-AVPD specific samples has been shown to be clearly detrimental to academic performance. For example, avoiding academic social engagement hinders students' opportunities to learn from others, expand collegial social networks, and progress in their chosen career, along with the fear of criticism precluding academic help-seeking (Hu & Wolniak, 2013). Avoidant coping has also been linked to lower grade point averages in college samples (MacCann et al., 2011) and, although the stability of AVPD over time has been questioned (Wright et al., 2013), there is evidence that people with AVPD symptoms often have broad impairment in occupational functioning (Hu & Wolniak, 2013), indicating that early avoidant academic behaviours can interfere with later career success.

The Current Study

The aim of this study was to address gaps in the research on the role of avoidant academic behaviour in the relationship between AVPD symptoms and stress. Based on the prior research indicating associations between AVPD

symptoms and stress generation (Cummings et al., 2013) and AVPD symptoms and avoidant coping (Taylor et al., 2004), it was hypothesized that AVPD symptoms would be significantly associated with increased stress and avoidant academic behaviours. Additionally, it was hypothesized that avoidant academic behaviours would

moderate the relationship between AVPD symptoms and stress, that is, that the magnitude of AVPD's effect on stress would fluctuate in accordance with the level of avoidant academic behaviours. While avoidance likely reduces stress for students with AVPD by helping them avoid activities that they find distressing, it is also possible that avoidance increases stress due to not completing assignments or help-seeking. Thus, given the paucity of research in this area, we made no specific hypothesises regarding the exact nature of the moderating role of avoidant academic behaviours in the relationship between AVPD symptoms and stress.

As prior studies usually refrain from clinically diagnosing participants (Cummings et al., 2013), AVPD symptoms were measured on a dimensional scale rather than categorizing participants into clinical/non-clinical groups. Measures of avoidant academic behaviour were included if they reflected social avoidance (e.g., avoiding class engagement or asking for help) or avoidance of stimuli that might elicit negative emotion (e.g., avoiding novel tasks). Stress was measured with a multi-purpose scale that included anxiety, which is also highly associated with AVPD (Bouteyre et al., 2007).

Methods
Participants

A total of 123 participants took part in the study (78% women, 85% aged 18-22 years old), with the majority in their second year of college

(M = 2.15, SD = 1.18). English as a second language was measured to examine a role, if any, that language anxiety may play in classroom behavior as identified by Rocca (2010). The majority (93.5%) of participants responded "no" to the question "Are you an ESL/International student?" Participants were recruited from an undergraduate psychology participant pool at a Canadian college and offered a bonus course credit for participation.

Measures

The avoidant subscale of the Personality Diagnostic Questionnaire was used to measure AVPD symptoms (PDQ-4; Johnson & Bornstein, 1992). Participants indicated if seven statements (e.g., "I avoid working with others who may criticize me") were true or false for themselves. This subscale is used indicate the presence/absence of AVPD symptoms by summing the number of items rated as true and comparing this to a criterion cut-off, which is followed by a clinical interview in a clinical setting. However, since the aim of this study was not to diagnose participants, a continuous AVPD score was calculated by summing the number of true responses for an overall score (min = 0, max = 7), as done in previous studies using the subscale, with higher scores indicating higher endorsement of AVPD traits (e.g., Cummings et al., 2013).

The Depression Anxiety Stress Scales 21 was used to measure stress, along with anxiety as a control variable (DASS-21; Henry & Crawford, 2005). Seven statements comprise each of the two subscales: anxiety (α = .82; e.g., "I felt I was close to panic") and stress (α = .90; e.g., "I found it hard to 'wind down'"). Participants rated agreement with items on a 4-point scale (0 = did not apply to me to 4 = applied to me), which were summed as overall scores for each subscale.

Avoidant academic behaviour was assessed using the subscales performance-avoid goal orientation (α = .73; e.g., "It's very important to me that I don't look stupid in my class") consisting of six items, and the avoidance of novelty (α = .77; e.g., "I don't like to learn a lot of new concepts in class"), consisting of five items, from the Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000). Seven items from an avoidance of help-seeking scale were also included (α = .77; Ryan & Pintrich, 1997) with statements about perceived threat from professors and peers regarding help-seeking (e.g., "I think the professor might think I am dumb when I ask a question in in class") and the general avoidance of help-seeking (e.g., "I don't ask for help in class, even if the work is too hard to solve on my own"). See appendix A for the final measure of combined items. Items were scored on a 5-point scale (1 = not at all true to 5 = very true), which were summed as overall scores for each subscale.

Procedure & Analysis

Participants completed the consent, demographic, and survey questions via an online platform (SurveyMonkey.com). Each measure appeared in a random order and questions within each measure were randomized to minimize potential order effects. At the end of the survey participants received a debriefing form and bonus course credit worth 2.5% of their grade. A moderation analysis was conducted using Hayes' (2013) PROCESS plugin in IBM SPSS Statistics 27 software. AVPD scale score was the predictor variable, with avoidant academic behaviour overall score as the moderator, stress score as the outcome variable, and anxiety as a control. Predictor and moderator variables were centered to ensure the coefficients for the two variables that define the product were interpretable within the range of the data (Hayes, 2013). The Johnson-Neyman (1936) approach was used to further

explore the nature of the interaction and significant cut-off regions. This approach helps to examine any interaction effects and the values at which the potential moderator moves from an insignificant to significant region.

Results

Preliminary Analyses

Independent samples t-tests were run to examine potential differences among gender, age, year of study, and ESL status. There was a significant difference of gender on the avoidance of help-seeking subscale, $F(118) = .730$, SE = .38, p = .035, indicating women (M = 5.01, SD = 1.67) were more likely to engage in avoidance of help-seeking behaviors than men (M = 4.21, SD = 1.56). However, this finding must be interpreted with caution due to the low number of men represented in the sample (19.5%). The data met assumptions for normality/independence of errors (Durbin-Watson = 1.92) and multicollinearity (VIF = 1.45). Corroborating prior findings of high levels of AVPD in student samples, 51% of the sample scored 4 or higher on the AVPD scale which is the screening threshold for justifying further clinical investigation (Cummings et al., 2013). As hypothesized, AVPD was correlated with stress and all avoidant academic behaviours. See Table 1 for means, standard deviations, and correlations.

Moderation Analyses

Model 1 – Total Avoidant Academic Behaviour

Model 1 combined all avoidant academic behaviour subscales as a single moderator and was significant ($R^2 = .75$, $F(5, 117) = 43.32$, $p < .001$), prompting additional analyses of each avoidant academic behaviour subscale to identify specific domains of significance. A model testing avoidance of novelty was not significant and is, thus, not reported. Results of significant models are shown in Table 2.

Model 2 - Performance-Avoid Goal Orientation

Model 2 tested the moderating role of performance-avoid goal orientation (i.e., the motivation to avoid negative evaluation of performance) on AVPD symptoms and stress and was significant ($R^2 = .57$, $F(5, 117) = 41.14$, $p < .001$). The interaction term explained approximately 4% of the variance above and beyond the two main effects of the predictor (AVPD) and moderator (performance-avoid goal orientation). At high and low levels of performance-avoid goal orientation, the relationship between AVPD and stress was not significant. However, significance regions identified by the Johnson-Neyman output indicated that AVPD symptoms were significantly related to stress when performance-avoid goal orientation was less than 4.77 points on the scale, $b = .57$, $SE = .24$, $t(117) = 1.98$, $p = .05$ (i.e., when performance-avoid goal orientation scores were lower than 4.77, there was a significant positive relationship between AVPD and stress), or more than 4.70 points on the scale, $b = -.470$, $SE = .23$, $t(117) = -1.98$, $p = .05$ (i.e., when performance-avoid goal orientation scores were higher than 4.70, there was a significant negative relationship between AVPD and stress; See Figure 1).

Model 3 - Avoidance of Help-Seeking

Model 3 tested the moderating role of avoidance of help-seeking on AVPD symptoms and stress and was significant ($R^2 = .75$, $F(5, 117) = 41.24$, $p < .001$). The interaction explained approximately 4% of the variance. At low levels of avoidance of help-seeking, the relationship between AVPD symptoms and stress reached significance, $b = .61$, $SE = .25$, $t(117) = 2.39$, $p = .01$, however, not at high levels ($p = .19$). The Johnson-Neyman output showed that AVPD symptoms were significantly related to stress when avoidance of help-seeking was less than 2.85 points

on the scale, $b = .41$, $SE = .21$, $t(117) = 1.98$, $p = .05$, or more than 8.30 points on the scale, $b = -.595$, $SE = .30$, $t(117) = -1.98$, $p = .05$ (See Figure 2).

Discussion

This study provides support for the hypotheses that AVPD symptoms are significantly correlated with stress and avoidant academic behaviours and that avoidant academic behaviour plays a moderating role in the relationship between AVPD symptoms and stress in college students. High levels of motivation to avoid negative evaluation of performance and avoidance of help-seeking in students high in AVPD symptoms was associated with decreased perceived stress. This provides support for the reinforcing nature of avoidance as a preferred coping strategy for those with AVPD (Lampe & Malhi, 2018). However, only socially avoidant behaviours (i.e., performance-avoid, help-seeking) interacted with perceived stress levels. Conversely, there was no relationship between stress and non-social avoidant behaviour (i.e., avoidance of novelty). One interpretation of this result is that interpersonal scenarios elicit more stress for people with AVPD symptoms than when they encounter challenging, but solitary tasks. This is likely due to interpersonal difficulties associated with AVPD (Cummings et al., 2013). While the current results are consistent with Taylor et al.'s (2004) findings that higher levels of AVPD symptoms are correlated with the avoidance novel tasks, this avoidance does not appear to increase stress.

The results have several implications for the functioning of college students high in AVPD symptoms. First, engaging in avoidant academic behaviours likely undermines the academic success of people with high levels of AVPD symptoms even though engaging in such behaviours alleviates stress (Hu & Wolniak, 2013). Second,

avoidant behaviour and a subsequent reduction in stress likely plays a role in maintaining the AVPD symptoms for college students. Avoidance can provide temporary relief but has the potential to reinforce negative beliefs about the self and others, perpetuating an increased reliance on avoidant academic behaviour. Third, if left unaddressed, avoidant behaviour and AVPD symptoms have the potential to develop into long term mental health challenges (Bouteyre et al., 2007; Halquist & Lenzenweger, 2013).

The results also have implications for college-level classroom teaching. First, there is a high probability that instructors will encounter students with AVPD symptoms in the classroom. These students are likely to engage in avoidant academic behaviour that undermines their ability to reach their maximum level of success. Additionally, educational approaches such as group discussion, encouraging student questions, and experiential learning activities are likely to be stressful for students with elevated AVPD symptoms when they are unable to engage in avoidance. Awareness of this effect can help instructors to support students to persevere through their stress. This might be done through encouraging a growth mindset in class discussions versus a fixed ability (e.g., reframing evaluation as a developmental activity versus one for pointing out inherent inadequacies; Yu & McLellan, 2020), cultivating a supportive environment for students to raise their questions in (Bachrach & Arntz, 2021), and providing information on how to access professional therapeutic help. Supporting students in exposure activities might allow them to become habituated to anxious internal feelings and collect evidence that can contradict their beliefs regarding the self and avoidance (Bachrach & Arntz, 2021).

Future Directions and Study Limitations

Although clinical levels of AVPD are linked to lower academic achievement, poor interpersonal outcomes, and mental health concerns (Lampe & Malhi, 2018), it would be worthwhile to further investigate how avoidant academic behaviour mitigates or exacerbates these concerns in college students. Future research might also explore whether socioeconomic background or race plays a role in these relationships, as AVPD prevalence has tentatively been shown to be higher in those with lower educational attainment and among white populations (Marques et al., 2012; Olssøn & Dahl, 2012). Several limitations of

the application of this study should also be noted. Interpreting results from a non-clinical sample for practical use regarding clinical phenomena should be done so with caution. Future replications of this study with a college sample formally diagnosed with AVPD can extend findings to a clinical population. Likewise, caution is advised when interpreting self-report data, especially for personality disorders where the clinical component of the diagnostic measure has been omitted and no formal diagnosis has been made by a trained practitioner. For example, the self-report section of the PDQ-4 has been shown to overestimate personality disorders by about 50% compared to when used

in conjunction with the corresponding clinical interview (Calvo et al., 2013).

Overall, this study demonstrates that high levels of avoidant academic behaviour potentially mitigates stress for students with AVPD symptoms. Given this finding, it is important to further explore how avoidant academic behaviours affect students with AVPD in other domains of their academic and personal life. Increasing understanding in this area can help develop and guide behavioural interventions for students with AVPD symptoms who engage in avoidant academic behaviours, increasing their chances of improved functioning and academic success.

Table 1. *Means, Standard Deviations, and Intercorrelations of Student Sample*

Subscales	1	2	3	4	5	6
1. AVPD (avoidant personality disorder)	-					
2. Performance-avoid goal orientation	.575**	-				
3. Avoidance of novelty	.237**	.237**	-			
4. Avoidance of help-seeking	.508**	.569**	.450**	-		
5. Stress	.346**	.300*	.274**	.294**	-	
6. Anxiety	.380**	.201*	.258**	.236**	.712**	-
Mean	3.56	17.89	15.50	4.85	7.66	5.38
SD	1.99	4.39	3.44	1.66	4.64	4.76

Note. * $p < .05$ (2-tailed); **$p < .01$ (2-tailed)

Table 2. *Significant Models of Moderation Analyses Predicting Stress as the Outcome Variable*

		ΔR^2	B	SE	95% CI	t	p
Model 1 Predictors	AVPD (avoidant personality disorder	.572	.076	.193	-.307, .460	0.39	.693
	Total avoidant subscales		.081	.041	-.000, .164	1.95	.052
	AVPD x Total avoidant subscales		-.056	.017	-.090, -.022	-3.27	.001
	Anxiety*		.768	.068	.632, .904	11.20	<.001
Model 2 Predictors	AVPD	.037	.046	.209	-.368, .461	0.22	.825
	Performance-avoid goal orientation		.165	.083	-.000, .331	1.98	.049
	AVPD x Performance-avoid goal orientation		-.110	.034	-.179, -.042	-3.19	.001
	Anxiety*		.779	.068	.644, .914	10.12	<.001
Model 3 Predictors	AVPD	.036	.159	.179	-.195, .513	0.88	.375
	Avoidance of help-seeking		.097	.068	-.037, .232	1.43	.154
	AVPD x Avoidance of help-seeking		-.090	.032	-.154, -.027	-2.83	.005
	Anxiety*		.755	.071	.614, .897	10.59	<.001

Note. Total avoidant subscales = combined performance-avoid goal orientation, avoidance of novelty, and avoidance of help-seeking. *control

Figure 1. *Model 2 – Moderating Role of Performance-Avoid Goal Orientation in Relationship between AVPD Symptoms and Stress*
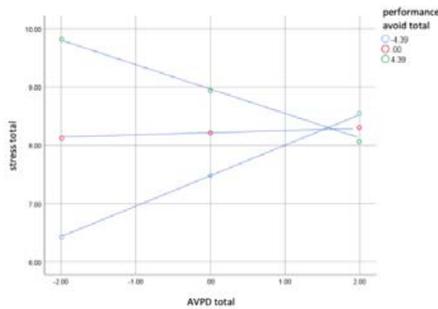
Note. Regression plot, plus and minus one standard deviation from the mean. At both high and low levels of performance-avoid goal orientation, the relationship between AVPD symptoms and stress was not significant.

Figure 2. *Model 3 – Moderating Role of Avoidance of Help-Seeking in Relationship between AVPD Symptoms and Stress*
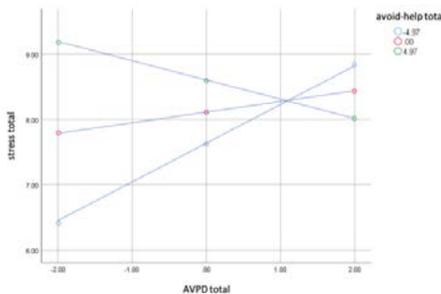

Note. Regression plot, plus and minus one standard deviation from the mean. At low levels of avoidance of help-seeking, the relationship between AVPD symptoms and stress was significant but not at high levels.

Appendix A
Avoidant Academic Behaviour combined subscales

Performance-Avoid Goal Orientation (Midgley et al., 2000)

1. It's very important to me that I don't look stupid in my class

2. An important reason I do my class work is so that I don't embarrass myself

3. The reason I do my class work is so my instructor doesn't think I know less than others

4. The reason I do my class work is so others won't think I'm dumb

5. One of my main goals is to avoid looking like I can't do my class work

6. One reason I would not participate in class is to avoid looking stupid

Avoiding Novelty (Midgley et al., 2000)

1. I would prefer to do class work that is familiar to me, rather than work I would have to learn how to do

2. I don't like to learn a lot of new concepts in class

3. I prefer to do work as I have always done it, rather than trying something new

4. I like academic concepts that are familiar to me, rather than those I haven't thought about before

5. I would choose class work I knew I could do, rather than work I haven't done before

Avoidance of Help-Seeking (Ryan & Pintrich, 1997)

1. I worry other students might think I'm dumb if I ask a question in class

2. I worry about what other students might think if I express an idea in class

3. I worry the instructor might think I'm dumb if I ask a question in class

4. Instructors are more impressed if I complete my work without asking for help with it

5. I worry the instructor might think I'm dumb if I ask for help with assignments

6. If I need help understanding course material I skip it

7. I don't ask for help in class, even if the work is too hard to solve on my own
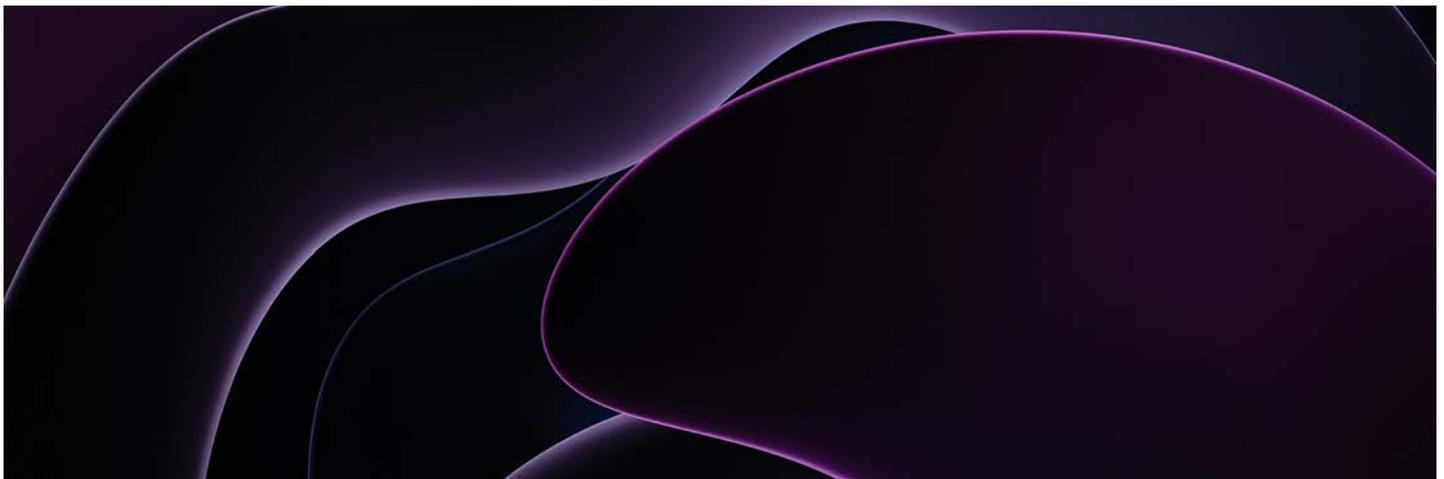
A Novel Bidirectional Model of Self–Regulation for Understanding Behaviour Change

Eric P., Samtleben / M.Sc. candidate, Trent University
Brenda, Smith-Chant / Ph.D., Trent University

Abstract

Interventions targeting self-regulation of behaviour are considered one of the most dominant approaches to behavioural medicine. However, there are currently many competing models outlining how self-regulation of behaviour is best achieved. Furthermore, current models leave out possible interplay among several facets of self-regulation, such as self-control, self-motivation, self-efficacy, and stress regulation, when predicting behaviour, leaving interaction effects unexamined. Thus, this short review aims to summarize past research and propose a novel bidirectional model of self-regulation which integrates competing theoretical constructs. The proposed model has the potential to inform future research and interventions rooted in

self-regulation by providing a wider lens to the issue.

Models of self-regulation vary on what factors underlie self-regulation (Bray et al., 2015; Joyce et al., 2018; Kok et al., 2016; Marcora et al., 2009; Taylor et al., 2020), but generally, most models include one of the following: an individual's ability to inhibit impulses (self-control); the ability to mobilize energy toward a goal (self-motivation); confidence in their ability to complete/ achieve a certain task or goal (self-efficacy); and the ability to recover and continue with a specific course of action after major or minor setbacks (resilience; Bédard-Thom et al., 2020; Englert, 2016; McCormick et al., 2019; Masten, 2018; Shanker, 2013). Self-regulation has been associated with persistence in challenging tasks, successful

management of stress, and a higher quality of life (Taylor et al., 2020; McCormick et al., 2019; Hagger et al., 2014). Increasingly, self-regulation has been identified as a potential skill that can be enhanced to promote health and well-being (Bandura, 2005; Durand-Bush et al., 2015; Liau et al., 2018; Mitsea et al., 2021; van Genugten et al., 2017). Despite acknowledging the multi-factor nature of self-regulation interventions targeting an individual's ability to self-regulate their behaviour tend to address a single factor (e.g., self-control, self-motivation; Breso et al., 2011; Joyce et al., 2018; Schnitker et al., 2017; Teixeira et al., 2020; von der Embse et al., 2019).

Researchers focusing on the efficacy of interventions that target one factor of intra-individual self-regulation have

demonstrated some important positive outcomes. For example, addiction studies targeting self-regulation behaviours in adults and youth are associated with reduced substance use, delinquent behaviours, depressive symptoms, burnout, and anxiety (Acuff et al., 2019; Sayette & Griffin, 2004). Health researchers have also noted that enhancing self-regulation skills are associated with greater adherence to exercise routines and maintaining a healthy diet (Annesi & Johnson, 2020; Asimakopoulos et al., 2017; Teixeira et al., 2015). However, many of these single-factor intra-individual self-regulation interventions have variable success, particularly concerning long-term outcomes and fail to replicate in other populations (Hofmann & Curtiss, 2018; Leyland et al., 2019). This variable success may be due, in part, to a lack of consideration of the interaction across multiple intra-individual determinants (Taylor et al., 2020; Sniehotta et al., 2014). For example, an intervention to increase an individual's ability to self-regulate their physical activity behaviour (i.e., exercise intensity and frequency) may effectively equip that individual with the coping skills required to maintain frequent intense exercise. However, their ability to implement these skills will be influenced by their motivation to do so (self-motivation), confidence in their new skills (self-efficacy), ability to override past learned responses in favour of the new ones (self-control), and capacity to persist in the face of exercise setbacks (resiliency; Eisenberg et al., 2018).

Suppose self-regulation interventions do not consider the interactions of intra-individual factors. In that case, they will be hampered when the individual is placed in a more holistic context involving the processes influencing outcomes, including extra-individual factors such as interpersonal relationships, social contexts, and societal factors (Hayes et al., 2022; Michie et al., 2005). Thus, when designing

interventions to address deficits in self-regulation skills, health psychologists must consider all relevant intra-individual factors underlying the process of self-regulation (Kok, 2018; Nilsen, 2015; Peters, 2014). This brief theoretical review aims to integrate the above factors into a novel bidirectional model of self-regulation to facilitate the understanding of underlying processes in intra-individual self-regulation. Doing so will potentially allow for multi-factor self-regulation research and the design of interventions targeting a more robust set of behavioural determinants leading to greater health outcomes.

Bidirectional Self–Regulation

Self–Control Capacity, Momentary Self–Control, and Self–Control Failure

Self-control can be divided into two interconnected factors: self-control capacity and momentary self-control. Self-control capacity represents the overall amount of self-control resources available to an individual when fully energized/rested (Hagger et al., 2010). In comparison, momentary self-control can be viewed as the amount of self-control resources available to the individual at any given moment. For example, when an individual with a large self-control capacity is fatigued, they are more prone to self-control failure because their self-control resources are momentarily depleted (Englert & Rummel, 2016). Combined, an individual's self-control ability consisting of capacity and momentary dimensions can be compared to a muscle, meaning its size and strength can be increased, it can generalize to multiple tasks, but it fatigues after prolonged use (Heatherton et al., 2011; Taylor et al., 2020).

The "muscle" metaphor represents the essence of the shifting, cost/gain, training, recovery, and conservation hypotheses. The shifting and cost/gain

hypotheses represent the neurological processes underlying self-control and self-control failure (Heatherton & Wagner, 2011). Collectively these hypotheses assert that when fatigued, the rewarding stimuli (e.g., watching TV instead of exercising) become more challenging to resist, in favour of the distal reward of a target body composition that the diet is meant to achieve, leading to self-control failure (i.e., missing the workout; Averbeck & O'Doherty, 2022; Kang et al., 2013; Stevens et al., 2007). These systems are neurologically based as intra-individual self-regulation skills are associated with frontal structures of the brain connected to behavioural control (Gogolla, 2017; Ichikawa et al., 2011; Stevens et al., 2011). When the individual is energized/rested, they can employ problem-solving and cognitive strategies to defer temptation, such as watching TV over exercising (Stevens et al., 2007). However, when cognitively depleted or other physiological demands are placed on the individual, resources shift away from the frontal lobe to subcortical

brain structures linked to emotion and reward (Heatherton & Wagner, 2011). This shift in neural activity to subcortical structures is thought to represent the depletion of one's self-control resources when in a state of fatigue (Marcora et al., 2009). Here, momentary self-control fails when the individual's ability to employ frontal lobe activities is depleted to the point where the implicit gain of ceasing regulatory effort now outweighs the implicit cost of continuing (Averbeck & O'Doherty, 2022; Courtney et al., 2013; Kang et al., 2013).In sum, the functional connectivity among the frontal and subcortical brain structures implicated in emotion, reward, and behavioural control represents an individual's self-control "muscle". The ability to sustain self-control behaviours is subject to the effects of recovery, conservation, and training.

The recovery and conservation hypotheses assert that when equipped with the necessary knowledge, individuals are able to conserve their self-control resources and recover them after depletion (Hagger et al., 2014; Muraven & Slessareva, 2003). These are essential to consider, as when individuals are made aware of their personal limits, coping abilities, and future task demands, they are able to conserve their self-control resources for future use (Muraven et al., 2006). Furthermore, following self-control failure, individuals can recover their self-control resources after a period of rest and engage in a relaxing activity (e.g., meditation, breathing, watching television). There is, however, a dose effect to be aware of in that longer rest periods lead to greater recovery of self-control resources (Hagger et al., 2010), meaning the more depleted an individual, the more rest they may need. The training hypothesis predicts that engaging in acts of self-control in one domain (top-down influence) can increase overall self-control capacity in other domains (bottom-up influence; Englert, 2016; Oaten & Cheng, 2006). The training hypothesis is an important consideration as it implies that individuals lacking in self-control can begin to increase this capacity by exercising their self-control skills in areas they are most comfortable in before learning to generalize their skills in other domains (Bray et al., 2015). Thus, with this knowledge, the individual can begin to address any factors leading to fatigue and depletion (e.g., lack of sleep, overworking); create an environment where depletion does not provide the opportunity to satisfy their urges (e.g., not keeping chocolate in the house, altering commute to avoid fast food restaurants); and grow their self-control capacity in an area of strength before applying it in other domains (e.g., learning to focus attention through sports then generalizing this skill to academia or vice versa).

Figure 1. Bidirectional Self-regulation Diagram
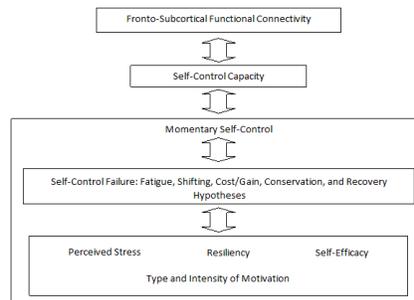
Note. This diagram depicts the bidirectional relationship between all the self-regulatory variables discussed. Self-control, Self-motivation, Stress, Resiliency, and Self-efficacy

Perceived Stress and Fatigue

The psychological determinants within the bottom box of Figure 1 represent variables that contribute directly to fatigue or moderate self-control failure (see next section for moderators). As depicted in Figure 1, perceived stress contributes directly to fatigue which has been associated with the depletion of self-control resources and the increased likelihood of self-control failure (Englert & Rummel, 2016). To better understand how perceived stress contributes to fatigue, it is helpful to consider the five domains of stressors (Fairbrother et al., 2017; Shanker, 2013). These five domains include: biological (i.e., our physiological responses to stress), emotional (i.e., internal mood and affect and corresponding changes in behaviour), cognitive (i.e., changes in the way we process information under stress), social (i.e., interpersonal interaction-based pressures and consequences), and prosocial (i.e., the impact of social demands on an individual; Shanker, 2013).

When considering these five domains, it is important to remember that while all humans possess the ability to experience stress across domains, content and environment are subjective; thus, the type and severity of stress varies, as does the subsequent amount of regulation required and resulting fatigue. This subjectivity means that certain individuals who experience

more stressors in a domain could be more vulnerable to under-regulation (i.e., failing to regulate a behaviour) or mis-regulation (i.e., using an ineffective regulation strategy) due to increased fatigue (Evans et al., 2013; Survarna et al., 2020; Vohs & Baumeister, 2004). Research has connected stress-related regulatory failures of this kind with increased rates of substance abuse, obesity, overeating, psychological distress (i.e., anxiety and depression), cardiovascular disease, and mortality (Annesi & Johnson, 2020; Grossarth-Maticek & Eysenck, 1995; Sayette & Griffin, 2004). The literature reviewed above supports the notion that perceived stress levels across the five domains contribute to the level of fatigue one experiences, which is associated with a greater likelihood of self-control failure. Therefore, stress appears to impact the likelihood of self-control failure through its positive relationship with fatigue.

Moderating Self-Control Failure

The remaining variables in the bottom box of Figure 1 (i.e., motivation, resiliency, and self-efficacy) are thought to moderate the relationship between stress, fatigue, and self-control failure (Bédard-Thom et al., 2020; Koestner et al., 2008; Marcora, 2008; Taylor et al., 2020). Individuals with more autonomous motivation are more likely to persist with regulatory effort when faced with fatigue than controlled motivation (Ryan and Deci, 2000; Koestner et al., 2008). This relationship is further impacted by the intensity/level of motivation, whereby individuals who are more tenacious about an activity are more likely to persevere in that activity (Brehm, 1989; Marcora, 2008). The development of personally meaningful goals is recommended to increase autonomous motivation and motivational intensity (Deci and Ryan, 2000; Richter et al., 2016; Stone et al., 2009). Meaningful goals are important to the individual, move them

toward self-actualization, and should be specific, realistic, and achievable with a progress-tracking component (Reeve, 2015; Stone et al., 2009). Furthermore, individuals with higher levels of self-efficacy combined with more meaningful goals tend to show greater persistence under challenging circumstances (Bandura, 1977; Warner et al., 2011; Warner et al.,2014). This increased persistence is thought to be due to greater motivation and perceived competence, which provides the mental fortitude required to persist with self-regulation when fatigued (Bédard-Thom et al., 2020).

Similarly, resiliency (i.e., psychological resources required to cope with challenges) is associated with increased perseverance in the face of challenges and a greater ability to recover after minor and major setbacks (Southwick et al., 2014). This association is thought to be related to the level of support and coping resources available to the individual (e.g., close relationships, physical ability, financial resources, coping style and knowledge; Masten, 2018). Together, self-motivation, self-efficacy, and resiliency may protect against the impacts of fatigue and subsequent self-control failures allowing for an increase in well-being through better self-regulation (Bédard-Thom et al., 2020; Koestner et al., 2008; Marcora, 2008; Masten, 2018; Reeve, 2015)

Conclusions and Future Directions

This paper introduced a novel bidirectional model of self-regulation that integrates past research on self-control, self-motivation, self-efficacy, stress, and resiliency with current neurological findings on the impact of fatigue on frontal lobe activity (Figure 1). Within the proposed model, self-regulation is a bidirectional process beginning with the functional connectivity among frontal and subcortical brain structures. The functional connectivity among these structures represents one's self-control "muscle", which can be trained and separated into a general capacity and momentary ability. An individual's general self-control capacity then impacts their momentary self-control ability and the likelihood of self-control failure induced by fatigue caused by prolonged exposure to emotional, rewarding, or stressful stimuli. However, when exercising momentary self-control, individuals are able to conserve their resources based on the task. In the event of complete self-control failure, they can recover via rest. Lastly, it appears that increased levels of autonomous motivation, motivational intensity, self-efficacy, and resiliency can moderate fatigue, increasing perseverance with regulatory efforts.

The present model has the potential to inform future research and intervention design as it emphasizes the possibility for bidirectional impacts of components of self-regulation and encourages future research to reflect these relationships rather than the narrow focus that is common in existing research (Kok, 2018; Michie et al., 2005; Nilsen, 2015; Peters, 2014; Sinehotta et al., 2014). As such, recommendations for future interventions would be to adopt a multi-factor approach when addressing behavioural dysregulation. For example, future interventions should include psychoeducation about the nature of self-control (i.e., training, shifting, conservation, and recovery hypotheses), its relationship with stress and fatigue, and effective coping strategies for managing stress as well as improving self-control and resiliency (Purwasih & Sanyata, 2020). The inclusion of such information would be a beneficial addition as maladaptive behavioural patterns are often learned as a consequence of insufficient knowledge regarding healthier alternatives (Lefort et al., 1998). Lastly, developing personally meaningful goals and incorporating a visual progress-tracking component may increase motivation and self-efficacy and reduce frontal lobe demands to problem-solve (Asimakopoulos et al., 2017). These strategies work by providing visual reminders of our progress which have been shown to help to make goal progression meaningful, resulting in improved motivation (Deci & Vansteenkiste 2003; Zamarippia et al., 2018), increased feelings of self-efficacy (Bandura 1988; Bandura 1986), and resilience (Stamp et al., 2015), which further boost motivation and perseverance.

Despite being grounded in past research, this review is theoretical, and the exact nature of the interactions among these variables must be debated and researched. Thus, researchers should seek to directly test the relationships outlined in the above model to strengthen its utility to inform self-regulatory interventions. The presented bidirectional model of self-regulation provides a helpful framework to support the planning of future research and interventions.

Human–Nature Connections: Theory, Practice, and Research Guided by Traditional Knowledge

Jacob S. van Haaften / M.A. Student, Trent University

Abstract

Human-nature connection is a topic of active debate in psychology and related fields. Several theories have been developed that describe how humans interact with nature and how nature can impact humans. Western scientists have also begun investigating traditional knowledges surrounding human-nature connection to better understand how contemporary psychological theories and practices can be adapted based on traditional knowledge. "Shinrin-Yoku" (forest bathing) is an ancient Japanese practice involving mindful connection with the natural environment, and it has been the subject of several empirical studies that have shown the practice to be effective in promoting well-being. This article explores how environmental psychology theories have been informed by Shinrin-Yoku. Further, it examines the effects of nature contact on human senses and suggests future directions for environmental psychology research.

Research on the human-nature connection and the benefits of nature contact on human well-being has gained increasing popularity in the past decades (Kahn et al., 2009). Likewise, the benefits of the ancient practice of Shinrin-Yoku (forest bathing; i.e., being present in a natural environment and experiencing the sensations in one's body as they relate to nature) has been quantitatively measured to determine how it can improve human well-being psychologically and physiologically (Tsunetsugu et al., 2010). This article reviews two foundational theories of human-nature connection and discusses potential benefits of further exploring ancient nature-based practices in environmental psychology.

Theory and Practice

The grounding theory supporting the human-nature connection is the biophilia hypothesis, developed by Wilson (1984). The biophilia hypothesis contends that humans are fundamentally connected to nature through genetic factors and evolutionary forces. Effectively, the hypothesis suggests that the human-nature connection is fueled by the tens of thousands of years of human interactions with nature and how these interactions have shaped human behaviour, development, and personality. Likewise, attention restoration theory (Kaplan, 1995) provides a foundation for human-nature connectedness and well-being. The theory suggests that different aspects of the environment promote rest in attentional sections of the brain; in turn, rest promotes restoration and well-being. Both theories describe well-being as a sense of restoration, internal ease, and physical and mental health, which will serve as an operationalized definition of well-being in this article. The biophilia hypothesis (Wilson, 1984) and attention restoration theory (Kaplan, 1995) have guided the formation of measures of connection to nature, including the "Inclusion of Nature in Self Scale" (Schultz, 2002) which quantifies the subjective con-

nectedness one feels with the natural world through overlapping diagrams of "self" and "nature," and the "Nature Relatedness Scale" (Nisbet et al., 2008) which evaluates one's connection to nature based on affective, cognitive, and experiential aspects. Consistent across both measures is the notion that connection to nature is subjective but that it can also be operationalized to an extent.

Research conducted on Shinrin-Yoku has supported these theories and the established operational definition of well-being by highlighting the physiological benefits experienced by participants in forested environments. Specifically, benefits can be observed as facilitated by the human senses. These benefits include physiological measures, such as increased parasympathetic nervous system activity and lowered heart rate, which are associated with reduced stress and increased relaxation (Task Force of the European Society Electrophysiology, 1996). Benefits have also been observed in psychological measures, including improved mood (Morita et al., 2007; Tsunetsugu et al., 2010). Other recent studies have drawn similar conclusions measuring nature contact and subjective connection to the natural environment overall (e.g., forests, lakes, rivers; Lachance, 2020). Researchers have also investigated the benefits of nature as a whole, through human senses.

In an influential study, participants were exposed to a stressor of mental recovery and well-being (Brown et al., 2013). Subsequently, the participants viewed either nature scenes (those containing natural environments) or urban scenes. Participants who were shown photos of nature scenes prior to and during the stressor experienced significantly higher parasympathetic activity during their recovery than those shown photos of a built environment, indicating a relationship between nature viewing and a healthy stress response.

More recently, Neale et al. (2021) conducted a multi-part trial that exposed participants to images of nature. The researchers found that viewing images of nature compared to urban scenes led to increased restoration, including improved subjective mood and perceived psychological restoration. However, a recent study found no difference between the restoration effects of viewing natural and urban scenes (Hicks et al., 2020). These conflicting results indicate the necessity of further study of this topic.

Research conducted on the smells of nature has been more consistent. Much research conducted on human olfactory senses and well-being has focused on the smells of fresh wood (e.g., Dayawansa et al., 2003; Hiruma et al., 2002; Itai et al., 2000 Tsunetsugu et al., 2010; Yoshifumi et al., 1999). For example, the smell of cedar chips is associated with decreased systolic blood pressure (Yoshifumi et al., 1999). Likewise, inhaling vaporized oils from hiba wood has led to decreased anxiety in hemodialysis patients (Itai et al., 2000). Research on other natural smells, such as beeswax and other plant scents has revealed associations between natural odors and subjective happiness and well-being. For example, Glass et al. (2014) exposed participants to synthetic natural odors, including beeswax and fresh summer air and found a strong association between these scents and reported happiness. Weber and Heuberger (2008) conducted similar research that established an association between exposure to plant scents and increased calmness and improved mood.

Tactile interactions with nature may also be related to well-being. Human touch and senses of connection are intimately linked. Studies on the impacts of nature touch on human well-being and connection have, for the most part, focused on human-animal interactions, such as with domestic pets (Jenkins, 1986; Solomon, 2010) and

human-plant contact through gardening (Franco et al., 2017; Scott et al., 2014). For example, Beetz et al. (2011) conducted a

study with insecurely attached children and found that contact with a dog significantly reduced salivary cortisol levels compared to contact with a stuffed animal or another human, suggesting that human-animal contact may reduce stress and enhance well-being. Similar studies have investigated the positive impacts of nature touch with non-sentient/conscious elements of nature. For example, Townsend (2006) investigated the impact of engaging in environmental activism involving significant nature touch and overall well-being. Results indicated that there is likely an association between being in a natural environment and feeling connected and well. This finding is supported by Nisbet et al.'s (2011) research demonstrating that nature relatedness (one's subjective connection to nature) is a unique predictor of well-being and connectedness.

Being connected to nature and the environment also involves experiencing and reacting to sound. One might associate the sound of nature with bird calls, flowing water, babbling brooks, and rushing winds. Natural sounds such as these have been used in several studies to demonstrate a link between nature and well-being through the lens of attention restoration theory (Alvarsson et al., 2010; Jahncke et al., 2011; Kjellgren & Buhrkall, 2010). Each of these studies found a positive association between listening to natural sounds (in nature or through recordings) and well-being or feelings of restoration. Researchers have also found connections between perceived and individually assessed restorative properties and bird sounds. In one study, for example, hearing bird calls increased self-reported restoration and impressions about the restorative benefits of hearing bird calls (Ratcliffe et al., 2013).

Research on taste, nature, and well-being is currently limited. Much of the existing research focuses on how natural or organic foods are perceived in terms of taste and emotional appeal. Overall, it appears that many individuals have a preference for organic foods based on taste and perceived freshness (Davies et al., 1995; Fillion & Arazi, 2002). One study also showed that the consumption of organic or 'natural' foods is associated with emotional appeal to food and perceived well-being (Lockie et al., 2004). Similarly, growing one's own food has been associated with perceived better taste and self-reported well-being (Kortright & Wakefield, 2010). Other researchers have examined the importance of eating foods that can be locally harvested. For example, McGrath-Hanna et al. (2003) found that the dramatic change in Inuit diets from traditional foods to processed goods due to hunting legislation, habitat loss, and diminishing wildlife populations has contributed to multiple negative health outcomes, including increased rates of mental illness. Cordain et al. (2005) argued that the industrialization of food processes has altered the basic qualities of the foods that much of the population consumes, including increased sodium content and reduced fiber content. Unfortunately, extensive empirical research on this topic is limited; however, the research that does exist indicates that eating more traditional diets comprised of foods that can be easily traced back to the natural world could improve human well-being (Redvers, 2019).

Interactions with nature impact human well-being through each of the five senses, but can also improve well-being through the imperceptible transmission of volatile organic compounds called phytoncides . Phytoncides, produced by plants, have been found to enhance sleep (Woo & Lee, 2020) and increase anti-cancer protein abundance (Li et al., 2009), and have demonstrated anti-inflammatory properties (Memon et al., 2021). While phytoncides represent one unseen element of nature, future research should explore other less obvious natural forces that act on holistic models of well-being. As researchers and the public continue to investigate the benefits of nature contact and natural experiences, new mechanisms through which we are affected by the natural world are sure to be discovered.

Conclusion

This article has explored human-nature connection through foundational psychological theories and concretely evaluated the benefits of nature connectedness through human senses. Also discussed was the modern exploration of Shinrin-Yoku, the traditional practice of forest bathing, through environmental psychology theories. Empirical benefits of Shinrin-Yoku and other nature practices on well-being were outlined and evaluated through human senses and psychological measures and theories. However, human senses and current psychological measures do not thoroughly evaluate all components of well-being. Specifically, with the discovery of phytoncides, and impetus has been set in place to discover and observe other mechanisms through which humans interact with and are impacted by the natural world.

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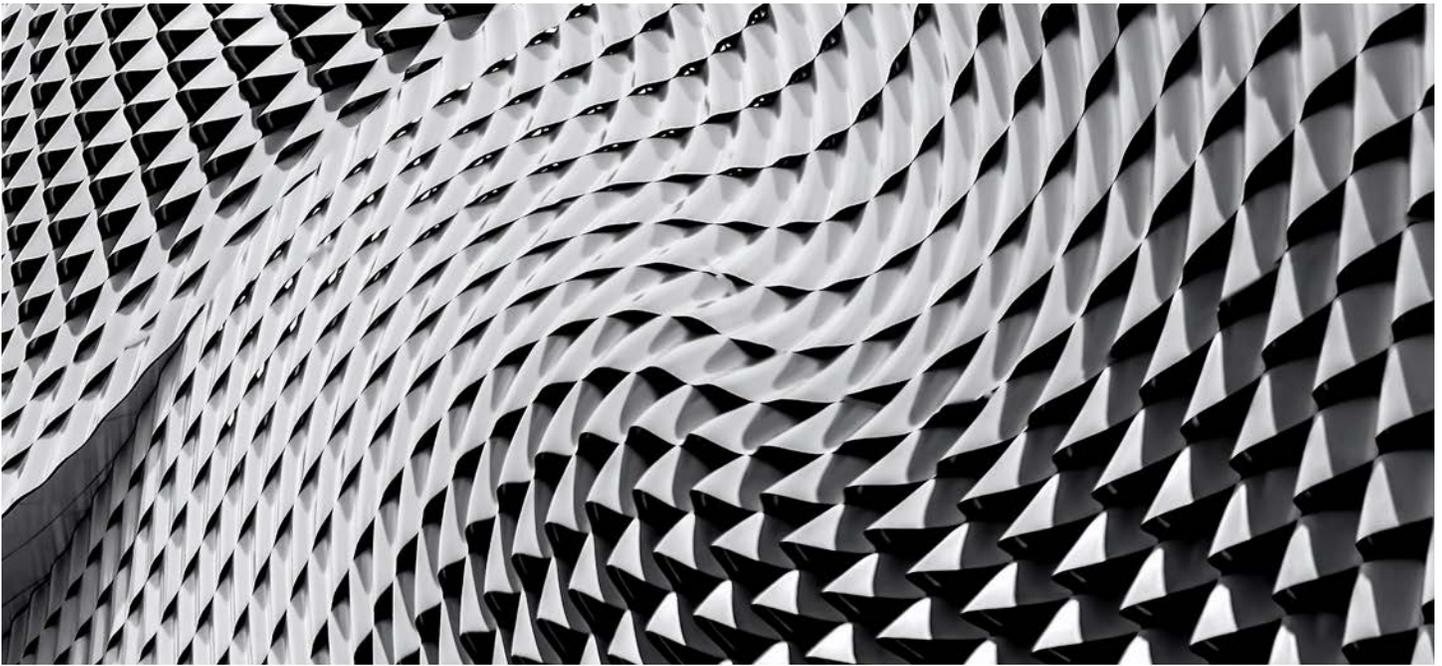
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