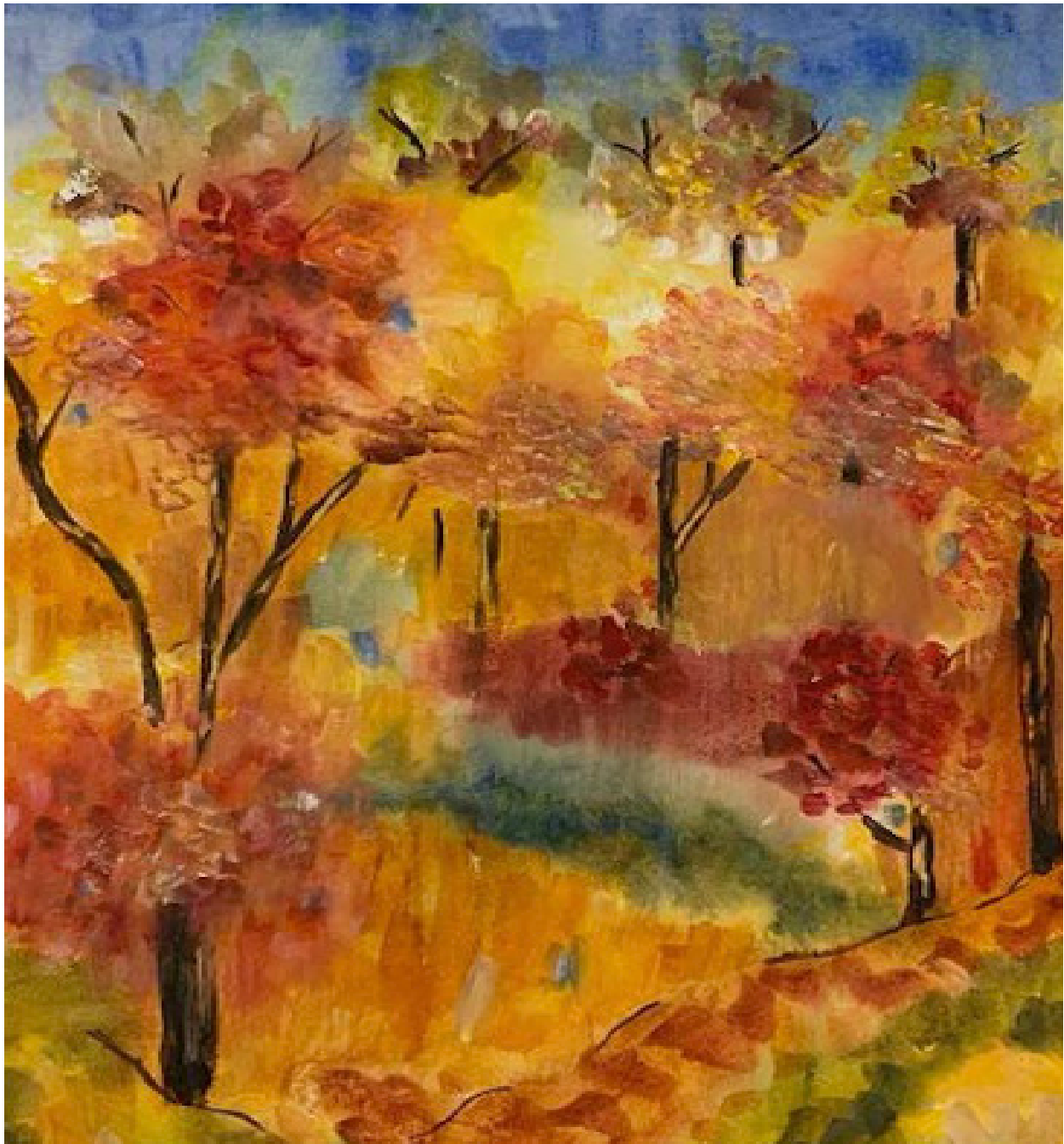# Graduate Student
Journal of Psychology

Graduate Student Journal of Psychology

The Graduate Student Journal of Psychology is a publication of the Department of Counseling and Clinical Psychology, Teachers College, Columbia University.

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Graduate Student Journal of Psychology

FORWARD

ARTICLES

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Department of Counseling and Clinical Psychology

LETTER FROM THE EDITORS:

After months of dedicated effort, we are thrilled to present Volume 21 of the Graduate Student Journal of Psychology. In this volume, we feature research studies that explore a wide range of topics, each offering a unique perspective on the multifaceted realm of human behavior and cognition. The richness of Volume 21 is evident not only in the variety of methodological and analytical approaches used, such as a priori procedures, systematic reviews, and moderation analysis, but also in the diverse ethos of our journal itself. These papers touch on important aspects like racial identity, cultural identity, and socio-economic status and focus on research in adolescents, young adults, international students, perinatal women, and parents, underscoring the need for a comprehensive understanding of human behavior.

We take pride in bridging the gap between graduate students and the professional world of publication, offering a space for students to share their innovative and original work. This volume would not have been possible without the dedication and diligence of our featured authors, peer reviewers, and editorial board. We express our sincere gratitude to our newly appointed faculty sponsor, Dr. Matt Blanchard, and congratulate him on his first issue in this new role. A special note of appreciation is also extended to our previous faculty sponsor, Dr. Randall Richardson-Vejlgaard, and editorial team members, Cassidy Iervasi, Hannah Manley, and Lori Kim, who have tirelessly paved the way for a smooth transition to this year's new editorial board. We commend their invaluable contributions and hard work.

We look forward to continuing to grow this platform that highlights students' innovative research. We invite our readers to share their thoughts and comments with us at gsjp@tc.columbia.edu. You can also connect with us through social media (Instagram, Twitter, Linkedin) @gsjp_journal. We extend our sincere thanks to everyone who has played a part in making this volume a reality, and we look forward to your continued support.

The Editors,

Daniella Ekstein, Catherine Shorb, Ellen Somers, Evelyn Tsai, Jianee Carrasco, Emma Langsford, and Yutong Zhu

Neuroplasticity Knowledge and Perceived Self-Efficacy in Western Adults: A Qualitative Examination

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Self-efficacy is described as people's beliefs regarding their capabilities to produce designated levels of performance that affect their lives and is considered important for self-regulation of mental health disorders. Biofeedback has demonstrated that knowledge of one's physiology can help regulate mental health disorders, such as anxiety (McKe, 2008). Neuroplasticity is defined as the capacity for the brain to rewire its structure and create new neural pathways to make up for lost functions due to brain injury. There is limited research in how neuroplasticity can be used as an agent for behavioral change. This qualitative study examined if knowledge of the brain's malleability may affect adults' perception of self-efficacy in recovery from evolutionary-based mental health disorders, with an aim to lay a foundation of general themes for further quantitative studies. Following 12 interviews, themes were recorded regarding perceived self-efficacy at time points during mental health recovery from an adult group who was knowledgeable about neuroplasticity versus a group which wasn't knowledgeable. In addition to other differences, the Superordinate theme of will was mentioned 64 times across the Knowledgeable group, versus only 11 times in the Non-knowledgeable group. As variations between the groups were perceived, future quantitative research may determine if educational programs can assist adults who are turning to self-regulation as a means for recovery from said afflictions.
Keywords: neuroplasticity, neural plasticity, self-efficacy, biofeedback, CBT

In the modern day, evolutionary traits can either positively or negatively intersect with cognition, which may lead to ailments such as addiction, anxiety, or depression. These evolutionary attributes (which once served us when human survival meant encountering a greater number of potential physical dangers), can contribute to displacement of thoughts, or attention, generating obstructive ideas or sensations when no physical threat exists (Rossman, 2010). In contemporary times, without the same level of external threats for these responses to usefully react to, humans are faced with the task of regulating their thoughts.

While addiction, anxiety, and depression may arise due to several factors (Ducci, 2012), this study focuses on the perception of one's ability to self-regulate addiction, anxiety, or depression (while operating under the assumption these afflictions have arisen as result of mismanagement of evolutionary traits). The study explores how awareness of the brain's biological plasticity may assist in the perception of one's ability to manage their cognition to improve their day-to-day experience. The supposition asks if adults with knowledge of neuroplasticity may generate a higher perception of self-efficacy through understanding that the brain is a malleable organ, and how their perception of self-efficacy may vary from those without knowledge on this topic.

Background

For the past century, scientific evidence has supported the ability for individuals to change patterns in their cognition, and their behavior despite the traits we may have inherited through evolution.

Some successful models of management include:

- **Metacognition:** A term used for "hyper awareness" over one's thoughts which can be used as a learning tool when it comes to completing a task (Flavell, 1979).
- **Cognitive behavioral therapy (CBT):** Originally developed by Aaron Beck to utilize thoughts, feelings, and behaviors in conjunction with one another for self-regulation (Beck et al., 1979).
- **Biofeedback:** A method that has been designed to monitor mental health issues, such as anxiety through observation of physiological metrics (McKee, 2008).

Neuroplasticity refers to the brain's ability to rewire its neural pathways when injury occurs, or its ability to generate a novel syntax following the completion of an action. Studies in neuroplasticity have demonstrated that structural changes in the brain is biologically possible, even in adulthood. Brain malleability has been utilized in recovery from loss of functions due to brain injury or damage (Doidge, 2007). However, neuroplasticity has yet to be explored as a tool to assist in behavioral change as related to mental health concerns. Bandura, who coined the term "self-efficacy" (a term used in psychology today), described the term as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives." (Bandura, 1994, p. 71).

Due to the perceived success of recovery and/or management of addiction, anxiety, or depression

through CBT, biofeedback, and metacognition, this study examines if adults with knowledge of their biological makeup may have a stronger perception in their ability to self-regulate their recovery from the above-mentioned (possibly evolutionarily induced) mental health afflictions. This study will review how the above mentioned methods (CBT, biofeedback, metacognition) have aided behavioral re-programming to support this supposition. This study also asks if it may be worthwhile to further research if those who are aware of the brain's biological ability to change in adulthood, may utilize this knowledge to cognitively enhance their sense of self-efficacy when it comes to recovery from said afflictions.

The Mind & Evolution

In a lecture at University of California, psychologist Martin Rossman (2010, 3:55) was quoted saying that humans have been born with faculties in our brains, that as far as we know, don't belong to any other creature on earth, allowing us to evolve from a vulnerable prey animal to the dominant creature on earth. As human evolution, spanning millions of years, has carried changes to our environment, it has brought subsequent biological progression with it. Dr. Beth Kurland (2018) explores how evolution of our species has included certain advantages that were once incredibly useful, but do not serve much purpose in a modern setting. These attributes still affect the way our thoughts, and even behavior functions today (Kurland, 2018). In a contemporary setting, each of these evolutionary traits can contribute to the afflictions of addiction, anxiety, or depression.

Studies have demonstrated that certain substances can cause people to over-evaluate their rewards by disrupting our working memory while creating temporal myopia (Schultz, 2011). This tendency stems from what Kurland (2018) calls "the finger trap dilemma," referring to a desire for humans to avoid unpleasantries (such as a snake). This desire which used to assist us while living in the wild, may enable us to proactively search for escape from discomfort through indulgence in things such as addictive substances (Kurland, 2018). Rolls and Cowey (1970) captured data from both captive and semi-free-ranging rhesus monkeys, and they found that monkeys displaying impulsive and aggressive behavior (traits which are seen to have been beneficial for our evolution), were also pre-disposed to addiction. It has also been argued that because substance

abuse is linked to human's evolutionary traits (such as the reward system), it should be treated as a human tendency which requires management, as opposed to a disease which needs medical treatment (Saah, 2005).

When it comes to anxiety, Brosschot et al. (2016) detailed how an inherited stress response in humans that is always running in the background, is ignited when a threat occurs. This stress response allowed us to stay alert when we had fewer protections and greater threats (Rossman, 2010). To assist individuals with management of anxiety by providing metrics on what healthy levels of anxiety may look like, a signal detection framework was published in by Bateson et al. (2011).

A correlation (though not a causation), between symptoms of loneliness and symptoms of low mood has also been perceived, while detailing the evolutionary theory of loneliness (Cacioppo et al., 2006). Research across several studies has been gathered to demonstrate how depression can help with problem solving as an adaptive feature (Andrews & Thomson, 2009) as depressed moods help us to target and avoid exclusion from social groups, which is a danger when it comes to survival, particularly in the wild (Badcock et al., 2017). Given the remnants of these traits, it may be natural for adults to experience the sensations of addiction, anxiety, or depression in our ever-changing environment, requiring on-going management through models which are accessible to them.

Evolutionarily-Based Mental Health Disorders and Access to Healthcare Today

In recent decades, addiction, anxiety, and depression have been on the rise in the West (North America and Europe). According to a study conducted by Hidaka (2012), a quantitative measure of modernization and lifetime risk of a mood disorder trended toward significance ($p = .060$) which may be attributed to a country's GDP per capita, the growing number of long-term illnesses as a result of changing environments, and increased levels of loneliness. It has been reported that up to 33.7% of the population in the modern day is affected by an anxiety disorder during their lifetime (Bandelow & Michaelis, 2015). It has also been recorded that there has been a surge in overdose deaths in the West related to addiction to opioids (Garg et al., 2019). Other studies have discussed the increase in difficulty to afford access to mental health care in the West due to inflation, a rise in demand for therapy leading to burnout from ther-

apists, and a lack of therapists in rural areas (Chan, 2022). With these trends, it's important for science to examine additional ways that adults can self-regulate experienced mental health symptoms, as access to clinical assistance isn't consistently available for all.

Digitizing mental health care in the modern day became more prevalent and accepted following the COVID-19 epidemic, which caused people worldwide to stay at home. A study examining digitalized mental health care cited Talkspace, an online therapy application which reported a 65% increase in clients following the epidemic (Gratzer et al., 2020). Furthermore, researchers have examined the increase in the use of social media as a tool to self-regulate mental health (Ozimek & Förster, 2021). An example is the Instagram channel @headspace, with over one million followers worldwide, which creates posts regarding the benefits of meditation, self-care, and more to help people at home with navigating their mental health experiences (Headspace, 2023). Continuing to digitize education surrounding psychology as a self-regulation tool may assist those who are suffering from the above-mentioned afflictions, with insufficient access to assistance in a clinical environment.

Neuroplasticity and the Brain's Ability to Change

In The Brain That Changes Itself, Dr. Doidge (2007) details how our neural pathways can be altered. If a neural pathway becomes damaged or blocked from an injury, the brain automatically searches for new connections for certain tasks or utilizes other paths to send signals. He also provides an example of people who become blind and are then able to enhance other sensations to complete a task. This is known as re-organization (Doidge, 2007).

Doidge's (2007) book details how the brain is the only organ that is capable of giving the owner a qualitative, subjective sensation and inner awareness. The sensation one has while eating gelato from Grom in the Latin Quarter of Paris will likely be different from the sensation one feels while living isolated with the flu in a London flat. Each conscious state has "a certain feel to it." The awareness of our sensations will be important later in this study.

Dr. Paul Bach-Y-Rita has done extensive work in the use of tongue sensors to treat balance disorders due to deteriorated vestibular functions. His findings show that re-calibrating the central nervous system through these sensors can improve patients' balance (Bach-y-Rita et al., 2005; Tyler et al., 2003). Dr. Pascual-Leone once said, "The system is not plastic, but elastic," meaning the brain could be molded and formed, but was unable to completely "snap back," to a previous iteration (Doidge, 2007, p. 209). Pascual-Leone's quote was demonstrated in a study where teachers of blind students were submerged in complete darkness for a week. At the end of the week, the teachers could decipher what kind of motorcycle was near to them by listening to the engines. When their blindfolds were lifted, they were completely disoriented. Pascual-Leone mapped their brains using transcranial magnetic stimulation. He then used the brain scans to perceive that the visual cortex had been used to process auditory signals (Pascual-Leone & Hamilton, 2001).

Based on Roll's experiment, Dr. Jeffrey M. Schwartz designed a study for his own patients with obsessive compulsive disorder (OCD). He introduced mindfulness into an OCD clinic and developed a four-step method, instructing patients to create real-time mental notes to obstruct the experience they were having with mindful commentary when they get caught up in compulsive thoughts. His findings were the following:

> Our PET scans had shown that the orbital frontal cortex, the caudate nucleus, and the thalamus operate in lockstep in undoubtedly the source of a persistent error-detection signal that makes the patient feel that something is dreadfully wrong. By actively changing behaviors, refusing changes which brain circuits become activated, and thus also changes the gating through the striatum. The striatum has two output pathways, as noted earlier, direct and indirect. The direct pathway tends to activate the inhibited cortical activity. Refocusing, I hoped, would change the balance of gating through the striatum so that the indirect, inhibitory pathway would become more traveled, and the direct, excitatory pathway would lose traffic. The result would be to damp the down activity of this OCD circuit (Schwartz & Begley, 2003, p. 85).

Following the completion of these studies, we better understand how the malleability of the brain may lead to recovery or improvement from certain neurological ailments and specific mental health afflictions, such as obsessive-compulsive disorder (OCD). It is

worth exploring if it may potentially do the same for evolutionarily induced mental health disorders which are currently regulated with use of biofeedback, metacognition, or CBT. We will explore the current understanding of these methods more in the following sections.

Biofeedback & Self-Regulation

Biofeedback is a process which measures physiological information that is displayed to patients so they can better attempt to control their symptoms. In the case of psychology, biofeedback is utilized for management of stress and anxiety, and requires patients who have a strong psychological awareness of their own symptoms. Patients have recorded physiological changes they've experienced during times of stress (such as sweating), demonstrating it is possible for notions of mind-body interactions to resonate with an individual (McKee, 2008).

Accurate feedback of performance facilitates the learning of any skill, not just when it comes to controlling physiological behaviors. It assists with everything from hitting a golf ball into the hole on the green to solving an algebra problem (we will observe this more in the section on metacognition). A person bowling with a blindfold on isn't as likely to make a strike – not only because they cannot see what they're doing – but because the visual feedback of their performance following an action informs their next attempt. For instance, if they visually recorded that the way they tossed the bowling ball forced it to go too much to the left, and therefore into the gutter, they know to straighten up their grip in the next round. For biofeedback to work successfully with patients, the patient must have the capacity to respond, be motivated, receive positive reinforcement from learning, and be provided with accurate information regarding the results of their learning. From biofeedback, we see the potential of observation when it comes to recovery from mental health issues, namely anxiety (McKee, 2008). In a study related to obesity reduction, Teufel et al. (2013) recorded an increase in self-efficacy following treatments of biofeedback in 31 women, however, additional studies would need to be conducted to statistically support this theory.

As science has recorded the benefits of observing our biology as self-regulation tool for mental health disorders, the author asked whether a similar methodology could be applied when it comes to neuroplasticity, training adults on the malleability of the brain, and testing their perception of self-efficacy before and after. Before designing a research proposal on this hypothesis, it was supposed that conducting a preliminary study on any key differences in themes between adults who are knowledgeable about neuroplasticity and those who aren't would be prudent. Through this initial, qualitative study, science can first assess if variation in perceived self-efficacy exists between those with knowledge of brain malleability and those without knowledge.

Metacognition & CBT

Metacognition is a term used for "hyper awareness" over one's thoughts. This concept has been developed in various ways since Aristotle, however, it is often associated with John Flavell who suggested that an awareness of control regarding cognitive processing of thoughts regarding learning was drawn from both metacognitive knowledge, followed by regulation (Flavell, 1979). To properly evaluate and monitor one's own learning, metacognition not only involves a patient thinking about what they've learned, but how they learned, in addition to examining their own learning process (Flavell, 1979). Flavell's 1979 work detailed metacognition into the various forms:

- **Content knowledge** (declarative knowledge): An understanding of capabilities, such as a singer knowing the strength of their vocal cords, or a salesperson knowing their memorization skills.
- **Task knowledge** (procedural knowledge): A perception of a tasks' difficulty based on the type of assignment, the length and what it entails.
- **Strategic knowledge** (conditional knowledge): The ability to strategize based on the available tools to learn.

Metacognition has recorded that using our cognitive thoughts in learning can improve performance in an array of ways. It has been found that self-questioning as a strategy to monitor and regulate perceived performance was effective (Child et al., 1998). Studies have also recorded a significant positive relationship between the use of Metacognitive Reading Strategies and mastery-approach goal orientation (Baker & Brown, 1984). The practices behind metacognition has led into CBT which is described by the National Health Service (NHS, 2023) as the following:

- CBT is based on the concept that your

thoughts, feelings, physical sensations and actions are interconnected, and that negative thoughts and feelings can trap you in a negative cycle.

- CBT aims to help you deal with overwhelming problems in a more positive way by breaking them down into smaller parts.

You're shown how to change these negative patterns to improve the way you feel. Unlike some other talking treatments, CBT deals with your current problems, rather than focusing on issues from your past. Evidence-based practice of CBT details that there are numerous empirical studies published regarding the success of this treatment for ailments such as addiction, anxiety, and depression, with literature on this topic from less than 2,000 studies, articles or books published in 1995-1999, to 14,000 in between 2010-2014. The three principles are defined by Dobson and Dobson (2017) as the following:

1. **Access hypothesis:** This means that thoughts are accessible to us and aren't unconscious.
2. **The mediation hypothesis:** This means that our thoughts are responsible for how we experience or feel about situations which surround us.
3. **The change hypothesis:** This means that by changing our thoughts we can change our behavioral or emotional response to certain stimuli or events.

Given the current research and understanding of CBT as a tool to regulate thoughts which then effect behaviors or emotions, this study questions if knowledge of the makeup of the brain itself may be used as a self-regulation tool within these methods.

Visualization, a Psychological Perspective

"Worry gets a lot of bad press because we don't use it very well." (Rossman, 2010, 3:44)

In his lecture, How Your Brain Can Turn Anxiety into Calmness, Dr. Rossman (2010) makes the case that imagination is the key mental faculty that separates humans from animals. Imagination allows humans to remember things from the past and project inventions or creative ideas into the future. It allows us to picture how reality may vary if we try things in different ways. Rossman argues that few of us have been taught the correct way to use our imagination. Empirical analysis designed by philosophers such as Aristotle have also contributed to the progression of

society. For us to test a hypothesis and survey the results, we first must make observations, invent a scenario, then bring that scenario to fruition. In other words, without science, ideas are just ideas. But still, the scientific discoveries, prior to being tested, were ideas first

To examine how the imagination may manifest itself into action, Dr. Pascual-Leone (1995) conducted an experiment with piano players which demonstrated that visualizing playing the piano lit up the visual cortex in the same format as if one were actually playing it. In other words, when people close their eyes and imagine a simple object, such as the letter A, the primary visual cortex lights up, just as it would if the subjects were looking at the letter A. Imagining scenarios or outcomes also overlaps with the neural circuits required to complete the execution of an action (Agnati et al., 2013). With this knowledge, it is implied that visualization as a function of the imagination can improve performance–with a drawback being humans oftentimes visualize or imagine negative events or scenarios, partially due to our evolutionary faculties. While this study is preliminary research regarding cognitive awareness as it pertains to neuroplasticity, it is worth asking if holding knowledge of the brain's malleability may assist in the ability for one to imagine their brain changing physically, which will be further explored in the discussion section.

Criticisms and Gaps in Knowledge Regarding Neuroplasticity, Biofeedback, and Metacognition as Tools for Change

While neuroplasticity has been examined through several studies, its usage has mainly been applied regarding recovery from loss of brain function, or to assist with OCD. Research has supported that plasticity of the brain may be a key function into improving sensations of depression (Wilkinson et al., 2019), meanwhile, other studies perceived how various gray matter in the brain is responsible for the ability to learn as we age (Fischer et al., 2022). However, when it comes to the ability to form new pathways or connections, there are also no current experiments or papers which examine how knowledge of this capability may affect the perceived self-efficacy of recovery from the mental health issues of addiction, anxiety, and depression.

While biofeedback has been a successful tool when it comes to the monitoring of anxiety, it is costly and requires the patient to be in a certain place at a certain time, with specific facilities available. Biofeedback's in-

ability to scale is a hindrance to its overall success as a tool for recovery from mental health disorders, particularly given the earlier research cited regarding the growing trend to self-regulate mental health disorders in the West due to a lack of access to such facilities. Metacognition is a helpful practice when it comes to learning, but there aren't current searchable studies which function on its ability to change behavior.

Finally, certain research has perceived brain activity during visualization in its participants as well as some physiological effects, though it did not allow us to explore how associating cognitive thought with the power of imagination may relate to perceived self-efficacy in recovery from mental health afflictions (Chen et al., 2017).

Purpose of the Study

As a recap, science is aware of the following:

- Certain mental health afflictions are induced by evolutionary traits, and are rising in prevalence today, with an increasingly difficult access to healthcare in the West, leading to a growing tendency for adults to self-regulate mental health disorders.
- Cognitive awareness is an effective tool in the regulation from these evolutionarily based disorders through methods such as CBT.
- Observation of biology is also an effective tool in the regulation of evolutionarily based disorders, mainly anxiety through the method of biofeedback.
- It is biologically possible for the brain to form new neural pathways.

Science has yet to record if knowledge regarding the biological malleability of the brain may equip people with a higher sense of perceived self-efficacy when it comes to recovery, and/or management from these evolutionarily based-mental health disorders. The purpose of this study is to lay a foundation for the uses of neuroplasticity in conjunction with cognition and biological awareness and examine how these faculties may work with each other. This is an initial investigation into any potential associations between adults' knowledge in neuroplasticity and their belief in the potential for recovery from mental health afflictions. The three afflictions of addiction, anxiety, and depression were chosen as a focus as these disorders may be evolutionarily induced and therefore treatable through self-regulation. If these disorders are present

in the modern day as a response to humans attempting to navigate a rapidly changing environment which our evolutionary fear responses cannot adequately adapt to, it is possible that utilizing cognitive awareness around the topic of neuroplasticity may be an agent of assistance. By examining the potential difference in themes between those who are knowledgeable regarding brain malleability and those who aren't when it comes to perceived self-efficacy for recovery from addiction, anxiety, and depression, the psychological community can determine if promoting knowledge regarding neuroplasticity to the general population can help with management of said disorders.

Should the findings of the interviews demonstrate themes that knowledge of neuroplasticity may correlate to one's perceived self-efficacy when it comes to recovery from these mental health disorders, there may be opportunity to explore how training people on the functions of the brain may help with their own self-regulation as a form of therapy. Scaling such training and education could potentially be more accessible and affordable than individual patients utilizing clinical assistance, such as CBT, or biofeedback sessions. The potential for knowledge sharing as a means of assisting with recovery from these disorders should be further explored after quantitative investigations, which would be dependent on the findings of this study.

Method

A foundational, qualitative study based on combining knowledge of neuroplasticity and cognitive awareness was created, aiming to perceive how these two components may correlate in adults with the mental health disorders of addiction, anxiety, and depression. In this preliminary investigation, the researcher examined potential associations between knowledge of neuroplasticity and a positive outlook on recovery from mental health issues with an objective to document initial research. The study utilized ground theory (Strauss & Corbin, 1994), reasoning that allowing themes to arise from the data may detail potential findings that justified resources for more extensive quantitative studies. This was decided following a non-conclusive search for published studies regarding this supposition.

Research Design

The research was carried out in 12 interviews total, across an adult population ages 25-71. Six participants who held general knowledge of the subject

of neuroplasticity were placed in the Knowledgeable group, while six who attested they had no general knowledge of the subject of neuroplasticity were placed in the Non-knowledgeable group. The aim of dividing the results into two groups was to examine the variation of themes (whether Superordinate or Subordinate) which arose between those with knowledge versus those without knowledge and to record any differences. Prior to the interviews, each of the participants filled in a survey which asked two questions detailed below to place them in the correct group. The exact questions sent in the survey are detailed below with the full survey detailed in Appendix B.

Survey Questions:

1. *Have you heard of the term neuroplasticity? (Yes/No)*
2. *Please rate your knowledge of neuroplasticity from 1-5, with 1 being little-to-no knowledge and 5 being an expert in the subject. (1,2,3,4,5)*

Participants who answered question one with "Yes," and question two with any rating of "two" or above, were placed in the Knowledgeable group. Once six participants for each group had been gathered, the interviews commenced.

Research Questions

Participants in both groups were asked the questions detailed below in a one-to-one interview with the researcher which was recorded and then transcribed. The questions chosen were the same across both groups as the aim was to see any general differences in the perception of one's ability to change and possibly recover from addiction, depression, or anxiety and then assess the different themes. The researcher did not ask about knowledge of brain malleability during the interview, as the goal was not to provoke an association between knowledge and the themes of recovery that the participants may not have had. By asking both groups the same set of questions and analyzing the themes afterwards, differences in the groups which existed regarding the overall sentiment towards recovery and the possibility for change in adults were able to be recorded. The full interview schedule with instructions can be seen in Appendix C.

- *Do you think that human beings can change habits once they become an adult?*
- *How much do you believe in the phrase, "You can't teach an old dog new tricks?"*
- *Do you believe people with mental health dis-orders such as addiction, depression or anxiety have a high potential to recover if they're provided with the right resources?*
- *On a scale of 1-5 with 1 being the lowest ability and 5 being the highest ability, how do you rate your own ability to change habits or behaviors you find are no longer serving you?*
- *What techniques do you use to change what you view as unhelpful behaviors?*
- *Is there anything else you'd like to add?*

Research Setting

All participants were interviewed remotely using Microsoft Teams via an invitation sent out using the researcher's BPP University sponsored email account c.agonis@my.bpp.com.

Participants

The inclusion criteria for participants required that they were over the age of 18 (therefore in the adult category) and weren't part of a known vulnerable group within that category (such as those with a learning disability). The questions asked were focused around the participant's views on the ability to recover from addiction, anxiety, and depression, and didn't examine active recovery from these afflictions. Therefore, there was no mental health criteria utilized in recruitment. Those who expressed verbally or in writing that they may be part of a vulnerable category were excluded, as this study was a preliminary investigation on the general adult population to lay a foundation for further studies and wasn't set to examine those of a particular vulnerable group. Participants were chosen from countries within North America and Europe, as the research conducted for the study pertained to Western trends and practices. Of the 12 participants sampled, the demographics included two male-identifying adults and 10 female-identifying adults, ages 31-71 residing in the UK, USA, and Switzerland. The full table of participant characteristics can be viewed in Appendix A.

Procedure & Data Collection

Each participant was recruited using the researcher's personal Instagram account (@chixonthe-hud) and Facebook page (dallas_athent). The full advertisement text was pre-approved by BPP's ethics community prior to posting, and is detailed below:

Slide 1: As many of you know, I'm currently obtaining my MSc in Psychology at BPP University. For my dissertation, I'm running a study on self-efficacy for recovery from mental health issues in adults.

Slide 2: I will be interviewing participants regarding their perception on the potential to recover from mental health issues, and examine if that has any correlation with knowledge of neuroplasticity.

Slide 3: If you'd like to help me by partaking in the study, please submit your email here and I will email you additional information. You do not need to have knowledge about neuroplasticity. We need participants for both the study group and control group. Thank you all.

Participants were accepted for the study regardless of if they knew the researcher personally. The only utilized criteria is that listed above in the participants section. Once interest was expressed via the Instagram and Facebook posts, participants were emailed a consent form via the researcher's BPP University email address (c.agonis@my.bpp.com) which asked them if they consented to participate in the study and informed them they could withdraw any time without consequence. The consent form provided the basic outline of the study and a breakdown of the kinds of questions that were to be asked. It detailed that the study was run as part of the researcher's MSc in Psychology and that the researcher was a student at BPP University. The full consent form and information sheet sent to the participants can be viewed in Appendix D.

Upon receiving the participants' signed consent forms, participants were then sent the survey detailed above in this document's research design section using the Microsoft Forms account connected to the researcher's BPP University email address. The survey notification informed the participants it was capturing their email addresses for the purposes of adding them to the Non-knowledgeable group or Knowledgeable group. Once the groups were formed, the participants were emailed virtual appointment options held on Microsoft Teams which were recorded and saved (audio only) in the researcher's password protected BPP University SharePoint account, with no personal information included. Participants were advised prior to recording to turn off their cameras for additional privacy. No identifiable information was shared in any interview recording including names. The recorded interviews were then transcribed using Sonix, and permanently deleted once transcription had concluded. The participants were notified via email upon deletion of the recordings.

Interview Process

To ensure consistency across the interviews, each participant was interviewed by the author of this paper. Each participant was asked a set of pre-defined questions during the interviews, which can be seen in Appendix C. These questions were not altered across all 12 interviews, nor were they re-ordered. If the participant only gave a short answer, (such as only a few words), the interviewer would ask them what they thought of when they heard the word "resources" following question three, in order to generate additional insight. All participants were able to speak at their own desired length to each question.

Ethical Considerations

Ethical considerations for this study were low, as all participants were adults over the age of 18 and weren't part of a known vulnerable group. In the information sheet provided prior to the interviews, candidates with any mental health issues they felt could be affected by partaking from the study were encouraged to withdraw, which was also shared with the participants verbally prior to the interviews being recorded. During the recording process of the interviews, the researcher ensured not to use any of the participants' names so that they would not appear in any transcripts. The study conducted was not experimental, meaning there was no intervention throughout the interviews. During the study and in line with the BPP University Ethics Committee, participants were notified that they could opt out at any time throughout the study, including during the interview.

Data Analysis

Following the transcription of all interviews, the transcripts were analyzed using Thematic Analysis (TA) using the steps outlined by Braun and Clarke (2006). TA was the chosen process for reviewing the results of this study, as the process of the researcher familiarizing themselves with the material via several read-throughs ensured thorough examination of potential underlying themes. Additionally, using TA would also allow for replication of this study, or further analysis of the interviews already conducted by additional parties, who can continue to iterate on the transcribed interviews if necessary. In a qualitative analysis, TA involves a process of pre-determining themes and searching for codes in the research which may support or negate those themes, or reading each transcript several times, and marking each expression of a thought, feeling, idea or association made by a participant as a "code" (Byrne, 2021). This study took

the second approach. Once the codes were marked, common themes emerged from the data. Themes were not proactively searched for in the process and were only determined following the coding process. In an example from Participant's 8 interview, two codes were marked in the sentence "I think there is capacity (code 12) to change both depending on just where you are on the spectrum of your brain's ability (code 13) and what's left of it," as they both expressed a thought, feeling, idea or association. The first expression that was coded was that there is capacity to change, and the second was that there was a *neurological component* related to this capacity. A full example of the coding process and following TA can be seen in Appendix F.

A quantitative measure was added to the thematic analysis, with the frequency of each mentioned code being recorded to heighten each code's prevalence within their respective themes. To promote consistency, all codes listed in the results were transcribed in their original form and were not used as placeholders for other terms. Ambiguous sentences were interpreted within context following several read-throughs by the author of this paper and researcher, Catherine Agonis, who remained the sole reader of the results throughout the study. How the researcher's own experience may have affected these interpretations are detailed in the reflexivity statement below. As the researcher is aware that having one reader may result in a potential bias in the analysis of the results, they have included a sample analysis in the appendix, which is color coded, for review. The researcher can also be contacted to release the transcripts of all 12 interviews should peers wish to examine their contents for further analysis. Once the interview transcripts were printed, read, and the codes were marked, they were organized in a Google Sheet utilizing various tabs for each theme.

To begin the thematic analysis, the interviews were first broken into two groups, the Non-knowledgeable and Knowledgeable groups. The researcher then familiarized themself by reading each transcribed interview three times. Codes that were mentioned more than once have been marked with the count number in their respective tables denoting the number of times mentioned. The amount of mentions also affected the importance of the code for the overall theme, as it was supposed that if a code was mentioned more than once in an interview, or across multiple interviews, it was held in higher regard to the speaker. The top themes

with the most code "counts" were then selected as the Superordinate themes, and the rate of frequency from which the theme was mentioned was denoted. Any codes or themes not related to the key themes were considered outliers and removed from the analysis. To ensure consistency in the analysis of the codes, the researcher conducted all the reviews using Braun & Clarke's (2006) TA structure. The researcher reviewed the four most frequently mentioned Superordinate themes per each group, in addition to the key overall themes mentioned, as recommended by Eval Academy in this kind of thematic analysis (Jones, 2022).

Reflexivity Statement

As an individual who grew up in the USA in the 1990s, I understand I am personally used to "finding a solution" to my own issues and tend to be "solutions oriented" when an uncomfortable experience arises. During my upbringing, the USA maintained a "pull yourself up by your bootstraps" culture, in conjunction with the notion of the "American Dream." Both sentiments induced not only a belief, but a pressure on citizens to "make it" at all costs and persevere no matter the background or experience. This is demonstrated in pop culture of the era, including Hollywood films such as Forest Gump and superhero comics such as Spiderman which tell stories regarding individuals who found triumph despite all unlikely adversaries, largely due to the accepted, innate goodness and strength of their persona. These narratives (some realistic and others clearly fantasy), shared a different message than that of media from other periods, such as the Victorian age. An example of a popularized narrative whose aesthetics varied from that of contemporary times would be Edith Wharton's Summer, (1917) which ends tragically for the heroine despite all her efforts to live "truthfully" as a single woman during a time where marriage was considered of utmost importance. With the influx of positive messaging in the USA during the 1980s-early 2000s, it felt accepted by society that if you "really pushed and tried," and "had a magical touch," you could make anything happen.

In addition to the cultural surroundings, the household of my upbringing lacked a comparatively large presence of an authoritative figure compared to that of my peers. Learning to self-govern potentially gave me a personally higher sense of perceived self-efficacy as I never believed designated authorities were to credit for my success (nor my failures). With this said, there's the

possibility that my position in this study, which examines perceived self-efficacy, was influenced by my general position that I personally hold will and influence over my own behavior and the subsequent outcomes.

Additionally, as it pertains to the review of the codes, it should be noted that I was raised speaking American-English, which may hold a different analysis than an individual of a different English-speaking country, as Americans have the tendency to be more expressive, thereby potentially reducing the perception of the implied intensity when it came to the interpretation of particular thoughts.

Results
Identified Codes & Themes

To begin the thematic analysis, the participants were put into one of two groups, those being the Knowledgeable group and the Non-knowledgeable group. The findings for both groups are listed below, with breakouts for Superordinate themes and Subordinate themes particular to each group. Several of the codes were related to themes which did not have enough total mentions to substantiate inclusion in the results. For instance, within the Non-knowledgeable group, the theme of the perception of biology playing a major role in one's ability to change was mentioned only 10 times across all six of the interviews. Codes related to this theme, and this theme itself were removed.

Common Themes Across Both Groups

In order to assess the themes respective to the Non-knowledgeable group versus the Knowledgeable group, the themes were coded separately and then combined into common Superordinate themes where there were major alignments. The three Superordinate themes which overlapped are discussed in this section, and are listed and detailed as the following in Table 1:

- The day-to-day environment is a key factor in one's ability to change.
- The possible techniques one can utilize range from medical to holistic.
- Overall, one's ability to change their behaviors or recover from addiction, anxiety or depression is not only possible, but promising.

On average, the length of the interviews for the Knowledgeable group were 18% longer than the Non-knowledgeable group with an average of 1278 words spoken in the former group versus an average of 1052 in the latter. The Knowledgeable group's extended length of average interview times meant that certain themes were mentioned with greater frequency, as the topics were discussed at longer intervals. What these metrics may indicate will be examined more in the discussion section.

The Day-To-Day Environment Is a Key Factor in One's Ability to Change

Both groups of participants recorded one's environmental surroundings as a key contributing factor to their ability to change. Environmental factors mentioned were access to basic needs, access to varied experiences, and access to mental health resources. This theme had a total of 83 code mentions across all 12 interviews.

Sub-Theme: Community, Family, Friends and Having a Person Is a Key Component to Recovery. "Having a person," whether that person was a partner, family, chosen family or friends, was reported as a needed element to an individual's direct surroundings to support change from both groups of participants, as seen below.

Interviewer: When you think of the resources, what does it look like to you?
Participant 1: Okay. So, in the very beginning, the support of your immediate circle, whether that's family or chosen family. (Participant 1, Non-knowledgeable group)

When discussing available resources that assist with recovery accessible within one's environment, Participant 1 named support from family first. Partner-related comments were made 26 times within the Knowledgeable group, versus 13 times in the Non-knowledgeable group. In some cases, such as in Participant 10's statement below, the perceived potential of assistance from loved one's was also dependent on the ability of a person to keep a relationship, indicating there is an element of responsibility on the individual to ensure that resource is available.

But, you know, family resources and friend resources and the ability to develop relationships and friendships is an important resource, which is very much based on the individual. (Participant 10, Knowledgeable group).

It was unclear from the interviews what correlation knowledge of neuroplasticity (if any) may have to a stronger belief in perceived self-efficacy if human connections are also formed.

Possible Techniques One Can Utilize Range from Medical to Holistic

Perceived techniques mentioned to help people change habits or behaviors ranged from medical (namely attending therapy and use of prescribed medications), to holistic (such as taking part in meditation). This theme's codes had 70 mentions across all 12 interviews. Two sub-themes regarding techniques were mentioned frequently across both groups as discussed below.

Sub-Theme: Therapy. It was reported across both groups that therapy was a helpful component to recover from mental health afflictions with some participants also mentioning medication in conjunction with seeking professional help. This indicated that institutionally supported assistance was relevant to recovery, regardless of perceived personal capabilities. Therapy was mentioned 17 times in the Knowledgeable group, and six times in the Non-knowledgeable group.

Quote 1:
Interviewer: And what do you think the kinds of resources that should be provided are?
Participant 2: Firstly, as many forms of therapy as possible, like cognitive behavioral therapy, for example. (Participant 2, Non-knowledgeable group)
Quote 2:
My first thought is therapy when I hear resources. (Participant 9, Knowledgeable group)

Similarly to Participant 10 who viewed access to support from family and friends as a key resource within one's surroundings, Participants 2 and 9 associated therapy as a technique one can turn to which could be used to aid recovery. The prevalence of therapy in discussions across both groups demonstrated an overall belief that professional assistance was a key factor for change, regardless of knowledge of brain malleability.

Sub-Theme: Writing / Journaling. In both groups, several participants described using writing and journaling to assist with improving behaviors and advancing past bad habits. Participant 1 expressed that the process of writing helped assist them in knocking off small intentions throughout the day.

I actually have to write it down. If I put it on my phone, I'm less likely to have completed it. I don't know why I have to write it. (Participant 1, Non-knowledgeable group).

As Participant 1 shared, a greater level of satisfaction occurred when writing-by-hand was involved. Participant 9 expressed the satisfaction they received by crossing things off a to-do list or seeing their intentions written on the page, sharing a similar sentiment to Participant 1 of writing and/or journaling as a useful technique inconsequential to levels of neuroplasticity knowledge.

My biggest thing that I do is bullet journaling, and so I've done habit trackers in there where like for example, one thing that I really wanted to start doing a few years ago was to make sure to always read something before I looked at my phone in the morning and something that I tracked where I wrote out the days of the week and I put a little dot for every day that I did it, and it just felt very satisfying to look when there were a lot of dots. (Participant 9, Knowledgeable group)

While this sub-theme had arisen between both of the groups, its presence wasn't related to the thesis question at large.

One's Ability to Change Their Behaviors or Recover From Addiction, Anxiety or Depression Is Not Only Possible, but Promising

All 12 participants expressed they believed change was possible when it came to the mental health afflictions of addiction, anxiety, and depression, in addition to a disbelief that one is unable to change habits once reaching adult age. In referring to the colloquial phrase "You can't teach an old dog new tricks" as "nonsense," Participant 3 expressed a disbelief that adulthood hindered one's ability to update their programming.

Similarly, negative reactions to this phrase were present across all participants. Additionally, when asked at the beginning of the interview "Do you think that human beings can change their habits once they've become an adult?", all participants responded affirmatively regardless of which group they were in, alas, no difference in this sentiment was recorded between the groups. However, sentiments of positivity were expressed with greater prevalence in the Knowledgeable group. In total, this theme received 64 mentions across 10 interviews, with 41 mentions in the Knowledgeable group versus 23 in the Non-knowledgeable group.

Non-knowledgeable Group: Particular Themes

Following the initial analysis, the Non-knowledgeable group generated 90 codes which were collated into eight Superordinate themes. Each of the Superordinate themes were ranked according to the

number of total codes mentioned with repeated codes counted towards the total. After additional re-reads of all interviews, the list of codes was reduced to 66 out of the original set of 90. Codes which did not relate to an overall theme, and were therefore outliers, were removed. A recount of the codes within each theme was completed, allowing deduction to four major themes with linked Subordinate themes. The breakdown of final codes can be seen in Table 2. While three of these Superordinate themes were included in the overall theme group and discussed above, this paper will highlight the Superordinate themes and Subordinate themes particular to the Non-knowledgeable group in this section so their differences from the Knowledgeable group may be discussed for additional analysis.

Changing One's Behavior Is Possible Through Activity

Despite having no knowledge in neuroplasticity as demonstrated by the participants' surveys, the participants in the Non-knowledgeable group each attested to a belief or understanding that the brain is a malleable object whose structure can be altered through a repetition of actions or activity. This theme had a total of 39 codes mentioned across six interviews.

Sub-Theme: Introduce Randomness. Participants in the Non-knowledgeable group recorded the need for an individual to attempt to introduce varied experiences into their own surroundings independent of the immediate offerings of their environment to aid their ability to change behaviors. The call to action in Participant 3's statement below utilized an understanding of evolution as an exploration of how randomness helps us evolve on a macro-level.

> The more randomness you introduce, the higher your probability is that you will find an experience that teaches you something meaningful or that will lead to change. I think that's how biology evolves, right? It doesn't know what a good gene is, so it just keeps changing its genes and the good genes survive. And yeah, I think that that can be taken for human behavior as well... Reading a book is randomness...Traveling is randomness. (Participant 3)

The scientific outlook, despite claiming no knowledge of neuroplasticity, took an empirical approach towards personal advancement. It has the potential to be linked to the environmental Sub-theme described later in this section.

Sub-Theme: Repetition as a Driver for Change. Several participants within the Non-knowledgeable group mentioned how the repetition of tasks as a practice could eventually induce a new pattern from a person who is looking to alter their behavior. For example, Participant 5 described a belief that dedicating oneself to a conscious repetition led to an acceleration towards self-improvement despite claiming no knowledge regarding brain malleability and the ability to reorganize or create new pathways through activity via this study's survey.

> And you continue to proceed forward as a different human. It takes constant practice and control. (Participant 5)

Where this supposition stemmed from was unclear and will be examined further in the discussion section.

(The Day-to-Day Environment Is a Key Factor in One's Ability to Change) Subordinate Theme: Varied Surroundings

Participants in the Non-knowledgeable group brought up diversity and exposure to varied experiences as a key factor in one's environment which will help them to change. These mentions were different from the codes related to the Subordinate theme of "introducing randomness."

> I think observations play a huge role, and if you've never had a chance to observe an improved version of a state, then you might just not know that that is something that could be improved or something that can even change if you've never seen a change. If you grow up in a broken household where I don't know, the parents are always arguing, the relationship is toxic and you're never exposed to a positive relationship, it is possible that you just don't have the observation to know that good relationships are possible. (Participant 6)

Via this quote from Participant 6, it is possible that the idea of benefiting from varied surroundings is linked to the idea of introducing randomness. Both express a need for diversity to advance improvement, with the above comment leaning more towards the general environmental factors outside of a person's control as a resource, and the introduction of randomness through activities such as reading and travel as a technique within an individual's authority.

Sub-Theme: Privilege. Participants in the Non-knowledgeable group mentioned privilege when

it came to access to basic human needs including health-care, housing, and time as affecting one's ability to change. I feel like I'm privileged enough to have the resources to make any change that I choose to make. (Participant 3) As Participant 3 implied, their own privilege was seen as a factor in their ability to alter their habits. It was indicated from participants without knowledge regarding the brain's plasticity that environmental factors, which may be out of a person's control, may affect their perception of self-efficacy when it comes to recovery from these disorders.

Knowledgeable Group: Particular Themes

Following the initial analysis, the Knowledgeable group generated 280 codes which were collated into seven Superordinate themes. Each of the Superordinate themes were ranked according to the number of total codes mentioned with repeated codes counted towards the total. After additional re-reads of all interviews, the list of codes was reduced to 192 out of the original set of 280. A recount of the codes within each theme was completed, allowing deduction to four major themes with linked Subordinate themes. The breakdown of final codes can be seen in Table 3. While three of these Superordinate themes were included in the overall theme group and discussed above, this paper will call out Superordinate themes, and the Subordinate themes particular to the Knowledgeable group in this section.

Will Is a Key Factor in Changing Behavior

The participants in the Knowledgeable group recorded the importance behind individual will when it comes to recovery from mental health afflictions or unhelpful behaviors. Numerically, this was the most expressed theme between any group, with 62 total mentions across six interviews, and the highest frequency of mentions across all interviews with one mention per 0:50 minutes on average. While this theme was also raised in the Non-knowledgeable group, the total mentions were 11, ranking it below other more commonly mentioned themes and excluding it from the overarching themes from that group. The difference in mentions highlights the relevance of this theme to the Knowledgeable group.

Sub-Theme: Positive Mindset. Participants in this group recorded that maintaining hope, positivity and/or an intrinsic outlook towards "the glass being half-full" assisted in their perception of self-efficacy when it came to behavioral change. An example was expressed by Participant 7, who shared a belief that a solution is always available.

I think intrinsically it's the hope, like the everyday will bring something new. Every day there is always a chance to modify whatever is being like in the past. There is always a solution. I'm 100% convinced. There is always a solution for everything. (Participant 7)

While none of the participants linked a positive mindset with knowledge of the brain's malleability, the concept of "keeping positive" as an agent for change was demonstrated more frequently within this group.

Sub-Theme: Although Possible, Change Isn't Easy and Takes Effort. Mentions regarding the amount of effort required to induce change were sometimes linked to the desire of the individual. Participants in this group called on the reality that change is a process, which requires personal dedication and intention.

I would say that's completely based on your openness and receptiveness to changing behaviors. I think that that's a really difficult thing to change in somebody subconsciously if they're not open to it themselves. (Participant 8)

In addition to discussing the effort required from an individual to recover from addiction, depression, or anxiety and/or change their behavior, Participant 8 indicated that improvement efforts were characteristic.

Sub-Theme: Openness. Several participants in the Knowledgeable group shared that an individual's ability to changed was linked to a personal openness to do so. There wasn't a recorded trend regarding what the participants believed led to openness.

Interviewer: And how much do you believe in the phrase you can't teach an old dog new tricks?
Participant 8: For dogs or for people? [Laughter]
Interviewer: I guess it's a phrase for people.
Participant 8: I definitely don't believe that at all. I think if the dog is open to learning new tricks, then the dog handler can teach it new tricks, yeah. (Participant 8)

While records such as Participant 8's demonstrated a belief that the ability to change in adulthood stems from an individual's openness, it is unclear how this may be linked to knowledge of brain malleability. (Additionally, it is important to note that while responding, the Participant was laughing, leading to an interpretation that they were playfully joking about the analogy referring to dogs. Due to the non-verbal reactions during the interview, it

was supposed that the Participant was continuing to speak about the dog as an analogy for humans.)

The Possible Techniques One Can Utilize Range From Medical to Holistic-Subordinate Theme: Self-Awareness

Participants in the Knowledgeable group detailed the need for cognitive self-awareness as a requirement for one to change.

Quote 1:

I think it takes a lot of work and self-awareness, but yeah, I think it's absolutely possible. (Participant 11)

Quote 2:

I think there has to be an awareness of whatever it is that you want to change. (Participant 12)

Although the knowledgeable group detailed a need for self-awareness of one's issues in order to change, it was not indicated in how that self-awareness can be obtained, nor how this may be linked to knowledge of brain malleability.

Comparison of Groups

Despite the Non-knowledgeable group attesting to having no knowledge regarding neuroplasticity, a belief that change in one's behaviors was possible, as well as their ability to recover from addiction, anxiety, and depression was recorded in all six interviews from this group. This belief was equally expressed in the Knowledgeable group, demonstrating that perception regarding the ability to change and recover existed. Originally, when assembling this study, it was supposed that the sentiment regarding the possibility of change would be more affirmative with the Knowledgeable group versus the Non-knowledgeable group, meaning the Non-knowledgeable group would thematically indicate change wasn't always possible for adults. However, these findings recorded that regardless of knowledge as it relates to neuroplasticity, the participants believed that the potential to recover from mental health disorders in individuals is present, and no difference in this point of view was perceived across the two groups (for instance, no participants responded to the question of the ability to change negatively). In total, the theme, "Overall, one's ability to change their behaviors or recover from addiction, anxiety or depression is not only possible, but promising," received 64 mentions across 10 interviews, with 41 mentions in the Knowledgeable versus 23 in the Non-knowl-

edgeable group. While the overall sentiment remained consistent, the greater number of mentions in the Knowledgeable group is worth examination as it pertains to this supposition and demonstrated a variance in prevalence from the Non-knowledgeable group.

Of the original list of Superordinate themes, "Childhood development as a key-factor in one's ability to change" was mentioned throughout both groups, but less frequently than the final Superordinate themes selected, leading to its exclusion in the final Superordinate themes list. It was originally presumed that those who believed childhood events and experiences grossly affected one's ability to change may have a lower sense of perceived self-efficacy when it came to the possibility of recovery, as this theme may imply a deterministic outcome set by the first few years of our lives. The theme of development (which oftentimes cited childhood upbringing or trauma in this study) insinuated that recovery is more difficult once we reach adulthood as we are coded from a young age. An example of this would be from Participant, 2, who stated, "Your ability to do that is the direct result of trauma. So, people who have suffered trauma fall into some behaviors to either self soothe or survive, and so I think those things are hard to change."

Of the Knowledgeable group, the theme of development was mentioned 22 times across six interviews, and from the Non-knowledgeable group it was mentioned 17 times across six interviews. It was first suspected during the original read through of the transcripts that the equality of this theme's importance across both groups demonstrated a corresponding sense of perceived self-efficacy despite the presence of knowledge. This was due to the theme of change being possible arising as a Superordinate theme in both groups, and development being a less mentioned theme in both groups. However, upon the second screening of the Superordinate themes across groups, key differences emerged and were noted.

Firstly, the importance of will and self-determination in an individual was the major theme in the Knowledgeable group, with more mentions and a higher frequency than any other theme across both groups. Within the Knowledgeable group, this theme was mentioned 62 times, as opposed to the Non-knowledgeable group who mentioned it only 11 times, excluding it from an overall Superordinate theme for the Knowledgeable group

while being excluded in the final list of Superordinate themes for the Non-knowledgeable group.

Self-efficacy is defined as an individual's belief in their ability to complete behaviors or tasks to attain a certain performance (Bandura, 1977). From the study's metrics and definitions described, it is worth further investigation if those with knowledge of neuroplasticity may also believe that a person has a higher ability to change if they have the will to do so. A link between will and perceived self-efficacy may possibly imply that ability to recover from the mental health disorders of addiction, anxiety, and depression via this capability lies more under their control than under other outlying factors, but this would need to be examined further.

When it came to the Superordinate theme of "Environment playing a key role," beliefs in how the environmental factors influenced one's ability to recover from mental health disorders varied across the Knowledgeable and Non-knowledgeable group. For the Non-knowledgeable group, the environment's sub-themes included an acknowledgement of privilege regarding having access to basic needs, such as housing and healthcare, possibly indicating that the ability to change is affected by external factors as opposed to internal ones. Factors of basic needs were not recorded in the Knowledgeable group, meaning the Subordinate theme of privilege did not arise. The presence of this Subordinate theme in the Non-knowledgeable group, versus the presence of the Subordinate theme of will in the Knowledgeable group, signaled a variation in the perception of what is within one's control versus out of one's control.

It was also found that despite not having formal knowledge regarding neuroplasticity, the Non-knowledgeable group believed that the brain was "re-codable" or malleable through action. While contemporary science largely steers away from nativist claims, it may be implied from the records of the Non-knowledgeable group that an innate understanding potentially exists regarding brain malleability. This is worth further consideration separate from this study. It is unclear where exactly this understanding stemmed from, and whether it was assumed or taught to these participants under some other name, or induced through subliminal, cultural messages (such as the popularization of sayings like "I think, therefore I am" by Descartes).

Finally, the lengthened average of interviews from the Knowledgeable group presented additional codes, and heightened support behind those codes by a higher frequency of mentions. Returning to the research behind metacognition and biofeedback, science currently accepts that witnessing feedback regarding one's performance can assist in the advancement of an individual aiming to change a sensation or ability. While both groups expressed a belief in adults' abilities to recover and change, the record of longer talk times combined with the supposition that will plays a major factor in ability indicates a difference between the groups. This supports the justification for quantitative research on how knowledge of neuroplasticity may influence perceived self-efficacy in recovery from addiction, anxiety, or depression.

Discussion

As presented, a difference in themes was demonstrated regarding the perception of self-efficacy from mental health recovery between groups of adults who have knowledge of neuroplasticity and those who don't. Themes related to internal factors (such as will) were more present in the Knowledgeable group and themes related to external factors (such as environment) were more present in the Non-knowledgeable group. Locus of control, which is the term describing an expectation of one's influence on an outcome being more internal or external, was not examined as a factor in this study during the research process (Nieben et al., 2022). However, based on the themes presented between the groups, it may be relevant to examine perceived locus control in participants in addition to perceived self-efficacy in future studies. Following the conclusion of this study, overarching questions to ask for psychology at large may be:

1. Should there be a focus on knowledge of neuroplasticity as an agent of change?
2. Is it possible that knowledge regarding brain malleability is innate?
3. Does knowledge of neuroplasticity affect one's locus of control?

Regarding the question of focusing on neuroplasticity as an agent of change, there is room for quantitative examinations regarding education of neuroplasticity as a self-regulation tool, particularly given the themes recorded in this initial qualitative study and the previous successful demonstration of biofeedback, CBT, and metacognition as regulation tools. As discussed in the introduction, evolution-

ary-based mental health disorders remain prevalent in the modern day, especially when set against a landscape of challenges in accessing clinical assistance. Through these questions, science can potentially develop additional quantitative studies which examine the components behind utilization of knowledge of neuroplasticity as an agent for recovery from mental health disorders, and not just as an agent for recovery from cognitive function due to brain damage.

Limitations

As this was a preliminary qualitative study, only 12 participants were interviewed total, with six in the Knowledgeable and six in the Non-knowledgeable group. As mentioned, during the thematic analysis, to accurately represent the importance of each code, the comments were quantitatively ranked by not only marking the codes mentioned, but also by counting the total number of mentions. However, the number of participants and the methodology doesn't qualify for statistical relevance, and so for this hypothesis to be validated in a statistical format, additional quantitative studies would need to be conducted. Considering the research as a qualitative study, whose purpose was to lay a groundwork for further research, no statistical analysis was completed due to a low-level of participants. Additionally, as this research was conducted as part of a student thesis, there was only one reviewer analyzing the codes, which may have left an individual bias in how the system was coded. Should another qualitative study be conducted to further examine this subject matter, it would be recommended to have additional researchers reviewing the codes and determining a final list of codes and themes in tandem. While no mention of neuroplasticity was made during the interviews themselves, since the survey sent out prior to the study as well as the information sheet included the term, it is possible that participants had done their own investigation and that had influenced their interviews.

Finally, the pool of participants ranged between three countries and a wide age range of adults, each of which may have their own cultural influences when it comes to their perception of recovery. It is possible that with a quantitative analysis we would see themes differ across demographics.

Practical Implications

The findings of this study suggest there may be a difference in how those with knowledge of brain malleability (Knowledgeable group) regard perceived self-efficacy when it comes to the recovery of mental health disorders versus those without knowledge of neuroplasticity (Non-knowledgeable group). As this study only utilized a small sample, it doesn't hold a statistical relevance, and so there are no immediate suggestions regarding practical changes in the administration of mental health care. Additional studies and analyses should measure the impact of these suggestions prior to practical applications being suggested for the adult population at large.

Suggestions for Further Research

Based on the study's findings from the Non-knowledgeable group, it was perceived that those without knowledge of neuroplasticity still held a belief that the brain can be re-coded through activity. While concepts regarding innate knowledge aren't popularized in modern-day psychology, it may be worthwhile to investigate where this seemingly "innate" understanding regarding malleability comes from - whether it is subliminal societal cues or education regarding brain plasticity occurring in subliminal formats. From this, we may understand better if this belief is indeed generally understood or if it is induced through learning. It would also be worthwhile to conduct such interviews across various cultures, as it is possible the answer would differ depending on different groups.

Furthermore, as indicated in the background section of this study, visualization (which as far as we understand isa faculty particular to humans) is a useful tool when it comes to re-arrangement of cognitive thoughts. Depending on the findings from any further studies on this topic, it may be beneficial to conduct an experiment of visualizing the re-routing of neural pathways as a mechanism for changing behavior.

Additionally, it is possible that individuals have received non-explicit affirmative feedback regarding brain malleability through experience. This may have been achieved through introspection following the changing of behavior over time or through the reward of society followingdemonstrated improvement (such as loved ones supporting an individual going through therapy). A further examination on how the topic of brain malleability may be subliminally shared in the west will help science understand the implications of this study. Finally, studies may ask in what ways can we quantitatively test the impact knowledge of neuroplasticity has on self-efficacy regarding recovery from mental health disorders.

Conclusion

Due to the perceived success of recovery and/or management of addiction, anxiety, or depression through CBT, biofeedback, and metacognition, this study's aim was to examine if adults with knowledge of their biological makeup may have a stronger perception in their ability to self-regulate their recovery from the above-mentioned mental health afflictions which may be evolutionarily induced. As presented, the findings between the Non-knowledgeable and Knowledgeable groups have recorded a variation in themes regarding sense of self-efficacy when it comes to recovery from mental health disorders of addiction, anxiety, and depression. These differences included:

- The Knowledgeable group's themes holding a focus on internal control, and the Non-knowledgeable group's themes holding a focus on external control.
- A higher sense that individual will plays a key role in the ability to change from the Knowledgeable group.
- A higher sense that privilege and access to basic needs is a major contribution to the ability to change from the Non-knowledgeable group.
- More lengthy interviews and ability to discuss the possibility to change from the Knowledgeable group

As this study had a small sample across three countries, we cannot yet state that there is statistical power regarding a heightened sense of perceived self-efficacy being associated with knowledge of neuroplasticity. However, the differences recorded in this study lay the foundation for further analyses which can explore a link between knowledge regarding brain malleability and the ability to self-regulate mental health disorders, as the Knowledgeable group generated codes relating to will and self-determination more frequently than the Non-knowledgeable group, and were able to discuss recovery at greater length.

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Table 1

Overall Superordinate and Subordinate Themes

Superordinate Theme	Subordinate Themes
The day-to-day environment is a key contributing factor in one's ability to change	● Community, family, friends and having a person is a key component to recovery
Possible techniques one can utilize range from medical to holistic	● Therapy ● Writing / journaling
One's ability to change their behaviors or recover from addiction, anxiety or depression is not only possible, but promising	**N/A

Table 2

Superordinate and Subordinate Themes for Non-knowledgeable Group

Superordinate Theme	Frequency (1 mention per X min)	Subordinate Themes	Codes
Changing one's behavior is possible through activity	1:03 min	• Introduce randomness • Repetition as a driver for change	• Behavior (4) • Randomness (4) • Thoughts / cognitive (3) • Change the way you operate / view things / your brain works (3) • Training (2) • Adapting (2) • Remind myself (2) • Flexibility (2) • Habits (2) • Different situations • Regular basis • Developmental • Addictions they've created • Schedule • Day-by-day • New circumstances • Engineering of the mind • Kind of stunted • Reset the patterns • New synapses • Improve that part of your brain • Situations or perspectives • Smaller goals • Short term • Routing and discipline • Everyday practice • Constant practice & control
The day-to-day environment is a key contributing factor in one's ability to change	1:10 min	• Varied surroundings • Community/ Friends/	• Support (7) • Financial (5) • Observations (5) • Other people / have somebody (3)

		Family • Privilege	• Family / chosen family (2) • Time • Privilege • Positive reinforcement • Grew up in • Exposed • Segregated villages • What wealth meant • Having a garage • No significance of a car • Becomes the truth • Stumble upon • Doesn't know what a good gene is • Absent of knowing • Experience • Encourage • Reinforcement
The possible techniques one can utilize range from medical to holistic	1:43 min	• Writing	• Therapy/ counseling (6) • Writing (6) • Medication (3) • Resources (2) • Professional (2) • Meditation (2) • Poster child for Citalopram • Practical advice • You need to do this • Coaching • Very directed
Overall, one's ability to change their behaviors or recover from addiction, anxiety or depression is not only possible, but promising	1:55 min		• Change (7) • Yes (5) • Potential (3) • Can't apply to everything (2) • 50% • Possible • I think it's nonsense • Grain of salt • Mentality • Likely

Table 3

Superordinate and Subordinate Themes for Knowledgeable Group

Superordinate Themes	Frequency (1 mention per X min)	Subordinate Themes	Codes
Will is a key factor in changing behavior	0:50 min	• Positive mindset • Although possible, change isn't easy and takes effort • Openness	• Openness / receptiveness (4) • Hard / difficult (3) • If the will is there (3) • Positive mindset (2) • Hope (2) • Desire (2) • Coping mechanism (2) • Always a solution for everything (2) • Want (2) • Learned a lot (2) • Just tell myself / make myself (2) • Reward (2) • Effort (2) • Stuck in their ways • Getting ourselves out of that mode • Trying • Everyday will bring something new • 70% • Interested • It's up to you • Motivated • Individuals • People don't like to do it • A lot of work • Pattern • Falling really down • Find myself • If the dog is open to learning

			- new tricks - I do think it comes down to that - Making his situation work - Difficult thing to change - All of the support and resources - Receiving that support - Don't believe change will happen - Conceivably capable - Not a curious person - Innate - Who manage - Motivation - Devoted - You can't have it - Don't want to do it - Eager - Accept - Ready - Research
The possible techniques one can utilize range from medical to holistic	1:09 min	- Therapy - Self-awareness - Writing / journaling	- Therapy (17) - Information / Awareness (8) - Medication (3) - Professional (3) - Writing / bullet journaling (3) - Removing temptation (2) - Find the right way (2) - Spirituality / religion (2) - Being uncomfortable - Not able to come out of it - Consider own circumstances - Meaning - Not necessarily - Routine
Overall, one's ability to change their behaviors or	1:20 min		- Yes /absolutely (9) - Possible (5) 100% (5) - Don't believe that (5)

recover from addiction, anxiety or depression is not only possible, but promising			- They can (2) - Bad attitude - Not all of it - You can learn to do anything - Certainly something we can do - It will take a long time - Can be - A lot - That's true - Able 5 - This idea - Incredibly hard - Potential
The day-to-day environment is a key contributing factor in one's ability to change	1:33 min	Having a person / partner / friend or family	- Other people / have somebody (8) - Friends (5) - Resources (3) - Family / chosen family (3) - Housing (2) - Reinforcement (2) - Impact (2) - Partner (2) - Needs - Check in with each other - Quite lonely - Social beings - One person to rely on - Talk you through - That's real therapy - Accountability - Impact on them - Keep alert - Continue to learn - Innate - All really important (government resources) - Listen to us - Become curious

A Scoping Review on Energy Drink Consumption Among Adolescents and Young Adults

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This scoping review aimed to identify empirical studies that have explored the use of energy drink consumption among adolescents and young adults. **Method:** A scoping review search was conducted in the following five databases: PubMed, Embase, Lilacs, Scopus, and Psycnet. Some inclusion criteria, such as being published in the last 10 years, and exclusion criteria, such as article type, animal-model usage, and age, were used to select the studies, and 11 were analyzed independently. **Results:** The results showed that adolescents use energy drinks for many factors, such as connection with peers and family, propaganda, and taste. Some studies have been developed in Australia and the United States of America, and some have explored other variables associated with energy drinks and alcohol use. **Conclusion:** It is essential to understand how energy drink consumption and behaviors are related to health or risky behavior and its associations with other drugs. More research is needed to explore the long-term health impacts of energy drink consumption during the critical developmental periods of childhood and adolescence, as well as its association with alcohol and other substances. The findings underline the importance of stringent regulations, public health policies, and educational initiatives to mitigate the risks associated with energy drink consumption among adolescents. Future research is essential to understand the long-term implications and develop effective preventive strategies to safeguard adolescent health and well-being.
Keywords: energy drinks, adolescents, health, consumption

Adolescence, defined by the World Health Organization (WHO) as individuals aged between 10 and 19 years, is a pivotal stage characterized by rapid physical, cognitive, and psychosocial development, laying the crucial foundations for good health (World Health Organization, 2019). Recently, there has been a discernible global increase in energy drink consumption among adolescents, which has become a subject of significant health concern and professional debate (Miller et al., 2018).

Energy drinks (ED) are beverages that typically contain varying amounts of caffeine, taurine, glucuronolactone, vitamins, herbal extracts, proprietary blends, and amino acids. They are marketed as products capable of enhancing mental alertness and physical endurance (Ahuja et al., 2021; Higgins et al., 2018). These drinks, available in carbonated or non-carbonated forms and with or without sugar, are distinct from traditional beverages like coffee, tea, sodas, and sports drinks, even though they may seem similar. A notable difference is in their caffeine content, with energy drinks potentially containing between 40 to 250 milligrams per 8 fluid ounces, as per the U.S. Food and Drugs Administration (FDA, 2018). This range is significantly higher compared to the caffeine content in an 8-ounce cup of coffee, which usually contains 80 to 100 milligrams. Studies also indicate that energy drinks have an average taurine concentration of approximately 750 milligrams per 8-ounce

serving (Ahuja et al., 2021; Caine & Geracioti, 2016).

The rise in the consumption of energy drinks among adolescents can be attributed to a myriad of factors. Targeted advertising, the promise of increased alertness, combating fatigue, aspirations for improved academic and athletic performance, and the trend of mixing these drinks with alcohol are some of the driving forces behind their popularity (Quigley et al., 2019; Reissig et al., 2009). However, this increasing consumption has been linked with several adverse health effects, including elevated blood pressure and psychological issues such as anxiety (Lisko et al., 2017). Furthermore, due to the addictive properties of caffeine and other similar components in energy drinks, there have been increased reports of anxiety, stress, and depression among consumers (Linden-Carmichael & Lau-Barraco, 2017; Richard & Smith, 2016). Given these associated risks, some countries have instituted restrictions on the sale of energy drinks, with others contemplating similar regulatory measures (Winston et al., 2005).

Therefore, this scoping review aimed to examine the use of energy drinks in adolescents and young adults to provide a synthesized summary of the evidence and identify gaps in our knowledge. The research question is: Have there been observable trends in the consumption of energy drinks among adolescents and young adults (aged 12-25) in the past decade, with particular emphasis on identifying influencing factors and associated health and behavioral risks?

With energy drinks gaining popularity due to aggressive marketing strategies, it is imperative to scrutinize the associated risks, thereby laying the groundwork for the development and implementation of prevention programs targeting both the youth and their guardians (Ahuja et al., 2021; Brache & Stockwell, 2011; Zandvliet et al., 2005).

Methods

A literature review followed the premises proposed by PRISMA (Page et al., 2021a; Page et al., 2021b). The scoping review was carried out according to the following steps: (1) formulation of the research question; (2) production and registration of the investigation protocol; (3) definition of inclusion and exclusion criteria; (4) developing of the research strategy and conducting the reference search; (5) screening of studies based on inclusion and exclusion criteria; (6) evaluation of the quality of studies; (7) data extraction (8) data synthesis and evaluation of the quality of the studies (Donato & Donato, 2019).

The approach for conducting systematic scoping reviews by Levac et al. (2010) guided the review based on the five-stage methodological framework that Arksey and O'Malley (2005) developed.

Stage 1: Identifying the Research Question.

The central question guiding this scoping review was:

> "Have there been observable trends in the consumption of energy drinks among adolescents and young adults (aged 12-25) in the past decade, with particular emphasis on identifying influencing factors and associated health and/or behavioral risks?"

Stage 2: Identifying Relevant Studies

After the initial search in EMBASE and PubMed, five electronic databases were searched: EMBASE, PubMed, PsycNet, Scopus, and Web of Science, with the last searches performed on August 03, 2022. Date limits were set for 10 years, and the search strategy included using descriptors: Energy Drinks AND (Teenagers) AND (Addiction), with necessary adaptations to the specifications of each database (Table 1). In searches between June 07, 2022, and August 03, 2022, 143 materials were identified.

Stage 3: Study Selection

Quantitative and qualitative peer-reviewed, original, full-length research papers were included. The reviewers were previously trained for the task

according to the following exclusion criteria: (a) reviews and meta-analyses; (b) Theses, dissertations, abstracts, and publications in congresses; (c) studies that are not in English; (d) animal model research; (e) sample with subjects under 12 or over 25 years old.

Participants

This Review focused on adolescents and young adults aged between 12 and 25 years. The population may have been studied in schools, universities, or through surveys.

Concept

During the review, the focus was on energy drink consumption by adolescents, specifically on health and relational factors. Studies that solely focused on addiction to sugar were not considered. The PICO strategy was used based on eligibility criteria, with P (population) being adolescents, I (intervention) lower levels of use, C (comparison) being patterns of use in adolescents, and O (outcome) being energy drink consumption during adolescence.

Search Strategy

When performing the search strategy in the five different databases, a total of 143 records were identified. These records were exported to Rayyan Software (Ouzzani et al., 2016). Duplicate records were then removed, resulting in 139 records for screening the title and abstract. The screening was performed by two authors (FRTA and GT), who independently compared the titles and abstracts of each record with the inclusion criteria. FRTA and GT finally agreed to include 11 records as relevant studies for full-text screening. The records considered eligible for full-text screening were then distributed among one other author, RMMA, in addition to FRTA and GT. They independently screened the full-text studies to assess eligibility for inclusion in the review.

The research tool Rayyan Software was used to combine all materials, remove duplicates (n=143), and for the independent reviewers (FRTA and GT) to screen the 139 unique titles and abstracts simultaneously (Ouzzani et al., 2016). FRTA and GT had a concordance rate of 96.8%, and a third reviewer (RMMA) assessed divergences. With those steps complete, 13 articles were selected for the second round of assessments, this time analyzing full text according to the same criteria previously stated.

Based on the analysis of the complete texts, 13 articles were selected for the data extraction phase. After this second exclusion phase, data extraction began, con-

sidering as inclusion criteria in the study: (a) articles that had energy drinks in their title; (b) studies that evaluated the effect of energy drinks on adolescents; (c) research that made comparisons between groups or intragroup; At this stage, two articles were excluded (see Figure 1).

Stage 4: Charting the Data

Three authors (FRTA, GT, and RMMA) analyzed energy drink use in adolescence, including three main phases: preparation, organizing, and writing. One author (FRTA) extracted study characteristics, which were also reviewed by GT and included in an agreement between RMMA. As this was a review, study quality (e.g., risks of bias, study strength) was considered, but not for a meta-analysis. Tables 1 and 2 show the systematization and categorization of relevant topics from the results of the studies included in this review, reflecting the review questions.

Stage 5: Collating, Summarizing, and Reporting the Results

The main characteristics of the eleven included studies are presented in Table 2. The studies were grouped by year of publication. Studies published in the same year were grouped alphabetically by first authors' surnames. The extracted data were: (1) citation; (2) country; (3) Study design; (4) outcome measures; (5) sample; (6) main findings.

Findings

The findings of the review are presented according to the review questions. Table 2 reports the general information and significant findings of the reviewed publications.

Results

Concerning the overall number of articles, there were 119.796 participants from different countries, most of them from China, the United States of America, and Italy, aged 12 to 19 years, who completed various surveys. The average is 11.979,6 adolescents. The most predominant type of test was the socio-demographic questionnaire, covering 50% of the total articles.

Several studies indicated that boys were more likely to report consumption than girls and in a more significant amount (Choi et al., 2016; Koivusilta et al., 2016; Magnezi et al., 2015). In this scoping review, cross-sectional survey data suggested that the use of energy drinks is patterned by gender. Larson et al. (2014) found a significant connection between regular consumption and lower breakfast frequency for

girls. In contrast, Ludden & Wolfson (2010) found that girls were likelier than boys to report expectations around appetite suppression. Patterns of use according to age were less clear-cut, with some studies showing that consumption levels increased with age and others demonstrating that the converse was true.

Martz et al. (2015) showed that cross-racial and ethnic patterns were also identified; black students were less likely to consume energy drinks than their white counterparts or Latins. Other studies have suggested that consumption levels are highest among Aboriginal, Hispanic, and/or Black students (Martz et al., 2015; Visram et al., 2016; Xu et al., 2020). Higher consumption levels were positively associated with being underweight or obese, being from a single-parent family, receiving complimentary school meals, having special educational needs, and having higher spending (Reid et al., 2015; Scalese et al., 2017).

Young people with higher scholastic averages, a higher sense of coherence, higher levels of parental monitoring, and more educated parents were less likely to consume and consistently associated with energy drink consumption was the use of alcohol and/or binge drinking, smoking, or susceptibility to smoking and other substance energy drinks (Miller, 2008).

One survey of Australian college students observed that premixed alcohol-mixed energy drinks (AMEDs) included the ability to drink more, sensations of being more awake or in control, the symbolic attractiveness of AMEDs, and the ease of obtaining and concealing the beverages for underage drinkers. The survey also identified several negative aspects of AMEDs, including difficulty speaking, hangovers, and increased aggression (Jones et al., 2012).

A study on the appropriateness of caffeinated drinks for children found that high caffeine intakes (>5 mg/kg body weight per day) were associated with an increased risk of apprehension (anxiety) and withdrawal symptoms. Nevertheless, evidence from young adult studies and expert discussions was used to suggest that relatively small quantities of caffeine may benefit cognitive function and sports performance, as well as contribute to daily liquid intake (Jones et al., 2012; Kemps et al., 2019; Sanchis-Gomar et al., 2015).

Views Regarding the Consumption of Energy Drinks

Our analysis of mixed method studies and relevant survey results revealed two significant themes:

motivations for usage and convincing on usage.

Motivations for Use

Many individuals, particularly boys involved in sports, consume energy drinks to enhance their athletic performance. Others may opt for energy drinks as an occasional substitute for soft drinks, but only when they have extra funds available, as they tend to be pricier (Abian-Vicen et al., 2014; Costa et al., 2014; Gallo-Salazar et al., 2015). Participants in studies have commonly reported that energy drinks "wake you up, make you feel alert, and taste good," "make me hyper," and "keep me energized for soccer matches" (Abian-Vicen et al., 2014; O'Dea, 2003). A research study conducted by Jones explored the perceptions of alcohol-energy drinks (AEDs) among 12-17-year-olds and found that young people enjoyed them because they increased the fun at parties and acted as a pick-me-up (Jones, 2011).

Convincing on Use

The use of energy drinks among young people is influenced by advertising and brand loyalty, according to a study that involved participants from three different age groups (16-21, 22-28, and 29-35 years). The study found that energy drinks were advertised on various platforms such as TV, the internet, games promotions, sports sponsorship, and shops. Industry marketing targeted specific drinks to men or women using sexualized imagery, humor, and social media (Bunting et al., 2013). The younger age group seemed more aware of their projected social image and more influenced by their peers when making purchasing decisions. Social situations, particularly spending time with friends, were identified as familiar contexts for energy drink consumption. Parents also played a significant role in influencing their children's use of energy drinks. They either discouraged or prohibited the consumption of energy drinks or encouraged and endorsed their use. The study found that energy drinks were easily accessible from convenience stores or supermarkets, provided by parents, shared by siblings or friends, or obtained free at sponsored events. (Bunting et al., 2013: Costa et al., 2014).

Discussion

This review set out to examine evidence of any associations between adolescents and young adults' health and consumption of energy drinks. It also sought to explore consumer experiences and attitudes toward these drinks. The evidence demonstrates that the use of energy drinks by children and young people is associated with several adverse outcomes and health-damaging behaviors. 139 studies were located, with 11 meeting our inclusion criteria. A total of 99.740 participants were included in the 11 articles. In which we have obtained the gender data of 28.326 participants (28.4%), amongst 47.2% were males and 52.7% were females.

Three randomized controlled trials demonstrated that pre-exercise ingestion of an energy drink positively impacted some aspects of sports performance (O'Dea, 2003; Pennay & Lubman, 2012; Sanchis-Gomar et al., 2015). Nevertheless, the referred studies involved small numbers of athletes, and the results should thus be treated with some vigilance. Several cross-sectional studies indicated that energy drink consumption by adolescents was strongly and positively associated with higher rates of impulsivity, risk behavior, smoking, alcohol, and other substance use, as well as being linked to physical health manifestations such as headaches, loss of vigor, stomach aches, insomnia, fatigue, and hyperactivity (Azagba et al., 2014; O'Dea, 2003).

Two studies provided evidence of a dose-response effect, although none of the investigations could define the reason (Jones et al., 2012; Pennay & Lubman, 2012). Typically, boys consume more energy drinks than girls. Usage was found to be patterned by gender and age, although there was some variance between studies on the direction of the association. The highest consumption levels have been observed in sedentary and physically active people, suggesting a link between sports and screen-based relaxation activities.

An exciting finding among the analyzed studies is in a Hungarian study by Toth et al. (2020) where he examined 631 high school students and their relationships with energy drinks that corroborate the hypothesis of this review. The social environment of respondents and the amount of time they spend with friends were also factors influencing ED use. Parents supporting or forbidding education use have a significant influence on their children. Those with a weaker sense of coherence and a tendency toward depression were much more likely to become addicted, those who were active in sports were significantly less likely to report symptoms of depression, and their sense of coherence was also more potent than young people who did not engage in sporting activities at the same time, ED consumption was widespread among young people who were active in sports (Tóth et al., 2020).

The studies mentioned above have reported perceived beneficial effects on young people's bodies and sports performance, with slight mention of any adverse effects and limited knowledge of energy drink ingredients among participants (Franklin et al., 2013; Pennay & Lubman, 2012; Sampasa-Kunyinga et al., 2020; Visram et al., 2016).

Other literature findings show that energy drinks can significantly increase the likelihood of negative mental health conditions, such as stress, anxiety, and depression. These adverse outcomes are particularly prevalent in adolescents and young consumers (Richards et al., 2016). Although energy drinks may positively impact mood in the short term, long-term consumption is more likely to harm mental health (Trapp et al., 2014). However, there is a lack of comprehensive data regarding the potential link between energy drink consumption and mental health issues in young people (Kaur et al., 2020). Consequently, it is plausible that the components of energy drinks could contribute to the development or aggravation of mental health problems (Babu et al., 2008).

As for the appeal of energy drinks among the young, taste and energy-seeking were identified as critical drivers for consumption. Advertising and brand loyalty have been highlighted as significant influences on young people's attitudes toward energy drinks, and peers, family, and friends also played an important role. A few studies found that more than half of young energy drink consumers (53%) reported using energy drinks to continue partying and drinking alcohol over a more extended period and may experience adverse effects ranging from difficulty sleeping to addiction to alcohol (Franklin et al., 2013; Park et al., 2012; Wiggers et al., 2020).

A study by Leal and Jackson (2019) used samples for monitoring students between 2010 and 2016 and found that energy drink consumers are significantly more likely to intend to initiate marijuana use. Youth who heavily use energy drinks have substantially higher odds of having the intention to use marijuana (Snipes & Benotsch, 2013). Other studies in Table 2 show that adolescents may have associations with depressive symptoms when they ingest energy drinks with alcoholic beverages (Cotter et al., 2013; Tóth et al., 2020; Xu et al., 2020).

Aggressive marketing campaigns by manufacturers toward adolescents and young adults put this group at risk. That said, an experimental study developed in Canada provided evidence that current warnings in caffeinated energy drinks (CEDs) could be enhanced to increase the salience of messages, with a more significant impact from clear, descriptive, front-of-package 'high source of caffeine' labels, eliciting lower product appeal and perceived safety ratings in young adults aged 12–24 years (Reid et al., 2015). As caffeine is the primary psychoactive ingredient in energy drinks and is responsible for the vast majority of toxicity, energy drink labels that present high levels of caffeine associated with 'danger' could reduce the number of poisonings through indiscriminate use (Zandvliet et al., 2005).

Advertisements for energy drinks are often targeted towards adolescents through popular TV shows and websites, which could potentially encourage them to consume such drinks (Harris et al., 2015). It is important to note that while the average amount of caffeine consumed by teenagers has decreased over the past 20 years, there has been a significant increase in energy drink consumption among adolescents over the past decade (Tran et al., 2016). This is a cause for concern due to the numerous reported adverse effects of excessive caffeine, ranging from minor sleep disturbances to mortality. High consumption of energy drinks among young people in recent years is a worrying trend (Mesirow et al., 2015).

The need to understand adolescents' consumption of energy drinks is justified primarily by a range of immediate risk behaviors that are associated. Regarding future health, recent reviews have pointed out that standards adopted during this period have a potentially lasting influence and can extend into adulthood, with repercussions on physical and psychological health (Rice & Klein, 2019). Different behaviors of children and adolescents can negatively affect health and well-being, with short or long-term impacts. Regarding energy drinks, there is evidence that the age at first use predicts future risks. A longitudinal study with young American military officers pointed to the age range between 13 and 16 years as critical, suggesting that adolescents who begin consumption during this period become more likely to consume larger quantities of the product in isolated episodes than those who started consumption after the 20 years (Sather et al., 2016). Furthermore, new associations have been found between frequent ED consumption with alcohol by adolescents and a greater risk of developing alcohol dependence in adulthood (Arria et al., 2011).

ED does not present therapeutic benefits, contains

understudied ingredients, is not fully regulated, and has no safe consumption levels yet established for children and adolescents (Curran & Marczinski, 2017; Howland & Rohsenow, 2013; Seifert et al., 2011). The context is one of uncertainty regarding the acute and chronic safety of these products. Thus, it is necessary to understand the patterns of ED consumption by adolescents in our reality, the motivations that have led them to consume, and the factors that may be associated, both protective factors against consumption and risk factors, due to eventual or regular use. Special attention to this stage of development, characterized by lower assessment and self-protection capabilities, can prevent global health and well-being issues, with consequences in different areas of adult life.

Conclusion

The data collected covered several significant biases to be considered; however, regarding the use of energy drinks for adolescents, it is essential to have more studies to understand that energy drink consumption might increase risk behaviors associated with alcohol, which can be seen through competition, or impulsive risk, and depression (Table 2). Adolescence is a phase of significant biological and social changes. It is crucial to be aware of these aspects, primarily regarding social support, for a greater possibility of dealing with new situations.

This review contributes to the growing body of evidence regarding the health effects of consuming energy drinks. For young people, the negative implications may outweigh the positive ones. Despite this, factors like the brand, relationships with energy drink users, taste, and perceived benefits increase their popularity among young consumers. The advertising for these products worldwide often features ideas of power, strength, energy, and explosion, using images and product names that allude to these concepts. It is crucial to explore the effects of high levels of ingredients like caffeine, taurine, and sugar in energy drinks on young people's bodies. More education is needed about energy drink patterns for this demographic. However, addressing this issue through policies and interventions is complex due to the choices adolescents and young people make. While individual health education is unlikely to have a significant impact, healthcare and other professionals can play a role in promoting safe consumption habits.

Young men were identified as an essential factor, in combination with the gendered marketing and perceived links to sports performance. More research is required to explore the longer-term health impacts, given that childhood and adolescence are critical yet understudied periods in developing health-related behaviors and use of energy drinks associated with alcohol or types of consumption. The potential effects of heavy and long-term energy drink consumption on child development, behavior, and educational outcomes also warrant further study.

Furthermore, the findings have important practical implications for public health policies and laws governing the sale of energy drinks to minors on a prevention level. The results highlight the significance of imposing more stringent regulations and education efforts to block adolescents' access to these drinks, promoting healthy habits.

Dealing with the problem of children and teens consuming energy drinks requires acknowledging the complexity of their choices. While educating them about health may have little impact, healthcare professionals and others should provide clear information about the safety of consuming energy drinks. They may need guidance from organizations like the Food and Drug Administration (FDA- U.S.A), the Brazilian Health Regulatory Agency (Anvisa), and the European Medicines Agency (EMA).

It's essential to conduct further research to explore the long-term health impacts, particularly during childhood and adolescence, which are critical yet understudied periods in developing health-related behaviors.

Strengths and Limitations

Three authors thoroughly and systematically screened titles and abstracts, followed by full-text studies and reference lists. Discussions were held to ensure that no appropriate studies were lost. We attempted to use various search terms such as "stimulant drink," "energy strip," "energy shot," and "energy mint," as well as "youth," "young adults," and "teen" for the population. However, these terms yielded little results in the research bases. This was a limitation of our study. Additionally, we only included studies in the English language, which may have caused us to miss some relevant papers. We searched five databases, but this is a partial number. However, we followed the recommendations of experienced academics to cast as wide a net as possible regarding the context, concept, and population.

Recommendations for Further Research

The findings have considerable and varied implications in the context of this research. This study reveals the increasing concern over adolescent energy drink intake and its potential connection to other drugs, especially alcohol. Theoretically, our findings add to the field by verifying and deepening our knowledge of the dangers that alcoholic drinks pose to adolescents.

Our research indicates that further long-term studies are required to track adolescents and better understand how their behavior may be affected as they approach adulthood through energy drinks. Additionally, this study highlights the need for more investigation into the development and effectiveness of preventive and educational programs targeting adolescents. This includes researching school-based interventions, public awareness campaigns, and collaborating with mental health professionals to combat the psychological risks of consuming energy drinks and other substances. Ultimately, this study establishes a strong foundation for future research to safeguard adolescent health and well-being while identifying key areas where significant contributions can be made to address the dangers of energy drink consumption in this age group.

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Table 1

Search Strategies Used for EMBASE, PsychNet, PubMed, Scopus, and Web of Science

Database	Search Strategy
EMBASE	'Energy Drinks' AND ('Teenagers') AND ('Addiction')
PsycNet	(Any Field: "Energy Drinks") AND (Any Field: "Teenagers") AND (Any Field: "Addiction*")
PubMed	#1 Mesh Terms 'Energy Drinks' #2 Mesh Terms 'Teenagers' #3 Mesh Terms 'Addiction'
Scopus	('Energy 'Drinks') AND ('Teenagers') AND (Addiction')
Web of Science	'Energy Drinks' AND ('Teenagers') AND (Addiction')

Table 2

Summary of the Information and Characteristics of Each Study (n =11)

Citation	Country	Study Design	Outcome measures	Sample	Main Findings
Xu et al. (2020)	China	Cross-Sectional	The Children's Depression Inventory; Self-reported questionnaire for measuring ST, FFs, and SSBs consumption; The Bayesian multiple mediations.	14.500 students in four provinces of China.	Consumption of FFs and SSBs during ST may enhance the association with depressive symptoms in adolescents. FFs and SSBs consumption may play a mediating variable in the association between ST and depressive symptoms.
Sampasa-Kanyinga et al. (2020)	Canada	Cross-sectional	Ontario Student Drug Use and Health Survey (OSDUHS)	10.662 students in 7th to 12th grade who self-reported information on energy drink consumption and substance use.	Results provide supporting evidence that middle school students who consume energy drinks are at higher risk of other substance use than their high school counterparts.
Toth et al. (2020)	Hungary	Cross-sectional	Depression Scale (BDS-13) and Sense of Coherence Scale (SOC-13). Logistic regression models were used.	631 high school and college students.	The social environment of respondents and the amount of time they spent with friends were also factors influencing ED use. Parents supporting or forbidding ED use have a significant influence on their children Those with a weaker sense of coherence and a tendency toward depression were much more likely to become addicted. Those who were active in sports were significantly less likely to report symptoms of depression, and their sense of coherence was also stronger than that of young people who did not engage in sporting activities. At the same time, ED consumption was prevalent among young people who were active in sports.

Leal et al. (2019)	United States Of America	Cross-sectional	Logistic regression models were used.	40.525 Undergraduate students	Energy drink consumers are significantly more likely to intend to initiate marijuana use. Youth who heavily use energy drinks have significantly higher odds of having the intention to use marijuana. Youth who heavily use energy drinks have significantly higher odds of having the intention to use marijuana.
Norberg et al. (2019)	Australia	Cross-Sectional	Modified Timeline Followback approach; Analytic plan.	148 Undergraduate students.	Caffeine consumption was positively associated with the number of standard drinks consumed. Caffeine was an independent risk factor for heavier and more harmful alcohol use. Students radically misperceive their intoxication levels and subjective intoxication best predicts ARCs.
Miller et al. (2019)	United States of America	Cross-Sectional	Sociodemographic characteristics, personality traits, lifestyles, and patterns of alcohol and caffeine use.	1.032 U.S. early (aged 13– 15; n=602) and middle adolescents (aged 16–17; n=430).	Findings show that adolescent energy drink use is widespread and varies due to demographic, psychosocial, lifestyle, and substance use characteristics. Common situational contexts for use were: compensating for lack of sleep and/or playing sports differed by gender and age cohort.

Kemps et al. (2019)	Australia	Cross-sectional	Experiment 1: Dot probe task; Cognitive Bias modification protocol (Direct attention away from energy drink pictures); post-training assessment of attentional bias. Ostensible taste test.	Experiment 1: 116 regular energy drink consumers.	Experiment 1: The observed reduction in attentional bias in the group of participants that were trained to direct attention away from energy drink pictures was not accompanied by a lower intake of energy drinks in the taste test.
			Experiment 2: Approach-avoidance task. Cognitive Bias modification protocol (Push joystick away in response to energy drink pictures); post-training assessment of approach bias. Ostensible taste test.	Experiment 2: 226 regular energy drink consumers.	Experiment 2: In line with Experiment 1, approach bias modification did not significantly affect energy drink consumption in the taste test. However, results were in the expected direction in that energy drink intake in the avoid group was lower than in the approach group.

Scalese et al. (2017)	Italy	Observational Study	ESPAD®Italia 2015 (European School Survey Project on Alcohol and Other Drugs)	30.588 Italian high school students aged 15–19 years. Both genders.	Respectively, 41.4% and 23.2% of respondents reported drinking energy drinks and Alcohol mixed with energy drinks in the last year associated with daily smoking, binge drinking, use of cannabis, and other psychotropic drugs. Among life habits and risky behaviors, the following were positively associated: going out with friends for fun, participating in sports, experiencing physical fights/accidents or injury, engaging in sexual intercourse without protection, and being involved in accidents while driving.
Bonar et al. (2015)	United States of America	Cross-sectional	AUDITC (Alcohol Use Disorders Identification Test), Energy drink use, reasons and consequences, Risk behaviors, and Demographics.	439 youth (M_{age}=18.6 years, SD=1.4; 41% male; 73% Caucasian).	The main findings are common reasons for combining energy drinks and alcohol were hiding the flavor of alcohol (39%) and liking the taste (36%). Common consequences were feeling jittery (71%) and trouble sleeping (46%). Combined users had the highest rates of risk behaviors (e.g., drug use, sexual risk behaviors, driving after drinking) and alcohol use severity.

Snipes & Benotsch. **(2013)**	United States Of America	Cross-sectional	Self-report Questionnaires assessing drug use, alcohol and AmED consumption, and sexual behavior.	704 undergraduate students from a university in the southeastern United States.	AmED consumers appear more likely to use cocaine, marijuana, and methamphetamine, as well as engage in unprotected sex, sex after drug use, and sex after too much drinking.
Cotter et al. (2013)	United States of America	Cross-sectional	HYPED study questionnaire (Hearing Young Perspectives on Energy Drink Use)	N=169; Adolescents= 43; Young adults= 126. Both genders.	Adolescents typically consumed a mean of 1.5 and young adults a mean of 2.6 energy drinks per day when using energy drinks and drank at most a mean of 2.4 and 2.6 drinks per day, respectively. Among adolescents, energy drink usage was more common than alcohol, "street" or illicit drugs, and tobacco usage but less common than caffeine product usage. For young adults, energy drink usage was more common than "street" or illicit drugs but less common than caffeine use and similar to tobacco and alcohol usage. Young adult energy drink users were more likely than young adult non-energy drink users to use tobacco and caffeine.

Note. Some of the studies utilized abbreviation words. ST: Screen time, FFs; Fast foods; SSBs: Sugar-sweetened beverages; ED: Energy drink; EDs: Energy drinks; MTF: Monitoring the Future; ARCs: Alcohol-related consequences; AmED: Alcohol mixed with energy drink.

Figure 1

Flow Chart of Steps Performed During a Scoping Review
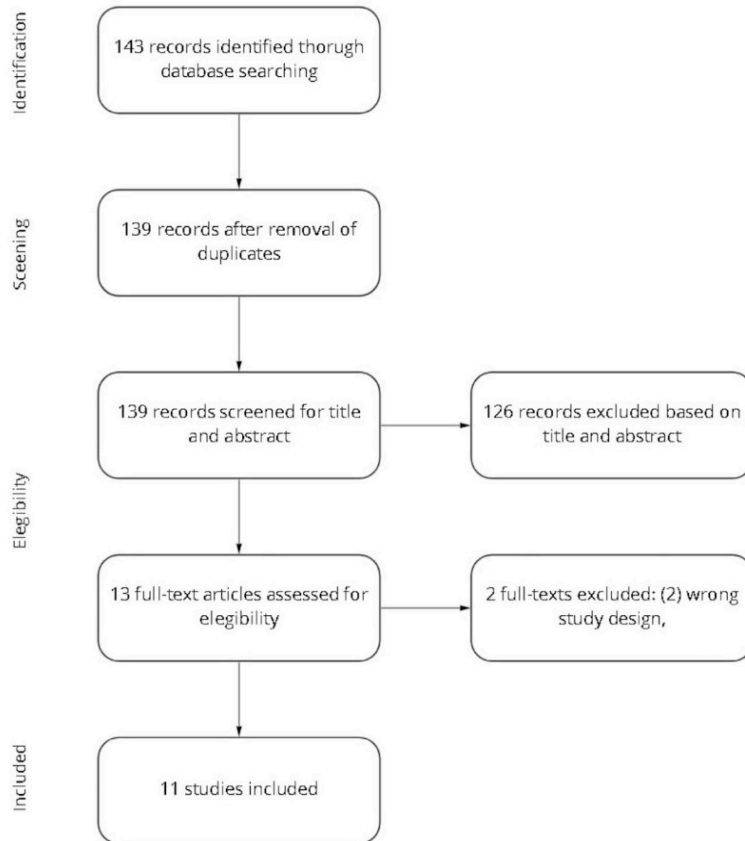
Interference Effects on Procedural Memory: An Assessment of Problem-Solving Task Performance

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Three experiments were conducted to assess interference effects acting on procedural task learning and performance using the Tower of Hanoi puzzle. In Experiment 1, participants in the no-interference group completed the Tower of Hanoi faster than the retroactive interference groups, with no differences between the types of tactile interference. These results indicate that retroactive interference may hinder procedural task performance but does not differentiate between consolidation and retrieval. Experiment 2 addressed retroactive interference placement by manipulating the delay prior to the interference task. Interfering with only consolidation or recall did not produce interference effects, but qualitative feedback regarding emotion raised questions about the effects of affect induction. Experiment 3 attempted to address the influence of a proactive and retroactive affect induction technique but did not produce a dichotomous happy versus neutral effect. Overall, the series of experiments conducted provides a conceptual replication of some previous research while contradicting other findings. This research not only extends our current understanding but also highlights the need to continue to explore factors that may influence the practice or acquisition of novel procedural tasks.
Keywords: procedural learning, interference, affect, memory, Tower of Hanoi

Memory refers to the ability of an organism to store, retain, and retrieve information over time (Atkinson & Shiffrin, 1968; Baddeley & Hitch, 1974; Cowan, 1999). It is a complex process that involves multiple brain regions and neural networks (for review, see Squire et al., 1993). There are several types of memory, including working memory, short-term memory, and long-term memory. Working memory refers to the cognitive system responsible for temporarily holding and manipulating information in the mind to perform complex cognitive tasks, while long-term memory refers to the storage and retention of information over a prolonged period, ranging from minutes to years, that is retrieved when needed (Cowan, 2008). Long-term memory is further divided into different subtypes, such as episodic memory, semantic memory, and procedural memory.

Procedural memory is the type of memory that enables us to learn and recall skills and procedures necessary for daily life, from simple actions such as brushing our teeth to complex activities such as playing an instrument or driving a car. This type of memory is critical for our ability to perform tasks efficiently and accurately without conscious effort or thought. It is also involved in the acquisition of new skills and the refinement of existing ones, making it essential for personal and professional development (Squire et al., 1993).

Comparing Procedural Memory to Other Types of Memory

Procedural memory is often implicit, meaning it operates outside of conscious awareness and without deliberate effort (Squire et al., 1993). When performing a skilled task, the individual is not necessarily aware of every step involved in the process, but rather, their body and mind learn the sequence of movements and actions through repetition and practice (Fitts, 1964). This type of memory is often referred to as muscle memory since the movements become autonomous and are often performed with little or no conscious thought (for review, see Packard & Knowlton, 2002).

Another key feature of procedural memory is its resistance to forgetting (Squire et al., 1993). Once a skill or procedure has been learned and stored in procedural memory, it can be retrieved and executed with little effort or conscious thought, even after years of disuse. This is because procedural memory is primarily stored in the basal ganglia, cerebellum, and motor cortex regions of the brain, which are involved in motor control and movement planning (Packard & Knowlton, 2002). This is in stark contrast to episodic and semantic memories.

Episodic memory is a type of long-term memory that involves storing and retrieving personal experiences, events, and episodes (Baddeley, 2000). Examples of episodic memory include remembering one's first day of school, a family vacation, a significant life event, or simply how to complete a puzzle. Episodic memory. involves conscious effort and is associated with the hippocampus and related brain regions (Tulving & Markowitsch, 1998). Another trademark of episodic memory is that it is declarative, meaning that it involves conscious recollection. This is a similarity that

episodic and semantic memory share (Tulving, 1999).

Compared to episodic memory, semantic memory involves the storage and retrieval of general knowledge and information about the world rather than specific events (for review, see Tulving, 1999). Semantic memory is associated with the neocortex and related brain regions, and it differs from other forms of memory in that it is more abstract (for review, see Allen & Fortin, 2013). However, extensive research indicates that episodic and semantic memory is prone to interference (Eakin & Smith, 2012; Flaisch et al., 2016; Wohldmann et al., 2008; Yang et al., 2013).

Interference in Different Forms of Memory

Various factors can influence the accuracy and reliability of stored information. One such factor is interference, which can disrupt the encoding or retrieval of information, leading to memory errors or loss (Unsworth et al., 2013; for review, see Robertson, 2012). Interference can be broadly classified as proactive and retroactive. Proactive interference (PI) is where previously learned information interferes with the encoding or retrieval of new information, while retroactive interference (RI) is where newly learned information interferes with the rehearsal or retrieval of previously learned information. For example, imagine trying to remember a previously learned list of items but then learning a new list of similar items. The new list may retroactively interfere with the retrieval of the old list, making it more difficult to remember.

Unsworth et al. (2013) conducted a series of experiments to understand how PI and RI affect memory recall for word lists. In Experiment 1, participants recalled words from either one or two lists. Both interference types caused lower recall, more intrusions (incorrect items recalled), and longer recall times. The hypothesis that participants might search both lists simultaneously but eliminate intrusions before recall was tested in Experiment 2. Participants recalled words from both lists, resulting in roughly equal intrusions from Lists 1 and 2. Rejecting intrusions was harder, and clustering indicated contextual cues helped recall. Experiment 3 examined recall with varying set sizes. Recall of Lists 1 and 2 was worse than control lists. Recalling both lists had worse results than recalling only one, replicating the "only effect" where combining lists led to larger search sets. Participants still included irrelevant items, causing interference. Finally, Experiment 4 used distinct categories for each list. Recall outcomes were similar for all three lists, suggesting distinct categories focused on participants′ search and reduced interference, resulting in comparable recall without intrusions.

Unsworth et al.'s (2013) results also might suggest that the effects of RI vary depending on the type of information being retrieved. For example, RI may have a greater effect on semantic memory than episodic memory. Another factor that has been well documented to influence the extent of RI in humans (Osgood, 1946; Wickelgren, 1965) and non-human primates (Medin et al., 1980) is the degree of similarity between the old and new information. The greater the similarity, the more likely it is that RI will occur. A third factor is the amount of time that has elapsed since the new information was learned, with more recently learned information being less susceptible to RI (Reyna, 1995). Yet, these patterns of results might be limited to declarative forms of memory.

The mechanisms underlying RI in procedural memory are not fully understood. However, studies suggest that RI may affect different stages of procedural memory processing, including encoding or acquisition, consolidation, and retrieval (for review, see Robertson et al., 2004). Acquisition refers to the initial learning of a new motor skill. Studies have shown that RI can impair the acquisition of procedural memory. For example, in Brashers-Krug et al. (1996), participants learned to compensate for velocity-dependent forces on a manipulandum and were immediately tested on a second task. Learning the second task within a short time period interfered with the retention of the first task. However, this RI was gradually reduced with the increase in the time interval between the two tasks. The study provides evidence that human motor memory is transformed rapidly with time and in the absence of further practice, in addition to providing evidence that RI occurs in tasks that rely heavily on procedural memory. This means that learning a new motor task can interfere with the consolidation of a previously learned task, making it more difficult to acquire the new task. This also suggests that RI may interfere with the encoding or consolidating new motor skills, lead ing to memory errors or loss. However, Brashers-Krug et al. did not differentiate between consolidation and retrieval.

Similar results are reported by Friedman and Korman (2016). In their study, participants completed a finger opposition task where they touched their

thumb and another finger in a specific sequence. They first did four test trials and then 10 training trials with the sequence shown on the screen. Then, half of the participants did an interference training session with a different sequence. All participants were tested again 24 hours later on the original sequence and a different sequence with both hands. Analyses suggested that RI prevented delayed gains in correct sequences but not accuracy and that two types of processes contributed to procedural learning: one sensitive to interference (consolidation) and one independent (recall). Yet, similar to Brashers-Krug et al. (1996), Friedman and Korman (2016) did not attempt to interfere with the recall or retrieval process independent of other stages.

Retrieval refers to the process of accessing and using previously learned information. When further scrutinized, Brashers-Krug and colleagues's (1996) results also appear to suggest that RI may not affect the retrieval of procedural memory, but their methods do not address this directly. More recent research has shown that RI can interfere with the retrieval of a previously learned task, possibly across memory types, making it more difficult to execute the previously learned task. Gagné and Cohen (2016) used a randomized controlled trial to investigate how interference between memory systems affects skill acquisition. Participants were assigned to one of four groups, each receiving a different combination of verbal and motor interference tasks during a finger-tapping sequence learning task. The authors used various measures to assess performance, including reaction time, accuracy, and the number of correct sequences produced. Participants were tested on the task immediately following the learning phase and again 24 hours later. Only the control group showed offline improvement, and introducing a visuospatial task before motor recall eliminated the gains, thereby suggesting interference between memory systems during subsequent motor recall. This suggests that various factors may cause RI and that RI may also negatively impact some of the retrieval processes of previously learned motor skills. Within other types of memory, the idea that other factors such as similarity, time, and the amount of practice influence performance is not new, but these are not the only possible contributors to performance.

Emotion and Memory

Emotional state can influence our ability to learn different types of information, including a new pro-cedural skill. Procedural memory is closely linked to the brain's motor system, which is also involved in processing emotions (Packard & Knowlton, 2002). Studies have shown that emotional arousal can enhance memory formation and retention. For example, LaBar and Phelps (1998) found that emotionally arousing words resulted in better memory retention than neutral words. The authors suggested that emotional arousal enhanced the consolidation of semantic memory. Conversely, Rimmele et al. (2011) found that participants who were exposed to negative emotional stimuli reported better memory retention than those who were exposed to neutral stimuli, even though their performance was actually worse. These mixed results suggest that our understanding of how emotion interacts with memory is lacking, especially within procedural memory paradigms or when emotion is evoked using different methods

Regarding PI, Yang et al. (2011) induced positive affect in participants by giving them candy as a token of appreciation. Participants' memory was then tested using word- and operation-span tasks, presented in increasingly difficult order. The word- and operation-span tasks were 10 trials each, with two trials at each set size ranging from three to seven presented in random order. An increase in positive affect appeared to moderate memory improvements for words and numbers. Although similar anecdotal (e.g., an athlete reporting that feelings influence performance) and empirical evidence suggest similar effects may exist within procedural memory (Steidl et al., 2006), our understanding is far from comprehensive. However, one study does find an effect of emotion on procedural skill learning within offline consolidation processes. Javadi et al. (2011) recruited 99 participants who were divided into nine groups, with each group having a combination of retention type and emotional content conditions. Participants completed a mirror-tracing task where stimuli included faces that were negative, positive, or neutral in expression, with a significant difference between the valence scores of positive and negative images but no significant difference in the arousal scores. The experiment was composed of two sessions (training and testing) with either a 12- or 24-hour retention interval. Participants also completed a finger-tapping task, which was used to evaluate alertness. The results suggest negative content during encoding improves later performance on the mirror-tracing task

more than neutral or positive content. In fact, participants who learned with negative images had greater skill improvement over time compared to those who learned with neutral or positive images. Another relevant but secondary finding suggests that alertness does not play a role in performance differences, which might suggest that physiological arousal is not as important as other factors. Although the most basic forms of PI and RI are not widely disputed, there is still some debate on the effects of emotion on learning, as the research findings have not always been consistent. Research has found positive and negative emotional states may enhance learning (Javadi et al., 2011; LaBar & Phelps, 1998; Yang et al., 2011). However, other studies have found that negative emotional states may hinder learning (Flaisch et al., 2016; Rimmele et al., 2011). Furthermore, interactions between variables such as level of skill expertise and affective tone have not been widely examined outside of video game literature (Weinreich et al., 2015), leaving gaps in the literature that should be addressed by basic research.

Overall, while there is some debate on the effects of emotion on procedural learning, it is clear that emotional states can impact the learning and retention of procedural skills. The exact nature of this impact, and whether it is positive or negative, may depend on various factors, such as the type of task, the individual's level of expertise, and the specific emotional stimuli involved. More research is needed to fully understand the complex relationship between emotion and procedural learning. To this end, we report on a series of three experiments conducted to (a) replicate the existing literature that demonstrates RI can directly impact procedural learning and performance, (b) clarify the importance and independence of the consolidation and recall processes within procedural paradigms, and to (c) explore the specific impact of unexpected rewards on novel procedural task acquisition and performance.

Experiment 1

Experiment 1 attempted to replicate previous literature that establishes RI within procedural paradigms (Brashers-Krug et al., 1996; Friedman & Korman, 2016; Gagné & Cohen, 2016; Robertson et al., 2004). We used the Tower of Hanoi as the target procedural memory task (see Figure 1), because it requires learning a specific set of rules and steps (Vakil & Heled, 2016) which can be taught instead of used as a measure of problem-solving. We expected that peg puzzles (see Figure 2) would produce the most interference due to their similarity to the Tower of Hanoi (Osgood, 1946; Wickelgren, 1965). Ring puzzles

(see Figure 3) are less like the Tower of Hanoi and were not expected to cause the same level of interference, but interference was still expected to occur compared to the writing control task. Therefore, the hypotheses for Experiment 1 were as follows:
1. RI that occurs between learning the Tower of Hanoi and the final performance test was expected to cause completion time (s) to increase significantly within the peg and ring interference groups when compared to the no interference control group.
2. Participants in the ring interference group were expected to complete the task faster than participants in the peg interference group when retested on the Tower of Hanoi.

Method
Participants

One hundred eight participants (30 men, 78 women; 18–50 years of age) were recruited via a bulletin board flyer and received course credit for their participation. Data from one participant in the ring group were excluded because they could not complete the post-interference Tower of Hanoi task. Data from one participant in the peg group were removed due to a pre-interference completion time that was over three standard deviations from the mean. Data from two more participants (one peg group, one ring group) were excluded for having a post-interference completion time that was over three standard deviations from the mean. Therefore, data from 104 participants were included in the final analyses (see Table 1).

Materials

The Tower of Hanoi (see Figure 1) required participants to move a tower of discs from a start peg to a target peg. There were two rules for moving the discs: (a) only one disc could be moved at a time and (b) a larger disc could not be placed on a smaller disc. The Tower of Hanoi task varies in difficulty based on the number of discs used. The minimum number of moves the puzzle can be completed in is calculated using the equation $f(x) = 2n\text{-}1$, where $f(x)$ represents the fewest number of moves and n equals the number of discs. Typically, the puzzle consists of three pegs and three disks. Difficulty increases as the number of discs increases. To make the task moderately difficult, the Tower of Hanoi task

used in this study consisted of three pegs and four discs. Successful completion of the Tower of Hanoi requires a set procedure that must be carried out in a specific order. The specific sequence extends the task beyond motor memory and forces participants to use spatial problem-solving skills and procedural memory.

Some participants in the study worked with either three different peg puzzles or eight different ring puzzles, each with a unique goal and set of rules. The three peg puzzles (see Figure 2) were the in-line puzzle (left panel), the elimination puzzle (center panel), and the addition peg puzzle (right panel). The in-line puzzle required participants to move pegs so that they switched sides, while the elimination puzzle involved removing all but one peg from play by jumping one over another to an open spot. The addition peg puzzle required filling all holes but one by tracing preset lines between them, with the caveat that a move could not be made if it led to a previously filled slot. For the ring puzzles (see Figure 3), participants had to disconnect two linked metal pieces by twisting, sliding, or pulling them apart, using similar strategies for each puzzle. Completion times in seconds were recorded using a stopwatch.

Procedure

First, each participant learned how to complete the 4-disc Tower of Hanoi puzzle with verbal, written, and visual instructions. Written instructions were given to each participant and read aloud, briefly outlining the objective and rules of the task. The visual instructions (see Figure 4) were provided in the form of an animated .gif (Karwath, 2005), and by one researcher demonstration. The discs were color-coded by size. Once the animation began, the discs moved from the start peg, following the best sequence possible (a total of 15 moves) to complete the task. The video lasted approximately 30 s and was replayed six times for each participant. After the instruction, participants were allowed two min to practice the Tower of Hanoi without the animation. This training method is modified slightly from Vakil and Heled (2016). Participants then ran through the Tower of Hanoi another time, completing it as quickly and efficiently as possible. Out of view of the participant, the researcher recorded the completion times (s) and the total number of moves made.

Following the practice phase, participants were randomly assigned to complete one of the three tasks: Writing control, ring puzzles, or peg puzzles. During a 10-min period, control participants wrote a detail-ori-ented description of the events of their day. If they finished early, they were instructed to write a detailed description of their favorite place on campus. Participants in the ring and peg puzzle groups solved as many of their respective puzzles as possible within 10 min. For both of those groups, puzzles were introduced verbally and in writing, with one visual demonstration by the experimenter. Participants repeated puzzles if they completed all of them within the 10-min period. Immediately following the interference task, Tower of Hanoi's performance was assessed again using the same method described for the pre-interference assessment.

Results

Homogeneity of variance was not violated for Before Interference completion time ($p = .776$) and completion time data appeared to be normally distributed. An initial analysis of variance (ANOVA) comparing completion times between groups before interference showed the effect of the Interference Group was not significant, $F(2, 101) = 0.496$, $p = .611$, $\eta^2 = .010$, suggesting that performance did not differ across groups prior to completing their respective interference or control task. Performance on the Tower of Hanoi was then examined using a series of 3 (Interference Group: Control, Ring Puzzle, Peg Puzzle) x 2 (Test Trial: Before Interference, After Interference) mixed ANOVAs on the dependent variables completion time and number of moves (power = 1.0). Homogeneity of variance was not violated for After Interference completion time ($p = .615$), Before Interference number of moves ($p = .287$), or After Interference number of moves ($p = .158$). Both of the main effects of Interference Group, $F(2, 101) = 3.225$, $p = .044$, $\eta_p^2 = .060$, and Test Trial, $F(1, 101) = 17.587$, $p < .001$, $\eta_p^2 = 0.148$, were significant on completion time. The Interference Group x Test Trial interaction was also significant on completion time, $F(2, 101) = 12.883$, $p < .001$, $\eta_p^2 = 0.203$. None of the main effects were significant on the number of moves, which suggests that all participants not only learned the puzzle but retained the steps equally well. Interpretations of the significant effects on completion time are provided below.

A series of t-tests using Tukey's correction were used to follow up on the significant main effect of the Interference Group. The Control and Ring Puzzle groups were significantly different ($p = .038$). Completion time was longer in the Ring Puzzle group ($M =$

23.914, $SD = 6.807$) than in the Control group ($M = 20.472$, $SD = 6.077$), regardless of Test Trial. No other comparisons were significant. The significant main effect of Test Trial indicated that completion time was longer After Interference ($M = 23.420$, $SD = 7.609$) than Before Interference ($M = 21.080$, $SD = 5.503$), hinting that at least one group's performance changed. Simple effects were run to follow up on the significant interaction effect and to further explore both within- and between-group differences. The simple effects of Test Trial at Ring Puzzle, $F(1, 101) = 22.61$, $p < .001$, $r = .44$, and Peg Puzzle, $F(1, 101) = 16.82$, $p < .001$, $r = .32$, were significant. Completion times were longer after completing the ring and peg puzzles than before completing them (see Figure 5). In contrast, the simple effect of Test Trial at Control was not significant, meaning there was no difference in completion time before and after performing the control task. Simple effects also indicated that differences were driven by completion times being different across groups following their respective tasks, $F(2, 101) = 7.92$, $p = .001$, while no differences were observed in completion times before the conditions deviated, $F(1, 101) = .500$, $p = .611$.

Experiment 1 Discussion

Previous research has shown the potential for RI in procedural memory (Brashers-Krug et al., 1996; Friedman & Korman, 2016; Gagné & Cohen, 2016; Robertson et al., 2004). Experiment 1 aimed to examine the effect of interference tasks on the retrieval of procedural memory of the Tower of Hanoi puzzle. Results showed that the writing control group completed the Tower of Hanoi puzzle faster than the peg and ring interference groups after the respective interference tasks. However, the peg task, which was subjectively more similar to the Tower of Hanoi than the ring task did not produce larger interference effects. Notably, the results also suggested that the level of interference did not affect the participant's total number of moves. These results support Hypothesis 1, but Hypothesis 2 was not supported. Experiment 1, like other research, did not compare the effects of consolidation and retrieval on RI (Brashers-Krug et al., 1996; Friedman & Korman, 2016). Experiment 2 was conducted to investigate the importance and potential independence of these processes in procedural memory and skill acquisition.

Experiment 2

Javadi et al. (2011) focused on retrieval as the point of action for RI. Another important process potentially affected by RI is the consolidation of newly acquired memories (Brashers-Krug et al., 1996; Friedman & Korman, 2016). Consolidation aids in memory retention by organizing material in working memory and preparing it for transfer into long-term memory (Squire, 1986). Without the consolidation process, memory would not transfer. This study aims to address the effects of RI on the differentiable processes of consolidation and retrieval by examining both potential points of action within the same RI paradigm as Experiment 1. Using the Tower of Hanoi again as a target task, our hypotheses for Experiment 2 were as follows:

1. Immediate forms of interference were expected to produce the greatest performance decline due to the learner's inability to consolidate newly learned information (Brashers-Krug et al., 1996; Friedman & Korman, 2016).

2. Delayed interference, acting directly before retrieval, was expected to have no performance-inhibiting effects due to allowing consolidation to complete automation of the procedural task (Javadi et al., 2011).

3. Participants in the control group were expected to perform better than participants in any other condition when retested on the Tower of Hanoi.

Method

Participants

One hundred and thirty-two participants (51 men, 81 women; 18–30 years of age) were recruited via the university's online research recruitment website and received research credit for their participation. Four participants were removed from the analysis due to not following the rules for completing the Tower of Hanoi puzzle, data from two more participants were removed due to incomplete data collection, and data from six more participants were removed due to their initial test completion time (s) being over three standard deviations from the mean. Therefore, a total of 120 participants were included in the final analyses (see Table 2).

Materials

The same 4-disc Tower of Hanoi puzzle that was used in Experiment 1 was used in Experiment 2. In

the interference conditions, participants worked with ten different ring puzzles instead of eight. Completion times in seconds were recorded using a stopwatch.

Procedure

The progression for Experiment 2 was similar to Experiment 1 with a few minor modifications. Each participant learned how to complete the 4-disc Tower of Hanoi puzzle following the same procedure as in Experiment 1. Participants were then instructed to complete the Tower of Hanoi again, completing it as quickly as possible and in as few moves as possible. Out of view of the participant, the researcher recorded pre-test completion time (s) and total number of moves.

Following the practice phase, participants were randomly assigned to complete one of the three conditions. During a 13-min period, no interference participants wrote a detail-oriented description of the events of their morning. If completed before time expired, they were asked to describe their favorite location at the university. Participants in the immediate interference group solved as many ring puzzles as possible within 10-min immediately following the pre-test, then had a three-min waiting period. Participants in the delayed interference group waited three minutes after the pre-test, and then were instructed to solve as many ring puzzles as possible within 10 minutes. Ring puzzle instruction was the same as in Experiment 1. Immediately following the experimental phase, Tower of Hanoi's performance was assessed again using the same method described for the pre-test assessment.

Results

The pre-test number of moves between groups was examined to gauge similarity in levels of mastery across groups. Homogeneity of variance was violated ($p = .001$) but completion times appeared to be normally distributed and the achieved power was .999. A Kruskal-Wallis H test indicated the median pre-test number of moves did not differ across conditions, $\chi^2(2) = 0.594$, $p = .743$. Homogeneity of variance was also violated for pre-test completion times ($p = .029$) and non-parametric tests were used for all subsequent analyses. A Kruskal-Wallis H test suggested that neither pre-test, $\chi^2(2) = 0.061$, $p = .970$, nor post-test, $\chi^2(2) = 0.150$, $p = .928$, completion times differed across groups, meaning the groups performed the Tower of Hanoi similarly before and after any intervention. Within-group performance between pre-test and post-test completion times was examined using a series of Wilcoxon signed-rank tests which suggested a significant difference within the Immediate Interference group ($z = -2.197$, $p = .028$, $r = .571$), with median post-test completion times ($Mdn = 19$) being faster than median pre-test completion times ($Mdn = 21$). All other comparisons were not significant.

Exploratory analyses conducted after removing all participants whose pre-test completion times were over three standard deviations from the mean of Experiment 1's Before Interference completion times yielded the same overall result, except that no significant difference was observed in the Immediate Interference group when comparing median pre-test completion times to median post-test completion times.

Experiment 2 Discussion

Experiment 1 indicated procedural memory performance can decline when RI tasks are introduced. Experiment 2 did not reveal the same findings when a three-min waiting period was added either immediately after the pre-test or immediately before the post-test. Offline performance gains were observed within the Immediate Interference group while performance did not change within the Control and Delayed Interference groups. These gains might be explained by offline practice, but previous research has only observed these gains within consolidation, suggesting that interfering with retrieval seems to, at least initially, cancel out these gains (Gagné & Cohen, 2016; Javadi et al., 2011). This highlights the importance of work implicating retrieval as an important yet separate mechanism within procedural memory performance and skill acquisition, suggesting that retrieval is less susceptible to RI than previously reported (Javadi et al., 2011). Experiment 2 suggests RI acting on the consolidation process apart from the retrieval process yields different results as compared to acting on both processes. However, another important factor was highlighted during the debriefing process.

Many participants noted that the ring puzzles elicited frustration. Experiment 2 did not quantify emotion as a possible variable acting on performance, but feelings of frustration may have inadvertently enhanced RI within Experiment 1 as other experiments have shown (Flaisch et al., 2016; Rimmele et al., 2011; Weinreich et al., 2015). However, participants did not provide similar informal feedback after complet-

ing Experiment 1. Experiment 2 may have also inadvertently introduced boredom or decreased motivation, factors that have been found to influence both learning and memory (Moore et al., 2014), although this is contrasted by research suggesting alertness does not impact procedural performance (Javadi et al., 2011). The mixed results warranted further research to address why RI did not occur and to examine potential influences of emotion observed in previous research (Javadi et al., 2011; Steidl et al., 2006).

Experiment 3

Previous research across memory types has implicated emotion as a factor that moderates performance (Flaisch et al., 2016; Javadi et al., 2011; LaBar & Phelps, 1998; Packard & Knowlton, 2002; Rimmele et al., 2011; Yang et al., 2011), with interventions ranging from emotionally-valenced images or word lists and the receipt of an unexpected gift. However, the research discussed earlier suggests that affect induction has mixed results and the effects are observed as both PI and RI. Experiment 3 was designed to address the implications of positive affect induction via receipt of an unexpected gift either before (PI) or after (RI) learning a novel procedural skill. We hypothesized the following:

1. Positive affect such as joy or happiness was expected to improve test performance regardless of placement (Javadi et al., 2011; Yang et al., 2011).
2. Improvements in performance were expected to be accounted for by an improved ability to learn the task (Yang et al., 2011).
3. Changes in alertness were not expected to impact skill acquisition or retrieval (Javadi et al., 2011).

Method

Participants

Seventy-eight participants (33 men, 45 women; 18-24 years of age) were recruited. Participants received General Psychology course credit and a $10 Amazon.com gift card for participation. Data from two participants were removed after the manipulation check analysis due to worsening completion times during practice. Data from one outlier was removed within the Delayed Gift group based on the first timed test immediately following the practice phase being greater than three standard deviations from me mean. Data

from three more participants were removed due to incomplete data collected, and therefore up to 72 participants were included in the final analyses (see Table 3).

Materials

The Tower of Hanoi was also used in Experiment 3. However, participants learned the 3-disc procedure. A transfer task was added which utilized the 4-disc procedure that was used in Experiments 1 and 2. The Positive and Negative Affect Schedule Expanded Form (PANAS; Watson & Clark, 1994) measured self-reported state affect during the experiment. Participants rated to what extent they agreed with statements with either positive or negative connotations. Higher scores on either positive affect words or negative affect words correspond to either higher positive affective tone or higher negative affective tone respectively. Within the general dimension portion, 10 responses were coded as general positive affective words while 10 others were coded as general negative affective words. Positive and negative emotionally charged words were broken down further into subgroups and categorized to analyze these additional dependent variables: joviality, attentiveness, sadness, fatigue, and surprise. These subgroups were identified logically as pertinent to this study while other subgroups such as fear, hostility, and shyness were excluded.

Procedure

Each condition's specific procedural sequence is depicted in Figure 6. One control group first completed the PANAS. Next, these participants were taught how to complete the 3-disc Tower of Hanoi puzzle with verbal, written, and visual instructions. Written instructions were read aloud and given to each participant briefly outlining the objective and rules of the task. Visual instructions were provided in the form of one researcher demonstration. After instruction, all participants were allowed five minutes to practice the Tower of Hanoi. The number of practice trials and successful completions during practice were recorded. Completing the puzzle or restarting marked the beginning of a new practice trial. Initial test performance on the Tower of Hanoi puzzle was measured (s) out of sight of the participant. The total number of moves was not counted as participants were allowed more practice time, and this should only have increased puzzle mastery. Immediately following learning and initial testing participants read a psychology magazine for five minutes. Immediately following, participants

were retested on the Hanoi puzzle. Following the second testing phase, transfer was tested using the 4-disc version of the Tower of Hanoi with no instruction. After the transfer measure, participants were awarded a $10.00 Amazon.com gift card. Another control group followed a similar process except they did not complete PANAS before learning the Tower of Hanoi. Instead, participants in this group completed the PANAS after learning instead of a five-minute waiting period. One experimental group followed the same process as the first control group except participants were awarded a $10.00 Amazon.com gift card before completing the PANAS. A second experimental group followed the same process as the second control group except participants were awarded a $10.00 Amazon.com gift card before completing the PANAS.

Results

PANAS

A series of 2 (Affect: positive, neutral) x 2 (Placement: before learning, after learning) independent groups ANOVAs were used to examine the following dependent variables: General positive, general negative, joviality, attentiveness, sadness, fatigue, and surprise. Homogeneity of variance was not violated for any of the affective variables and the distributions appeared to be normal. The achieved power was not as high as in other analyses but was sufficient: .817. Results indicated a significant main effect of Placement on attentiveness, $F(1, 71) = 6.441$, $p = .013$, $\eta_p^2 = .087$ (see Figure 7). On average, attentiveness was higher after learning ($M = 14.971$, $SD = 3.339$) than before learning ($M = 13.216$, $SD = 2.583$) free of the affective condition. No other main effects or interactions were significant.

Practice

Each participant was required to complete at least two of the practice trials being analyzed for their data to be included in the practice trial analyses. Five participants were excluded from all practice trial analyses (two from control group 1, two from control group 2, and one from experimental group 1), leaving up to 67 participants for analyses of the practice phase while achieving power = 1.0.

A 2 (Affect) x 2 (Placement) x 2 (Practice: practice two, practice three) mixed ANOVA was conducted to examine completion time differences between practice trials and across conditions. Homogeneity of variance

was not violated for either Practice Two completion time ($p = .325$) or Practice Three completion time ($p = .077$), and sphericity was assumed. Practice had a significant main effect on completion time, $F(1, 58) = 5.189$, $p = .026$, $\eta_p^2 = .082$. There was also a significant Affect x Practice interaction, $F(1, 68) = 4.18$, $p = .040$, $\eta_p^2 = .071$ (see Figure 9). No other main effects or interactions were significant. Simple comparisons were conducted to follow up on the significant interaction. Results indicated the positive groups' times differed significantly from one practice trial to the other $F(1, 60) = 10.90$, $p = .002$, $r = .39$, with practice three ($M = 16.469$, $SD = 5.486$) being faster than practice two ($M = 19.231$, $SD = 9.964$; see Figure 8). No other simple comparisons were significant.

A power function ($y = kx^n$; $r = .635$, $SD = .233$) and a quartic function ($y = ax^4 + bx^3 + cx^2 + dx + e$; $r = .753$, $SD = .166$) were calculated for each participant's practice period, and the quartic function was determined to have a better-fit coefficient. A 2 (Affect) x 2 (Placement) ANOVA was conducted as a precaution to ensure function fit was not different across conditions, resulting in no significant main effects or interaction. The derivative of each quartic equation was taken and solved at the points equal to the second, third, and fourth practice trial times. These derivatives gave the rate of change for each participant's power curve at each point. The rates of change were analyzed using a 3 (Practice: practice two, practice three, practice four) x 2 (Affect) x 2 (Placement) mixed ANOVA to examine changes in completion time (s). Homogeneity of variance was not violated within practice two ($p = .095$), practice three ($p = .094$), or practice four ($p = .092$). The main effect of Practice, $F(2, 126) = 10.311$, $p < .001$, $\eta_p^2 = 0.141$, on rate of change was significant. Pairwise comparisons for the main effect of Practice indicated changes in completion time differed between practice two and practice three ($p = .006$), practice two and practice four ($p = .006$), and practice three and practice four ($p = .007$). Respectively practice two completion times changed fastest ($M = 0.577$, $SD = 0.1.525$), then practice three ($M = 0.378$, $SD = 1.015$), and practice four ($M = 0.280$, $SD = 0.761$). No other main effects or interactions were significant.

Finally, a 2 (Affect) x 2 (Placement) independent groups ANOVA was used to examine potential differences in the number of attempted practice trials between groups. Unsuccessful trials were in-

cluded in the analysis. Homogeneity of variance was not violated ($p = .706$), and neither the main effect of Affect nor Placement on the number of attempted practice trials was significant. In addition, the Affect x Placement interaction was not significant.

Test and Transfer

A 2 (Affect) x 2 (Placement) x 2 (Timed Trial: first test, second test) mixed ANOVA was used to examine differences in performance between conditions and across timed trials. Homogeneity of variance was not violated for Timed Trial completion times ($p = .947$), and achieved power was 1.0. There was a significant main effect of Placement, $F(1, 68) = 4.339$, $p = .041$, $\eta_p^2 = 0.060$, with completion of the PANAS before learning resulting in slower average test completion times ($M = 7.740$, $SD = 1.608$) than when the PANAS was completed after learning the Tower of Hanoi ($M = 6.996$, $SD = 1.579$) regardless of affective condition. No other main effects or interactions were significant. The main effect of Placement was explored further using a series of independent sample t-tests comparing the first and the second test completion times based on PANAS placement being either before or after learning, which indicated the significant main effect was due to a difference in the second test completion times, $t(70) = 2.100$, $p = .039$, $d = .495$, with later PANAS placement resulting in faster completion times ($M = 7.021$, $SD = 1.509$) than early PANAS placement ($M = 7.773$, $SD = 1.529$). No difference arose between the first test completion times. A 2 (Affect) x 2 (Placement) independent groups ANOVA was used to examine the dependent variable of transfer time. Homogeneity of variance was not violated ($p = .369$), and there were no significant effects.

Experiment 3 Discussion

Previous research has used an unexpected gift of candy to induce a higher momentary positive affect before completing a task (Yang et al., 2011). In this study, a $10 gift card was used. It appears that the manipulation failed to produce the desired effects but there were notable changes in attentiveness. However, these changes are limited to after learning how to complete the Tower of Hanoi. This suggests that the intervention did not have a significant impact on attentiveness, but instead simply engaging in learning a novel puzzle might have caused the increase. In turn, the improve-

ments observed across practice trials between the positive and neutral affective groups might be attributable to non-significant differences in initial practice performance. This post hoc explanation is supported by the evidence suggesting that no group exhibited greater practice trial-to-practice trial performance changes. Therefore, the affective results of this study are largely inconclusive. That being true, it appears that the PANAS placement between the first and second tests may have facilitated performance in some way, but the extent and specific mechanisms of this influence are also unclear. Granted, all groups were able to master the 3-disc version of the puzzle, but transfer performance may have been better if a variable training method was used (Vakil & Heled, 2016). Overall, the changes in attentiveness are particularly interesting and will be covered in greater detail within the General Discussion.

General Discussion

This series of experiments had three main objectives: (a) Replicating existing literature demonstrating the impact of retroactive interference (RI) on procedural learning and performance, (b) clarifying the significance of consolidation and recall processes within procedural paradigms, and (c) exploring the influence of unexpected rewards on procedural task acquisition and performance. Experiment 1 replicated prior research on RI in procedural memory using the Tower of Hanoi task and various puzzles. Our first hypothesis was supported that both interference groups would perform worse than the control group. The amount of interference in the peg and ring groups was similar when participants were retested on the Tower of Hanoi, which was contrary to our second hypothesis. However, Experiment 1 did not differentiate between consolidation and retrieval processes. Experiment 2 aimed to clarify the impact of interference on the consolidation and retrieval processes in procedural memory performance. We hypothesized that immediate interference would lead to the largest performance decline, while delayed interference would have no effect. However, the results were not consistent with that hypothesis. We observed that emotions such as frustration and boredom might have influenced performance, which led to conducting Experiment 3. Experiment 3 did not yield the expected effects, though the interpretation of the results paralleled that of Experiment 2, except for the intriguing differences in alertness observed

before and after learning the Tower of Hanoi puzzle.

Affect Induction

Previous research has found that we can induce different affective states using various methods (Flaisch et al., 2016; Javadi et al., 2011; LaBar & Phelps, 1998; Packard & Knowlton, 2002; Rimmele et al., 2011; Yang et al., 2011). While Experiment 3 utilized an intervention based on previous work, we assumed that participant affect would be impacted by the surprise receipt of a $10 gift as compared to a small piece of candy (Yang et al., 2011). Given the results, we must acknowledge that there may be a reason why this particular intervention is not commonly used or reported (Zhang et al., 2014). This may explain why the methods used in Experiment 3 did not produce a clear positive and neutral dichotomy.

Future replication of Experiment 3 should use a different method to change participant affective tone. Zhang et al. (2014) tested four different commonly used affect induction procedures (recall with music, guided imagery, visual images with music, and embodiment) and found that all are effective in inducing both pleasant and unpleasant affective changes. However, some procedures are more effective than others. Viewing evocative photographs while listening to music and recalling an affectively salient event while listening to music were the most effective in inducing a pleasant affective tone, while viewing evocative photographs while listening to music was the most effective in inducing unpleasant affect. Overall, these results suggest that combining evocative images with music is a powerful way to manipulate affective states, while all four methods are equally effective in modifying arousal. Using these methods before learning the Tower of Hanoi, or imposing an effective strategy post-learning, might increase the likelihood of achieving the desired effect. This would provide further insight into if the placement of emotionally-valenced interference impacts various stages of procedural skill acquisition and performance.

Alertness and Procedural Memory

Previous research found that alertness was not a factor in procedural performance changes (Javadi et al., 2011). However, the definition of alertness matters. Previous literature defines 'alert' or 'alertness' in many ways, but we believe the following definition, modified and adapted from Oken et al. (2006) and Shapiro et al. (2006), is both recurrent in the literature and appropriate for this discussion. Alertness refers

to a heightened state of readiness or vigilance corresponding to the ability to maintain focus and attention on a task or situation. Javadi et al. (2006) used a self-report questionnaire and a finger-tapping task to measure alertness, whereas in Experiment 3, we used the PANAS. Another main difference is that in Experiment 3, we tracked changes in performance across the acquisition stage. This allowed us to determine what mechanisms might be driving overall performance differences if they arose. The differences in the results of Experiment 3 and those reported by Javadi et al. (2011) warrant further exploration into how the construct of alertness interacts with procedural skill acquisition.

In Experiment 3 we observed that alertness appeared to increase after participants' engagement in learning how to complete the Tower of Hanoi. We cannot attribute these changes to the monetary intervention, and therefore conclude that there is some other relationship between alertness and learning a procedural skill. This brings us back to the definition of alertness, and how previous research has linked it to changes in performance. Much of the early research exploring the role of alertness on memory defined alertness as needing sleep or not (Aguirre et al., 1985; Gorissen et al., 1997; Rogers & Rosenberg, 1990). However, contemporary research has expanded our understanding of alertness to include momentary fluctuations that influence both attentional control and memory processes (deBettencourt et al., 2018, 2019; Keene et al., 2022). We also better understand the neuroanatomical structures responsible for modulating alertness (Ross & Van Bockstaele, 2021; Van Egroo et al., 2022). However, there are still gaps in our understanding of the results of Experiment 3.

To date, there appears to be little or no research that systematically examines the influence of alertness on procedural memory processes. However, we might be able to glean some insight from other memory domains such as long-term memory encoding and working memory. Within these systems, vigilance, or the ability to maintain focus on a given task, can be measured using response time and pupillometry. Faster response times in decision-making tasks and larger pupil size compared to an individual's baseline are predictive of errors. In turn, errors suggest that not enough attentional resources are being allocated to the task. To clarify the relationship between vigilance and working memory, Adam et al. (2015) used

the whole report change detection paradigm. Participants were presented with a memory display, followed by a test array, and had to indicate whether it was the same or different. Instead of the standard same/different response, participants were presented with a 3 x 3 matrix of colors and had to select the individual color that appeared at the same location as in the original display. The researchers used a lapse model and an attentional control model to explain fluctuations in performance and found that the attentional control model best explained working memory performance. These findings suggest that attention lapses contribute to individual differences in working memory capacity. Further evidence to support an attentional control explanation was reported by deBettencourt et al. (2019). Participants completed a task in which they had to identify if an array consisted of colored circles or squares by pressing a button. The circles appeared more frequently than the squares, causing errors to occur when participants had to switch to identifying the squares. To measure the relationship between vigilance and working memory, a whole-report color task was added to the task at random intervals. Results showed that attention lapses, identified by faster reaction times, were related to errors in working memory.

Similar observations are made in long-term memory. deBettencourt et al. (2018) had participants complete a task where they identified indoor or outdoor scenes and then performed a recognition memory test with 200 images. Sustained attention was measured using the average reaction time over the previous three trials and was found to predict memory performance. Infrequent images preceded by faster reaction times in the initial decision-making task were less likely to be remembered in the surprise long-term recognition memory task than those preceded by slower reaction times. This suggests that an individual's level of vigilance during encoding affects which memories are formed. These recent studies might also give us insight into the results from Experiment 3, and at least give us an idea of why increases in alertness appear to coincide with procedural skill acquisition. When alert, individuals are more attentive and able to process information more efficiently, which can lead to better retention and retrieval of information. Additionally, alertness can lead to increased motivation (Neigel et al., 2017), which may encourage individuals to engage in more deliberate and focused practice, leading to improved skill acquisition. Furthermore, alertness can increase the capacity for mental flexibility and problem-solving (Greenberger et al., 1971; Ren et al., 2011), allowing individuals to adapt their strategies and approaches to the task at hand. However, we cannot rule out the possibility that simply engaging in a cognitively demanding process, such as procedural skill learning, might inherently increase attentiveness.

Conclusion

Collectively, these experiments offer mixed support for our hypotheses, emphasizing the need for further research employing diverse methods to induce affective tone. Such studies can shed more light on the impact of emotionally-valenced interference at various stages of procedural skill acquisition and performance. Additionally, these experiments underscore the importance of replication in psychology research and highlight the replication crisis, which pertains to the challenges of reproducing published research findings, especially in fields like psychology and other social sciences. Replication promotes transparency, openness, and research reproducibility, facilitating systematic progress in our understanding of the subject, rather than leaving gaps in the literature, as is currently the case with our limited understanding of alertness in procedural memory.

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Table 1

Descriptive Statistics for Experiment 1

Condition				Before interference				After interference			
		Age		Completion time (s)		Number of moves		Completion time (s)		Number of moves	
	N	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Control	36	21.06	2.51	21.28	5.15	15.42	1.38	19.67	6.86	15.53	1.23
Ring	35	22.40	6.96	21.63*	5.77	15.57	1.58	26.20*	7.07	16.03	2.56
Peg	33	20.30	4.48	20.33*	5.67	15.24	0.75	24.39*	7.52	15.58	1.48
Total	104	21.27	5.01	21.10	5.50	15.41	1.29	23.37	7.61	15.71	1.85

Note. This table displays the descriptive statistics of the final data used in Experiment 1, after initial data removals, and separated by condition.

* Significant differences between mean completion times measured before and after respective condition tasks as indicated by the simple effects analysis ($p < .001$).

Table 2

Descriptive Statistics for Experiment 2

Condition	N	Age		Before interference completion time (s)		After interference completion time (s)	
		M	SD	M	SD	M	SD
Control	41	19.05	2.13	26.02	21.00	27.90	26.94
Immediate interference	39	18.80	1.74	26.69*	15.78	23.26*	13.03
Delayed interference	40	18.83	1.34	34.80	33.98	36.63	50.86
Total	120	18.89	1.76	29.17	24.68	29.30	34.30

Note. This table displays the descriptive statistics of the final data used in Experiment 2, after initial data removals, and separated by condition.

* Significant differences between median completion times measured before and after respective condition tasks as indicated by the Mann-Whitney U test ($p < .05$).

| Variable | Total | | Positive | | | | Neutral | | | |
| | | | Immediate PANAS | | Delayed PANAS | | Immediate PANAS | | Delayed PANAS | |
	M	SD	M	SD	M	SD	M	SD	M	SD
PANAS analysis										
N =	72		20		17		17		18	
General positive	30.11	7.72	30.30	7.15	31.24	7.62	30.00	7.79	28.94	8.80
General negative	15.72	5.70	15.25	5.59	17.82	7.33	14.35	4.95	15.56	4.54
Joviality	22.44	7.20	23.35	5.82	22.82	7.38	23.53	7.24	20.06	8.35
Attentiveness	14.07	3.08	13.35[a]	2.66	15.65[a]	2.91	13.06[a]	2.56	14.33[a]	3.66
Sadness	6.85	2.82	7.60	3.60	6.47	2.48	6.88	2.96	6.33	1.88
Fatigue	9.19	3.92	10.05	4.07	8.12	3.77	9.94	3.94	8.56	3.87
Surprise	6.40	2.75	6.30	3.03	7.59	2.87	5.47	2.35	6.28	2.45
Practice analysis										
N =	62		17		17		14		14	
Practice 2 CT	19.23	9.96	19.82[b]	12.64	20.18[b]	11.87	19.64	7.63	15.36	3.50
Practice 3 CT	16.47	5.49	15.06[b]	3.67	16.06[b]	4.44	18.50	7.50	16.14	5.20
Equation fit (r)	.75	.17	.75	.18	.79	.13	.75	.16	.71	.20
Practice 2 change	-0.39[c]	0.73	-0.46	0.48	-0.45	0.65	-0.23	0.19	-0.18	0.77
Practice 3 change	-0.25[c]	0.48	-0.30	0.32	-0.29	0.43	-0.15	0.13	-0.12	0.52
Practice 4 change	-0.18[c]	0.36	-0.22	0.24	-0.21	0.32	-0.11	0.09	-0.08	0.39
Test and transfer analysis										
N =	72		20		17		17		18	
First test CT	7.35	1.72	7.75	1.70	6.95	1.72	7.66	1.76	6.99	1.66
Second test CT	7.41	1.56	7.92[d]	1.55	6.99[d]	1.63	7.60	1.53	7.05	1.43
Transfer test CT	98.13	70.48	99.74	69.24	108.99	91.68	110.11	69.16	74.77	46.19
Transfer test NM	36.12	15.45	39.80	16.68	37.06	13.17	37.77	19.27	29.61	10.44

Note. This table displays the descriptive statistics of the final data used in each Experiment 3 analysis, after initial data removals, and separated by condition. PANAS = positive and negative affect schedule; CT = completion time (s); NM = total number of moves.

[a] Attentiveness, as measured by the PANAS, was higher in the Delayed PANAS conditions compared to the Immediate PANAS conditions ($p < .05$).

[b] CT of practice trials two and three were different within the Positive groups ($p < .005$).

[c] The rate of change was significantly different across practice trials two, three, and four ($p < .001$).

[d] Second test CTs significantly differed between the Immediate and Delayed PANAS groups ($p < .05$).

Figure 1

Tower of Hanoi Puzzle

Note. The Tower of Hanoi is a wooden puzzle that involves moving a stack of discs, one at a time, from a starting peg (the left peg in this image) to a target peg (the right peg in this image). There are specific rules to follow: only one disc can be moved at a time, and a larger disc cannot be placed on top of a smaller one. To complete the tower with four discs, it takes a minimum of 15 moves. The first step is to place the smallest disc on the middle peg (see Karwath, 2005). The rules determine this choice. The next move is to put the smallest disc on the right peg, which creates space for moving the second largest disc to the middle peg. After building a three-disc tower on the middle peg, it becomes possible to move the largest disc to the target peg on the right. Then, participants can rebuild the tower on the target peg.

Figure 2

Ring Puzzles

Note. A ring puzzle is typically a metal piece bent into a ring-like shape and linked with another piece. They are solved by twisting, sliding, or pulling the pieces apart.

Figure 3

Peg Puzzles

Note. The left panel shows a peg puzzle requiring all pegs to switch sides. The center panel illustrates an elimination peg puzzle involving the removal of pegs from play by jumping one over another to an open spot. The right panel exhibits a peg puzzle requiring all holes but one to be filled by starting in any position and then tracing preset lines between holes.

Figure 4

Animated Procedure for Solving the Tower of Hanoi
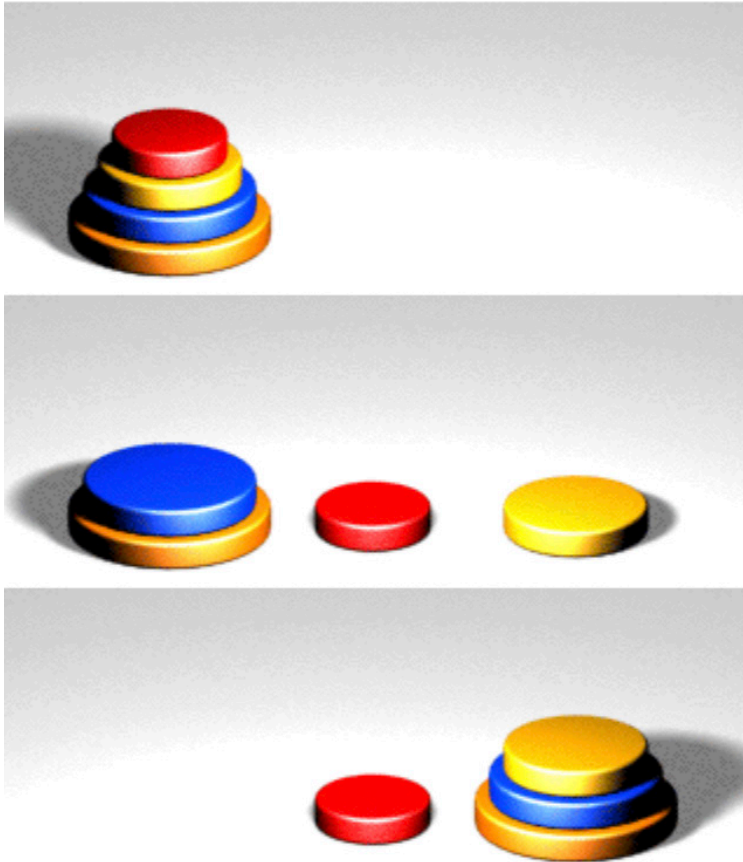
Note. Three slides from the digital .gif designed by Karwath (2005) illustrate an animated procedure for copleting the Tower of Hanoi puzzle with 4 discs.

Figure 5

Tower of Hanoi Completion Times Before and After Interference
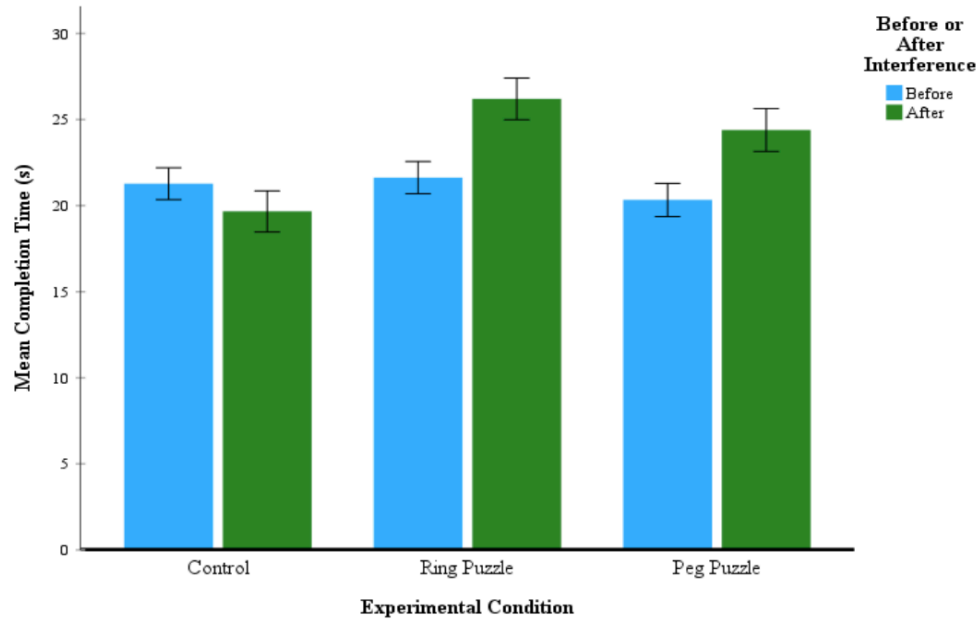
Note. Experiment 1 Tower of Hanoi completion time (s) before and after interference in the control, ring puzzle, and peg puzzle groups. Error bars denote one standard error around each mean.

Figure 6

Procedural Sequences in Experiment 3

C1: PANAS → Learning → Pre-test → Waiting → Post-test → Transfer

C2: Learning → Pre-test → PANAS → Post-test → Transfer

E1: Unexpected Reward → PANAS → Learning → Pre-test → Waiting → Post-test → Transfer

E2: Learning → Pre-test → Unexpected Reward → PANAS → Post-test → Transfer

Note. Experiment 3 procedures for each group respectively highlight differences in placement and affective tone.

C = control; E = experimental; PANAS = positive and negative affect schedule expanded form.

Figure 7

Attentiveness Before and After Learning the Tower of Hanoi
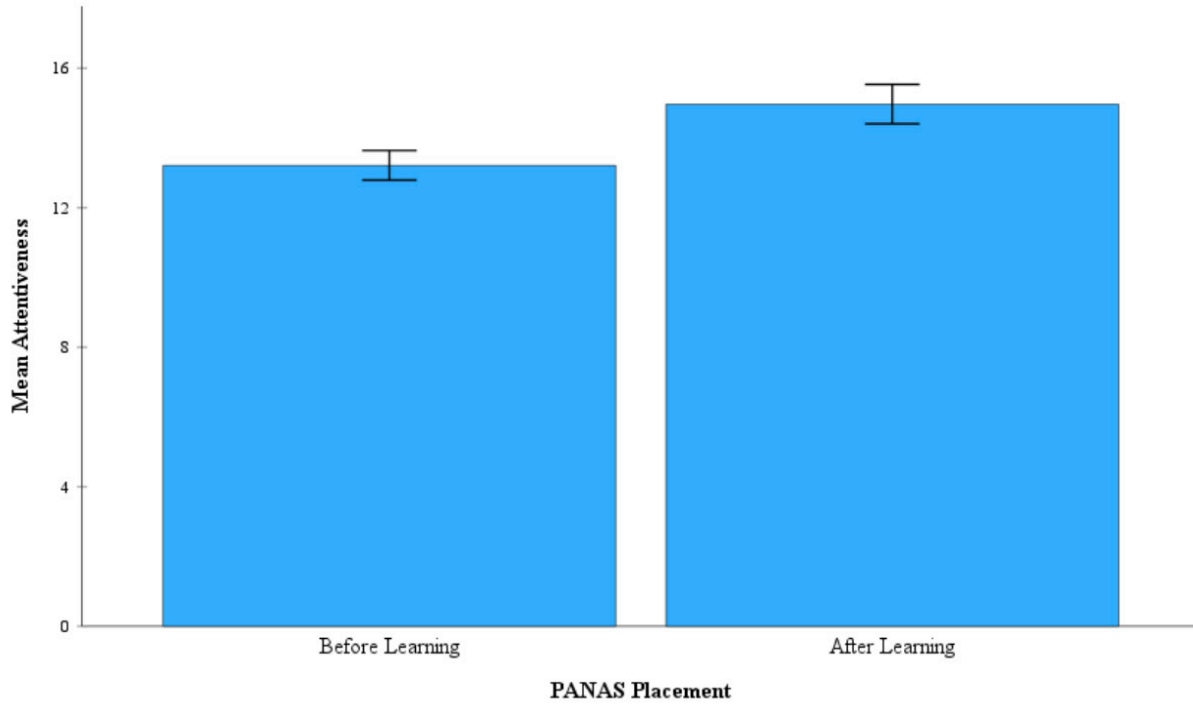
Note. Experiment 3 self-reported attentiveness measured before and after learning the Tower of Hanoi. Error bars denote one standard error around each mean.

Figure 8

Tower of Hanoi Completion Times Before and After Affect Induction
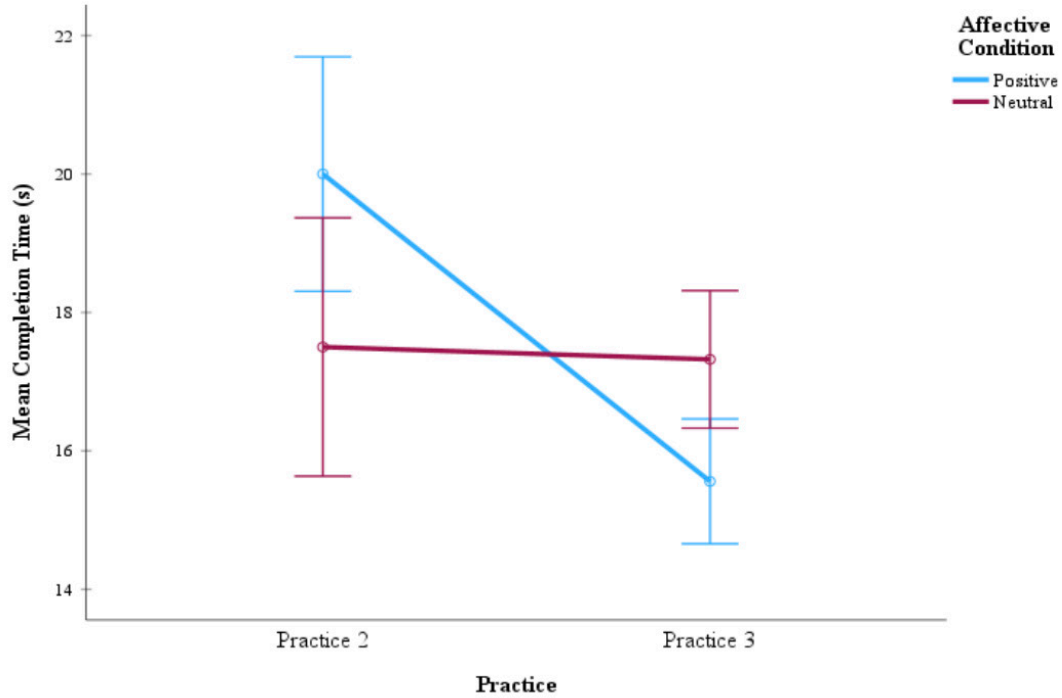
Note. Experiment 3 practice trial completion time measured at practice two and practice three, separated by affective condition. Error bars denote one standard error around each mean.

Social, Behavioral, and Academic Ramifications of Video Game Playing in College

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The purpose of this research project is to determine whether video game usage influences the psychological well-being of college students. This project seeks to understand technology usage habits among students and whether this affects school performance. Previous research suggests video games may be used to treat psychological issues such as anxiety. Self-report studies note video games were helpful in certain populations in coping with stress, developing positive social behaviors, and improving cognitive abilities (Carras et al., 2018; Nuyens et al., 2019; Schuurmans et al., 2018;). Since psychological well-being is a crucial factor in academic performance (Carton & Goodboy, 2015; Punia & Malaviya, 2015), the current study will examine potential relationships between gaming and college GPAs. Poor habits related to technological usage may lead to negative mental health outcomes. A survey examining these factors was completed by college students at Texas Woman's University. The survey was composed of questions from the Internet Gaming Disorder Scale, Psychological Wellbeing Scale, and Boundary Management Subscale. Data was tested using ANOVAs, a Tukey HSD test as a post hoc test, and Eta squared. The results of the data found gaming tendencies were not significantly associated with GPA but were associated with negative mental health outcomes and increased issues with technology boundary management. The study has marked limitations, due to the lack of non-gaming survey participants and most respondents identifying as female. These findings may be useful for clinicians in treating addictive gaming tendencies. Future research should examine more diverse student populations.
Keywords: college students, gaming addiction, GPA, boundary management, psychological well being

Young adults within the college-aged range (18-25) spend nearly seven hours a week on average playing video games (Limelight, 2019). Video game usage has been linked to positive mental health effects in both clinical and non-clinical studies as an alternative to psychiatric medication as well as reducing symptomology of psychological issues (Carras et al., 2018; Fish et al., 2018). Psychological well-being in college students may be a significant facet of school performance (Punia & Malaviya, 2015). General technology usage may also be a facet in determining psychological well-being (Barkely et al., 2014; Bjornsen et al., 2015; Lepp et al., 2014). To fully understand video gaming habits and how they may affect college students' academic performance, the psychological factors associated with well-being should be considered.

Video Game Usage

Young adults within the college-aged range (18-25) spend nearly seven hours a week on average playing video games (Limelight, 2019). As of 2019, nearly 46% of gamers are women (Gough, 2019). Most gamers define themselves as 'casual' gamers, and mobile devices such as smartphones or tablets are the most used means of playing video games. In the US, casual single-player games, such as Angry Birds or Candy Crush, are the most popular types of games, followed by casual multi-player games (e.g., Words With Friends) and First-Person Shooter (e.g., Call of Duty or Overwatch). Additionally, 56% of frequent gamers play multiplayer games, according to the Entertainment Software Association ([ESA], 2018). Other popular game genres include massive multiplayer online (MMO), simulations, real-time strategy (RTS), puzzles, action, stealth shooter, combat, sports, role-playing games (RPG), and educational games (Thought Catalog, 2015).

Because of the rising usage of video games, concerns about related psychological issues have been discussed. The *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (*DSM-5*) recognized Internet Gaming Disorder, or IGD, as a condition warranting further research and included symptoms such as preoccupation with gaming, continuing to focus on gaming despite the presence of problems, and jeopardizing jobs or relationships due to continued gaming (American Psychiatric Association [APA], 2013). Continued research on IGD notes men are more at risk for developing IGD and IGD is frequently comorbid with other psychological issues such as depression, anxiety, aggression, and obsessive-compulsive symptoms (Zajac et al., 2017). Additionally, IGD may place an individual at risk for physical health problems, such as being overweight or obese, sleep disorders, or a heightened risk for seizures (Li et al., 2017). Higher levels of gameplay time were also associated with issues related to psychosocial adjustment and lower levels of life satisfaction (Przybylski & Mishkin, 2016).

Despite the potential issues that arise with poor gaming habits, video game usage has been associated with certain positive mental health outcomes. In recent years, video games have been used experimentally

to treat mental health issues. In one recent study, casual video game play (CVG) was assigned to patients who were prescribed selective serotonin reuptake inhibitor (SSRI) medication (Fish et al., 2018). The CVG group continued to take medication while utilizing CVG but was compared to a treatment control group that only prescribed two forms of medication. The results indicate that CVG was effective in treating symptoms associated with anxiety disorders and could be used as an alternative prescription to extensive medication (Fish et al., 2018). In another recent study, a video game-based intervention addressed internalizing problems for youths with behavioral problems within residential care facilities (Schuurmans et al., 2018). The study also explored the psychological effects of treatment on youths' mentors. Both youth groups in the study received ongoing psychotherapy or prescribed medication as recommended by clinicians; however, only the experimental group received the game intervention. At the end of the study, the group that participated in the video game intervention self-reported improvements in both anxiety and externalizing problems immediately after the study and at a 4-month follow-up. The study also indicated improvements in the mentors' anxiety levels at the immediate follow-up (Schuurmans et al., 2018).

Another form of clinical research on video games used game intervention to treat negative mental health outcomes and used in-game behavior to predict treatment outcomes. In a study conducted by Wols et al. (2018), a video game intervention was used to teach children coping methods for anxious behaviors as well as define children's behaviors as "engaged" or "avoidant/safety" based on in-game actions (Wols et al., 2018). The researchers noted that game-based interventions could be useful in tailoring engaging interventions for children, and the game itself could be useful in recognizing specific anxiety-related behaviors to be targeted in therapy (Wols et al., 2018).

Non-clinical trial research on video game usage and positive mental health outcomes have also shown notable results. Carras et al. (2018) interviewed military veteran gamers about their experiences and how gaming assisted with aspects such as coping or well-being. Most of the individuals in the sample reported post-traumatic stress disorder (PTSD) symptoms or some other form of trauma-related issues. While many of the veterans reported they used gaming as a means of distraction from their mental health issues, the interactivity and narrative focus of games can help veterans develop insight into their own thoughts and feelings, which is useful for clinicians in assessing suicidality. Video games offered veterans opportunities for leadership and social opportunities through multiplayer games; these virtual spaces helped veterans develop support systems that are a major element in recovery interventions (Carras et al., 2018).

A Dutch study examined the relationship between competitive video game usage and children's social development in conduct problems, peer relations, and prosocial behaviors (Lobel et al., 2019). The results did not indicate any significant changes in prosocial behaviors but found that children who played competitive games reported improvements in conduct problems and peer relations. The researchers note that competitive gaming in the home environment should be viewed within the context of self-improvement and comradery (Lobel et al., 2019).

A study conducted by Stiff and Kedra (2018) examined the effects of intergroup social video game play on reducing prejudice. Participants in the study either played the game alone or with an outgroup partner and were told their opponent was either human or computer-controlled; all participants rotated between the four conditions of the study. The results of the study indicated that participants who played collaboratively with outgroup members also reported higher levels of favorability towards the outgroup. Stiff and Kedra (2018) concluded the findings of their study could be a potential utility of video games in reducing prejudice between groups. Lastly, specific video games may be useful for improving cognitive functions in specific aspects such as top-down control and processing speed (Nuyens et al., 2019). Research was compiled from multiple studies and focused on specific cognitive aspects such as attention, task-switching, and time perception. Many studies examined by researchers noted cognitive flexibility relative to task-switching was higher in gamers compared to non-gamers and gamers exhibit a higher global attention level and processing speed. Lastly, the literature also indicates that gamers display higher sub-second time perception, but research in this aspect is still largely limited (Nuyens et al., 2019). In general, video games have the potential to improve different facets of psychological health.

Psychological Wellbeing and Academics

Psychological well-being describes multiple facets of functioning that relate back to overall psychological health. Psychologist Carolyn Ryff divided psychological well-being into six major categories: self-acceptance, autonomy, personal growth, positive relationships, environmental mastery, and purpose in life (Ryff, 2014). Self-acceptance describes a person's attitudes towards themselves and their ability to accept both good and bad qualities. Autonomy is a measure of self-determination, independence, and the ability to resist societal pressure to think for oneself. Personal growth is a person's feeling of continued development and openness to new experiences. Positive relationships describe a person's warm, satisfying, and trusting relationship with peers or family as well as the capacity to extend empathy to others. Environmental mastery measures a person's sense of mastery and competence in utilizing external activities and opportunities. Lastly, purpose in life gauges a person's direction in life and long- and short-term goals (Ryff, 2014).

College Students

Many studies have explored different aspects of psychological well-being in college students to identify specific internal or external factors that affect students' well-being. A study conducted by Ludban in 2015, based on Ryff's categories, measured the psychological well-being of a sample of college students to understand the positive and negative factors that influence their psychological health. The results of this study suggest gender, age, support, and financial welfare are the primary aspects that predict psychological well-being in college students. Receiving support from family or friends, especially in specific circumstances for non-traditional students, is a significant factor in lowering stress and maintaining emotional mastery (Ludban, 2015).

Researchers have also examined the relationship between psychological instability and the propensity for developing psychological issues such as depression in an undergraduate sample (Gable & Nezlek, 1998). Students reported on facets of their psychological health such as anxiety, self-esteem, and causal uncertainty. Results indicated students who reported lower levels of psychological well-being were at a higher risk for depression. Additionally, while the relationship between daily adjustment and depression risk is complex, day-to-day instability should be considered to fully understand the trajectory of depression (Gable & Nezlek, 1998).

Specific lifestyle aspects of psychological well-being have also been examined (Ozpolat et al., 2012). The researchers utilized a lifestyle inventory to measure and categorize students' lifestyles into five sub-dimensions: control, perfectionism, pleasing, self-esteem, and expectations. Findings indicated students with low self-esteem and need-to-please lifestyles are at a greater risk of negative psychological wellbeing outcomes, compared to students who are expectation-oriented. Students who fit this lifestyle criteria may still maintain positive relationships with others but may do so at the cost of their own desires and well-being (Ozpolat et al., 2012). Additional findings indicated that students who engaged in task-oriented coping strategies also self-reported higher levels of psychological well-being (Punia & Malaviya, 2015).

Academic Performance

Studies examining the relationship between psychological well-being and college students' academic performance have been mixed. For example, the connection between the academic performance of first-year undergraduate students and their psychological well-being was examined (Topham & Moller, 2011). Results did not indicate an association between psychological well-being and academic performance at the end of the first year, but students with clinical levels of personal concerns may still be at risk for developing psychological health problems (Topham & Moller, 2011). A similar study conducted in 2015 by Punia and Malaviya also examined the relationship between college students' academic performance and psychological well-being. The results indicated that while most of the participants self-reported medium levels of well-being and average academic performance, those who reported medium or high levels of academic performance also reported higher levels of psychological well-being. In general, psychological well-being can affect both broad and specific areas of a college student's academic performance.

Although IGD symptoms may make it difficult for an individual to prioritize school responsibilities over gaming, research examining the effects of video game usage on academic performance has varied results. An early study from 2007 attempted to explore the correlation between academic performance and overall time spent on gaming. Anand's study utilized SAT scores and overall GPA as a gauge of academic

performance. The results of Anand's analysis showed that extensive gaming habits had a negative impact on both GPA and SAT scores. However, Anand emphasizes that SAT scores only represent a single instance of academic performance and extrapolating conclusions may be difficult (Anand, 2007). A 2014 study conducted by Drummond and Sauer examined collected data from adolescents to view the effect size of video game usage on academic achievement in science, mathematics, and reading. Across the data, differences in academic performance were negligible although the researcher noted that reading performance did show a noticeable decline but did not reach the cutoff level (Drummond & Sauer, 2014). A longitudinal German study from 2018 also examined the long-term effects of extensive gaming time on a sample of adolescents. Gnambs et al. (2018) specifically looked at the effects of the amount of time students spent playing computer games on their overall grade performance and competencies in math and reading. The study results indicated that students who played games most frequently would have a decline in grades in the proceeding years, but they did not show marked decreases in math and reading competencies (Gnambs et al., 2018).

A few studies found that moderate video game use may be beneficial for skills related to academic development. One study from 2013 explored the effects of strategic games (i.e., specifically strategy or RPGs) on students' self-reported problem-solving skills over time. Adachi and Willoughby (2013) found students who played strategy games predicted higher levels of problem-solving skills. The researchers also noted that higher problem-solving skills were associated with higher levels of academic achievement in students (Adachi & Willoughby, 2013). Another study by Przybylski and Mishkin (2016) examined the difference in effects of overall game time on adolescents' behavior, as well as comparing students who play cooperative games versus single-player games. Students in the sample who played for less than an hour a day had lower levels of conduct issues and hyperactivity, but students who played for more than three hours a day had higher levels of behavioral issues. Additionally, students who primarily played single-player games had lower levels of behavioral problems and higher levels of academic achievement; students who played cooperative or competitive games were more emotionally stable and reported better relationships with their peers (Przy-

bylski & Mishkin, 2016). Ventura et al.'s online study from 2013 compared the levels of persistence with tasks exhibited by gamers compared to non-gamers. During the study, persistence was measured using anagram or riddle tasks, which were correlated with a self-reported measure of persistence and examined alongside self-reported levels of gaming time. Individuals who reported higher levels of gaming time spent longer time persisting on tasks (Ventura et al., 2013).

Further research has examined the link between psychological well-being and aspects of school performance. For example, the exploration of the concept of belongingness at a university, and how it is affected by students' values, university norms, health, and academic outcomes have been examined (Suhlmann et al., 2018). Findings indicate that a sense of belongingness at a university contributes to overall psychological well-being and reduces dropout intention. Furthermore, a dignity self-construct is a major aspect of the relationship between student belongingness and the norms and values of the university (Suhlmann et al., 2018).

In addition to university retention, psychological well-being also affects the way students are involved in classroom participation (Carton & Goodboy, 2015). Carton and Goodboy's (2015) study examine how psychological issues such as depression, stress, and anxiety affect interaction involvement, and how these results could extrapolate to a classroom setting. The results indicated stress and depression were both negatively related to responsiveness and attentiveness, while anxiety was only related to attentiveness. It was concluded that these results could interfere with student class performance with symptomatology such as rumination, exhaustion, and poor sleep quality (Carton & Goodboy, 2015).

Problematic Technology Usage

Psychological health can be greatly affected by different forms of technology usage. Emerging literature has coined the phenomenon of technostress, which describes the struggles associated with adapting or coping with technologies in a healthy manner (La Torre et al., 2019). While emerging studies primarily focus on technostress because of workplace stress, technostress can be considered in other aspects of life. Specific forms of non-work-related technostress primarily stem from excessive usage of social networking services (SNS) and include issues such as communication or social interaction overload, internet multitasking, and compulsive

usage of smartphones. In a professional environment, technostress can lead to issues with psychological well-being such as worry, self-criticism, and a negative self-view (La Torre et al., 2019). Non-work-related technostress can result in conflicts between family and technology or work and technology. Furthermore, perceived stress stemming from technostress can lead to burnout, depression, or anxiety (La Torre et al., 2019). While current research on technostress is largely focused on work-related contingencies, non-work-related technostress is also important to consider given the major psychological effects of technostress symptoms.

Personality and Developmental Trends

While not explicitly labeled under the technostress definition, many studies have examined the psychological effects of technology dependency and personal factors that may be related to problematic technology usage. A study conducted by Montag et al. (2014) explored how personality factors may affect smartphone usage in college students. The researchers measured phone usage within their sample as well as participants' personality factors based on the big five personality traits (i.e., openness, conscientiousness, extraversion, agreeableness, and neuroticism). The results of the study indicated extraversion was highly associated with higher levels of phone usage (Montag et al., 2014). A similar study conducted by Hsiao (2017) also explored the correlates of technology usage with the big five personality traits. However, this study also included traits such as materialism and external locus of control, and technology usage was specified as compulsive usage of SNS and mobile game applications. Findings indicated that neuroticism, materialism, extraversion, and locus of control increase compulsive usage of SNS apps, while agreeableness, materialism, and locus of control influence the usage of game apps (Hsiao, 2017). Similarly, researchers have also examined phone usage in a young adult sample to understand individual differences in personality traits as it pertains to smartphone usage (Harari et al., 2019). Once again, extraversion was associated with higher levels of social behaviors, and thus more technology usage. Results showed openness to be associated with higher levels of social behaviors (Harari et al., 2019).

Tams et al. (2018) explored issues of locus of control in the context of technology dependency. In particular, the study describes the issue of Nomophobia, or the fear of not being able to access one's smartphone,

and correlations with technostress. In a work setting, technostress can lead to phone dependency, which in turn may result in Nomophobia and additional stress. However, when situational certainty is established, the effects of Nomophobia may decrease (Tams et al., 2018).

The effects of technology usage on adolescent psychological well-being has garnered much attention in recent years. For example, Twenge et al. (2018) measured self-reported levels of technology usage in multiple domains such as television viewing habits and new media screen activities and compared these usage levels to measures such as psychological well-being and levels of in-person interaction. Results indicated psychological well-being decreased as adolescent technology usage increased during the four-year period. Additionally, non-technology-based activities, such as using print media or sports and exercise that were associated with higher levels of psychological well-being declined over time (Twenge et al., 2018).

Several studies have noted the issues of problematic technology use in college students. De Leo and Wulfert (2013) explored the tenants of problematic Internet use (PIU) and how PIU relates to other externalizing negative behaviors such as illicit drug use or risky sex in a college student sample. The researchers found that PIU was not highly correlated with other forms of externalizing behaviors, and furthermore did not increase antisocial behaviors or affect academic performance. However, PIU behaviors were suggested to be risky for students who are experiencing socially anxious or withdrawn behaviors and may lead to interferences in daily functioning (De Leo & Wulfert, 2013). Beranuy et al. (2009) explored correlates between problematic Internet and phone use with perceived emotional intelligence and psychological distress. Findings indicated students who display higher levels of psychological distress also engage in higher levels of problematic technology use. Additionally, higher levels of attention to emotion, a component of emotional intelligence, were also associated with higher levels of maladaptive technology usage (Beranuy et al., 2009).

Specific fields of study may put students at risk for experiencing more symptoms of technostress. For instance, students in more technology-heavy fields of study, such as journalism and broadcasting, report higher levels of maladaptive technology usage, and female students show more consequences of maladaptive technology use than male students

(Beranuy et al., 2009). Bjornsen and Archer (2015) further explored the relationship between academic performance and problematic technology usage. Their study examined the in-class phone usage of a sample of college students and how the usage correlated with students' test scores. Results indicated phone usage was significantly negatively correlated with test scores and using a phone during class for social networking purposes was the activity most associated with lower test scores (Bjornsen & Archer, 2015). Similarly, Leep et al. (2014) examined the relationship between college students' cell phone usage and their quality of life, and how GPA and anxiety mediate the relationship. The study found students with higher levels of cell phone usage had lower GPAs, higher levels of anxiety, and overall lower levels of perceived quality of life. The researchers noted at the end of their study that recognizing the relationship between quality of life and cell phone usage is important for high-usage students to reflect on their habits (Lepp et al., 2014). In general, college students with poor mental health are more likely to engage in maladaptive technology-use behaviors, which may also affect their academic performance.

The Current Study

The purpose of this study is to examine the relationship between gaming, psychological well-being, and GPA in a college student sample. Previous research indicates that video games have the potential to improve psychological well-being, but a poor relationship with technology may have negative psychological and academic consequences. The researcher is interested in seeing if students who play video games casually (CVGs) report higher levels of psychological well-being compared to non-gamers (NGs) and gamers meeting the criteria for internet gaming disorder (AGs). Additionally, the researcher seeks to compare academic performance via GPAs between the three groups. Lastly, the researcher wishes to see if AGs also have more issues with technology boundary management compared to casual gamers and non-gamers. This research adds to the existing literature about the relationship between psychological health, academic performance, and video game use as well as video games as a factor contributing to technostress.

Hypotheses

1. Is there a relationship between gaming and subjective well-being in college students? H1: CVGs will report higher personal well-being compared with AGs and NGs. H2: NGs will report higher subjective well-being than AGs.
2. Is there a relationship between GPA and game usage among college students? H1: NGs will have a higher GPA compared with AGs and CVGs. H2: CVGs will have a higher GPA compared with AGs.
3. Is there a relationship between technology boundary management and gaming? H1: NGs will have lower levels of boundary management problems compared with AGs and CVGs. H2: CVGs will have lower levels of boundary management problems compared with AGs.

Methods

Data was collected from a sample of undergraduate students attending Texas Woman's University. The survey was published online using the PsychData Survey program after obtaining approval by the Institutional Review Board. The survey was used to collect self-reported data from students. The survey protocol included psychometric instruments as well as demographic measures. Participants electronically provided informed consent before participating in the survey and received SONA credits as an incentive to participate. The inclusion criteria required participants to be 18 years or older and currently enrolled in classes for the semester. Participants who did not meet the minimal age range were excluded. The data were examined using IBM's Statistical Package for Social Sciences (SPSS). Demographics of interest included age, gender, ethnicity, current number of credit hours, current GPA, types of video games played, specific genres of games played, whether the student plays games online or not, and number of hours played in a week. Groups were defined as NGs, AGs, and CVGs. NGs (non-gamers) are students who did not report playing video games at all. AGs (addicted gamers) are students who reported playing video games and met the minimum criteria for Internet Gaming Disorder based on their responses. Lastly, CVGs (casual gamers) are students who reported playing video games but did not meet the criteria for Internet Gaming Disorder.

The sample consisted mostly of Hispanic and Latino students (33.5%) followed by White (25.7%), Black and African American (20.4%), and other

ethnicities (20.4%). The mean age of students in the sample was 19.4 years (*SD* = 1.7). The gender ratio of the sample was 93.2% female, 6.5% male, and 0.3% non-binary or other. On average, students reported taking 13.8 credit hours (*SD* = 2.3) and had 3.3 GPAs (*SD* = 0.7). Students played 2.4 hours of video games a week on average (*SD* = 1.0).

Measures

The degree of gaming addiction in the sample was measured with the Internet Gaming Disorder Scale (IGD Scale). The IGD Scale (Lemmens et al., 2015) is a 27-item measure with a yes/no dichotomous scale. The IGD Scale is used to measure behaviors consistent with internet gaming disorder, such as overt preoccupation or persistence with gaming. The dichotomous version of the scale is internally consistent and possesses good criterion-related validity, with a Cronbach's alpha of .93 (Lemmens et al., 2015). More yes answers indicate more symptoms of IGD. An example of an item on the IGD Scale is "During the last year, have you been feeling tense or restless when you were unable to play games?" The *DSM-5* notes that, while the IGD diagnosis usually involves behaviors related to specific Internet games, it can involve non-Internet games (APA, 2013). Additionally, the *DSM-5* recognizes nine criteria for IGD: preoccupation, tolerance, withdrawal, persistence, escape, problems, deception, displacement, and conflict, as defined in Table 1 below. The *DSM-5* recommends a minimal threshold of experiencing five or more criteria for diagnostic purposes. As a result, addicted gamers, or AGs, are defined as gamers who meet this minimal threshold.

Perceived well-being will be measured with the Psychological Wellbeing Scale (PWB Scale; Ryff & Keyes, 1995). The shortened version of the PWB Scale was utilized and consists of 18 items on a seven-point Likert-type scale with anchors ranging from one (strongly agree) to seven(strongly disagree). This version of the PWB Scale has lower internal consistency but higher factorial validity; the scale has a Cronbach's Reliability over .88 (Lee et al., 2019). The PWB Scale is used to gauge psychological well-being in adults across multiple subscales including relationships with others and personal growth. We used all scales of the measure to determine how students perceive their psychological well-being. Higher scores indicate lower levels of perceived psychological well-being. An example of an item is "When I look at the story of my life, I am pleased with how things have turned out so far."

The Boundary Management Subscale (Asbury et al., 2018) is a nine-item measure with a three-point Likert-type scale with anchors ranging from one (never) to three (always). The Boundary Management Subscale has convergent reliability and internal consistency with a Cronbach's Alpha over .70 (Asbury et al., 2018). The Boundary Management Scale is used to measure boundary management behaviors related to technology use. Higher scores indicate more issues with boundary management. An example of an item is "When I go online, I lose track of time."

Results

Data Cleaning

Before conducting our analysis, the data was screened for outliers and missing data. Eight students were removed who were under the minimum age range or missing demographic information, 32 for missing significant portions of the PWB or BM surveys, and an additional 129 duplicate responses. A total of 169 responses were removed from the data set, and the final total sample was 382. Data met all assumptions regarding normality.

Overall, app games made up 34.4% of usage, gaming consoles represented 35%, and PC gaming at 30.7%. Most students who participated preferred one gaming platform type (42.6%), with 38.3% using two types, and 18.9% stated they played all three. The reported favored game genre within the sample was casual multi-player (46.4%) followed by causal single-player (30.1%), sports (4.9%), and RPG (4.6%). The full spread of demographics can be seen in Table 2 below.

Data Analysis

An ANOVA was conducted to test each of the hypotheses. The three gaming groups served as the independent variables, while psychological well-being, GPA, and boundary management served as the dependent variables. This analysis was used to examine potential differences between gaming usage and the dependent variables of psychological well-being, GPA, and boundary management respectively. After running the ANOVAs, group means were compared by running post-hoc tests. A Tukey HSD test was utilized as a conservative post hoc test for identifying significant main effects and interactions. Eta squared was also used to calculate the effect sizes between our means and measure the relationship between our variables.

A one-way between-subjects ANOVA was conducted to compare subjective well-being between non-gamers, addicted gamers, and casual gamers. There was a significant main effect of gaming time on personal well-being [$F(2, 370) = 3.69$, $p = 0.03$)]. Post-hoc comparisons using the Tukey HSD test indicated that the mean well-being score for AGs ($M = 92.45$, $SD = 13.57$, $n = 202$) was significantly different than the scores for CVGs ($M = 96.14$, $SD = 13.32$, $n = 141$). However, NGs' scores did not significantly differ from either AGs or CVGs ($M = 91.13$, $SD = 14.34$, $n = 30$). Taken together, these results indicate that gamers who met the criteria for addiction were more likely to report overall lower levels of subjective well-being compared to casual gamers. Non-gamers do not appear to report significantly better well-being than addicted gamers or casual gamers.

A second one-way ANOVA was conducted to compare GPA between NGs ($M = 3.31$, $SD = 0.55$, $n = 28$), AGs ($M = 3.25$, $SD = 0.68$, $n = 203$), and CVGs ($M = 3.38$, $SD = 0.62$, $n = 138$). There was no significant main effect of gaming on GPA [$F(2, 366) = 1.54$, $p = 0.22$]. As a result, gaming habits were not found to affect a student's GPA.

The final one-way ANOVA was conducted to compare boundary management levels between gamer types. There was a significant main effect of gaming on boundary management [$F(2, 379) = 8.97$, $p = 0.00$]. Post-hoc comparisons using the Tukey HSD test indicated that the mean boundary management score for AGs ($M = 1.99$, $SD = 0.32$, $n = 208$), was significantly different than boundary management scores for CVGs ($M = 1.84$, $SD = 0.31$, $n = 142$). NGs' scores ($M = 1.95$, $SD = 0.33$, $n = 32$) did not significantly differ from either AGs or CVGs. These results indicate that gamers who met the criteria for addiction are more likely to self-report more problems with technology boundary management than casual gamers. The results of my ANOVAs can be seen below in Table 3.

Discussion

The current study examined the relationship between gaming, psychological well-being, GPA, and technology boundary management. The researcher hypothesized addicted gamers would report lower levels of well-being, lower GPAs, and more struggles with technology boundary management compared to non-gamers and casual gamers. The researcher also hypothesized non- gamers would report higher levels of well-being, higher GPAs, and fewer struggles with boundary management compared to casual gamers and addicted gamers.

The analyses supported two of the three hypotheses. Definite conclusions could not be drawn about the NGs in the sample because of the few responses from NGs. However, the results suggest differences in psychological well-being and boundary management between the AGs and CVGs. The researcher expected GPA to also be significantly different between AGs and CVGs, but gaming did not appear to be a factor related to grades in college. The non-significant findings between GPA and gaming tendencies may be due to the sample. Texas Woman's University has a primarily female student population, and previous research on gender and GPA performance notes that women in general tend to have higher GPAs than men (Keiser et al., 2016). In turn, perhaps there is a ceiling effect in the sample where women's higher GPA may be due to increased abilities to self-discipline for academia (Duckworth & Seligman, 2006). The predominantly female sample may be useful to emerging research, as current studies on IGD seem to focus on male samples, and being male is often concluded to be a significant predictor of the disorder (Carlisle et al., 2019; Männikkö et al., 2019). A 2020 study compared a sample of male and female gamers and problematic technology usage towards video games or social media usage. The study found that female gamers tended to engage in problematic social media usage, while males were more likely to have problematic gaming tendencies (Cudo et al., 2020). An attempt at re-running the ANOVAs sans male participants ($n = 26$) resulted in no significant changes in outcomes. As IGD is still an emerging disorder, with little research focused on female-exclusive samples thus far, the researcher would caution against the generalization of the findings related to academic performance and IGD. However, future research on IGD in female samples may want to continue focusing on the overlap between IGD and problematic technology usage, particularly with social media.

Current findings do support the literature suggesting IGD is often comorbid with other psychological issues and problematic technology use

is associated with worse psychological outcomes. A longitudinal study on adolescents' pathological game usage noted that students with initially moderate symptoms were at a higher risk of developing increasing symptoms over time, including specific issues such as anxiety, depression, and problematic phone usage (Coyne et al., 2020). Another study noted additional correlations between addicted technology usage and psychological disorders, with men being more vulnerable to video game addiction and women to problematic social media usage (Andreassen et al., 2016). Recognizing the overlap between IGD and technology boundary management is also an important step in research, as recognizing symptoms and related effects for both areas is still limited (Zajac et al., 2017).

The preference towards game consoles within the sample is curious, as current research on gaming addiction is primarily centered around online gaming. Online games are in constant development, which encourages players to play often and play for long periods of time. Furthermore, online games offer prolonged opportunities to interact with other people online. Both factors may contribute to addictive gaming tendencies (Yildiz, 2019). Additionally, greater concerns are being levied about mobile game addiction. One study theorizes that mobile gaming addiction may be the result of phubbing, a phenomenon that results from individuals using phones at the behest of in-person social interaction (Yam & İlhan, 2020). This study also notes phubbing refers to the overlapping effects of mobile gaming, social media, internet, and phone addiction, which ties back to some of the previously discussed issues with technostress. Considering the preferred console of choice may be a point of interest in future IGD research.

Also, of interest within the sample is the high number of respondents who identified as Hispanic or Latino. Texas Woman's University has a high population of Latino and Hispanic students, estimated to be around 28.3% of the total student population ([TWU], 2020). Again, while current IGD research is limited, the few ethnocentric studies have primarily focused on Asian countries such as China or Korea due to extreme cases of game addiction leading to the death of an individual (Chen et al., 2018). According to the National Alliance on Mental Illness (NAMI), Hispanics and Latinos seek out mental health services less than the rest of the adult population. Delays in

seeking treatment often lead to worse psychological health outcomes. Additionally, common psychological issues within these communities include generalized anxiety disorder, depression, post-traumatic stress disorder, and substance abuse (NAMI, 2020). Understanding the inherent mental illness risks within the Hispanic and Latino communities may be useful for clinicians in treating IGD within the population.

Another area of focus to consider is the reason why students may be motivated to play video games. Broader research points to a variety of factors that contribute to player enjoyment such as the pleasure and satisfaction from executing a behavior, entertainment, and the ability to socialize with others (Hsu & Lu, 2004). Video games can also empower individuals, particularly if an individual lives in an uncertain environment (King & Delfabbro, 2009). Additionally, personality and motivational factors can account for individual engagement in gaming (King & Delfabbro, 2009). Lastly, gaming may be used as a coping strategy for stress or other forms of psychological issues, though inherent disorders may put an individual at risk for gaming addiction (Chang et al., 2019; Kircaburun et al., 2019). Gaming motivation often differs between individuals but may account for the likelihood of addiction.

Limitations

This study is subject to several limitations. Data collected for the study was self-reported and subjected to response bias. Additionally, the study was quasi-experimental and causality cannot be inferred. Social desirability bias may have affected participant responses to the survey. This study also has limited generalizability because the sample primarily consists of Hispanic and Latino female college students. Due to the nature of the study, few NGs participated, which made it difficult to draw conclusions about NGs compared to AGs and CVGs.

Future Research

Future research should address the design limitations by expanding to college populations from other geographic regions to see how the model generalizes to other college students outside of the southern United States area. Additionally, further research should include more comparison data taken from nongamers, as well as more male and non-binary gamers and gamers of other ethnicities. A longitudinal study should be considered to understand the long-term effects of gaming on GPA and well-being to better permit

causal inferences to be made. It may also be of interest to expand the research population beyond college students and examine working adults' usage of video games, and how usage relates to technology boundary management and affects perceived wellbeing.

Conclusion

The study underscores the effects of IGD in the lives of students and provides insight into how IGD correlates with perceived psychological well-being and technology boundary management. Both psychological well-being and boundary management significantly correlate with gaming. Although the study does not fully address IGD psychological issues, the study offers valuable insight into understanding IGD and its related effects on mental health. Despite limitations, the study shows that issues with technology boundary management and lowered subjective well-being are associated with addicted gaming. Both factors should be evaluated during the treatment of IGD. Clinicians should consider the overlap between technology boundary management and addicted gaming tendencies, as well as incorporate interventions to improve well-being.

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Table 1

Nine Criteria for Internet Gaming Disorder From the DSM-5

Criterion	Description
Preoccupation	Preoccupation relates to being all-absorbed by gaming and spending substantial amounts of time thinking or fantasizing about gaming during times of non-play.
Tolerance	Tolerance is characterized by an increasing amount of time spent on games to feel their desired effects (e.g., excitement, satisfaction).
Withdrawal	Withdrawal refers to symptoms that emerge when unable to play or attempting to cut down or stop gaming. Symptoms typically involve feeling restless, irritated, angry, frustrated, anxious, or sad.
Persistence	Persistence entails an enduring desire for gaming or unsuccessful attempts to stop, control, or reduce gaming.
Escape	Escape relates to engaging in a behavior to escape from or relieve negative mood states, such as helplessness, guilt, anxiety, or depression.
Problems	This criterion refers to continued gaming despite being aware of the negative consequences of this behavior for central areas of life.
Deception	Deception refers to individuals lying to others about, or covering up the extent of, their gaming behaviors.
Displacement	The gaming behavior dominates, with a resulting diminishment of other social and recreational activities.
Conflict	This reflects more substantial issues as a result of gaming, referring to losing or nearly losing, an important relationship or opportunity related to schooling or employment.

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders (5th ed.; American Psychiatric Association, 2013). Adapted from "The Internet Gaming Disorder Scale by Lemmens, J. S., Valkenburg, P. M., & Gentile, D. A., 2015, Psychological Assessment, 27, p. 567.

Table 2

Demographics of Sample

N = 382	*Frequency (%)*
<u>Gender</u>	
Male	26 (6.5%)
Female	356 (93.2%)
Non-binary or Other	1 (0.3%)
<u>Ethnicity</u>	
White	98 (25.7%)
Hispanic or Latino	128 (33.5%)
Black or African American	78 (20.4%)
Other ethnicities	78 (20.4%)
<u>Platform Usage</u>	
App Games	120 (34.4%)
Console Games	122 (35.0%)
PC Games	107 (30.7%)
<u>Game Genres</u>	
MMO	1 (0.3%)
Simulation	3 (0.9%)
Adventure	2 (0.6%)
Puzzle	10 (2.9%)
Action	5 (1.4%)
Combat	4 (1.1%)
FPS	12 (3.4%)
Sports	17 (4.9%)
RPG	16 (4.6%)
Education	12 (3.4%)
Casual Single Player Casual	105 (30.1%)
Multiplayer	162 (46.4%)

Table 3

One-Way ANOVA Results for DVs by Gaming Group (N = 382)

Dependent Variable	$h2$	df	MS	F
Psychological Well Being	0.02	2.00	676.57	3.69
GPA	0.01	2.00	0.65	1.54
Boundary Management	0.05	2.00	0.88	8.97

Appendix A

Twenty-Seven Items for the Internet Gaming Disorder Scale Preoccupation
During the last year...
. . . have there been periods when you were constantly thinking about a game while at school or work?
. . . have there been periods when all you could think of was the moment that you could play a game?
. . . have there been periods when you were constantly fretting about a game?
Tolerance
During the last year...
. . . have you felt the need to continue playing for longer periods of time?
. . . have you felt the need to play more often?
. . . have you felt unsatisfied because you wanted to play more?
Withdrawal
During the last year...
. . . have you been feeling tense or restless when you were unable to play games?
. . . have you been feeling angry or frustrated when you were unable to play games?
. . . have you been feeling miserable when you were unable to play a game?
Persistence
During the last year...
. . . did you want to play less, but couldn't?
. . . did you try to play less, but couldn't?
. . . were you unable to reduce your time playing games, after others had repeatedly told you to play less?
Escape
During the last year...
. . . have you played games to forget about your problems?
. . . have you played games so that you would not have to think about annoying things?
. . . have you played games to escape negative feelings?

Problems
During the last year...
. . . have you skipped work or school so that you could play games?
. . . have you played throughout the night, or almost the whole night?
. . . have you had arguments with others about the consequences of your gaming behavior?
Deception
During the last year...
. . . have you lied to your parents or partner about the time you spent playing games?
. . . have you hidden the time you spend on games from others?
. . . have you played games secretively?
Displacement
During the last year...
. . . have you been spending less time with friends, partner or family to play games?
. . . have you lost interest in hobbies or other activities because gaming is all you wanted to do?
. . . have you neglected other activities (e.g., hanging out with friends, hobbies or sports) so that you could play games?
Conflict
During the last year...
. . . have you experienced serious problems at work or school because of gaming?
. . . have you experienced serious conflicts with family, friends or partner because of gaming?
. . . have you lost or jeopardized an important friendship or relationship because of gaming?

Appendix B

Psychological Wellbeing Scale
1. "I like most parts of my personality."
2. "When I look at the story of my life, I am pleased with how things have turned out so far."
3. "Some people wander aimlessly through life, but I am not one of them."
4. "The demands of everyday life often get me down."
5. "In many ways I feel disappointed about my achievements in life."
6. "Maintaining close relationships has been difficult and frustrating for me."
7. "I live life one day at a time and don't really think about the future."
8. "In general, I feel I am in charge of the situation in which I live."
9. "I am good at managing the responsibilities of daily life."
10. "I sometimes feel as if I've done all there is to do in life."
11. "For me, life has been a continuous process of learning, changing, and growth."
12. "I think it is important to have new experiences that challenge how I think about myself and the world."
13. "People would describe me as a giving person, willing to share my time with others."
14. "I gave up trying to make big improvements or changes in my life a long time ago"
15. "I tend to be influenced by people with strong opinions"
16. "I have not experienced many warm and trusting relationships with others."
17. "I have confidence in my own opinions, even if they are different from the way most other people think."
18. "I judge myself by what I think is important, not by the values of what others think is important."

Appendix C

Boundary Management Subscale

- I am on my cell phone while watching TV I am on my cell phone while driving
- Others get mad at me because I am on my cell phone frequently
- I leave my cell phone on and place it close to my bed when I go to sleep I am on my cell phone during dinner, even when dining with others When I go online, I lose track of time
- The time I spend online interferes with my personal relationships
- I neglect things that need to get done due to the time I spend online I get extremely anxious when I cannot use my cell phone

The Impact of Childhood Parenting Styles on Feelings of Embodiment in Adolescence

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This research project aims to better understand the relationship between parenting styles and feelings of embodiment. Embodiment is defined as a perceived sense of ownership and awareness that individuals have over their own bodies, and healthy embodiment is believed to positively impact psychological functioning in children. The parenting styles examined within this study were Baumrind's original three parenting styles: authoritative, authoritarian, and permissive. These parenting styles are based on two dimensions: control and warmth. Authoritative parenting has been found to encourage independence while maintaining a supportive environment. For this reason, there is a lot of research that supports authoritative parenting in young children. Undergraduate participants were asked to complete a modified version of the Parental Authority Questionnaire and the Body Consciousness Questionnaire. Participants were then shown three parent-child interactions related to sleep, food, and bathroom, as well as two potential parent responses to these interactions. Participants were asked to rate the level of autonomy and warmth each of these potential parent responses conveyed, as well as which response they preferred, which response they believed that their parents would have chosen, and which response they would choose if they were the parent. Due to the empirical research supporting the benefits of authoritative parenting in many aspects of psychological functioning, we predicted a correlation would exist between authoritative parenting and positive embodiment. However, there was no significant correlation found between these variables. A new significant relationship between authoritarian parenting and public body consciousness was found. Further research on this relationship is suggested, as well as the development of a better scale for measuring healthy embodiment.
Keywords: parenting styles, embodiment, body consciousness, authoritative, authoritarian

The human connection between mind and body is an essential component of psychological health. The concept of embodiment, a perceived sense of ownership and awareness that individuals have over their own bodies, has risen to prominence in the field of psychology within the last few decades. Despite abundant research linking a lack of embodiment to psychological dysfunction, little is known about the relationship between how development influences embodiment later in life. This study aims to examine the correlation between parenting styles during childhood and embodiment in late adolescence and early adulthood.

Theories of Embodiment

Embodiment relies on the distinction between body image and body schema. Body image is the primarily conscious system of perceptions, emotional attitudes, and conceptual beliefs regarding one's body. A body schema, however, is the unconscious, automatic sensory-motor capacities and activations (i.e., posture and movement regulation). Both concepts describe embodiment, and both are correlated with healthy psychological functioning and a mind-body connection (Gallagher & Zahavi, 2008). This distinction between body ownership and agency is a useful tool for better understanding the bodily self and psychological dysfunction. The discussion surrounding body schema and body image prompted a classification of two kinds of disturbances of embodiment. The first, based on body schema, affects the subject's embodied sense of self (i.e., within schizophrenia or depression). The second is related to body image and body awareness (e.g., eating disorders, body dysmorphic disorders, somatoform disorders) (Gallagher & Vaever, 2004). The mind-body relationship is influential in shaping positive psychopathology (Kearney et al., 2022). Embodied self-regulation has grown in therapeutic approaches. An integration of a behavioral component or embodied actions has been shown to benefit a greater connection of mind and body. For instance, mindfulness, yoga, and therapy practices such as CBT require an alignment of body and mind (Brown, 2003; Bryant, 2009). From a clinical lens, a lack of embodiment has been linked to psychological dysfunction and psychopathological disorders such as depression, eating disorders, and schizophrenia, which are often explained as a disturbance of embodiment (Fuchs & Schlimme, 2009). In general psychiatry, there are two kinds of body awareness disturbances: hyper-embodiment and disembodiment (Wilde, 2003). Fuchs and Schilmme (2009) describe disembodiment in the context of schizophrenia, where patients feel that they no longer inhabit the body or they feel alienated from the body. Patients also feel a mechanization of the body, a disintegration of habits, and a sense of detachment or disconnection around others. These researchers describe hyper-embodiment in the context

of depression, where patients feel that they cannot escape the body, the body feels oppressive/heavy, and it is an obstacle (Fuchs & Schilmme, 2009). Additionally, individuals experiencing hyper-embodiment describe a loss of the capacity for affective attunement. Both bodily disturbances are the result of a disruption in embodiment in terms of body schema, the unconscious, and automatic processes of the body.

Another psychological dysfunction relating to embodiment dysregulation is the result of a disturbance in body image. Body image was first described by Paul Schilder (1935), who described it as a mental representation of one's body that is developed by every individual. It has been described as a multidimensional concept relating to other people's perceptions, thoughts, behaviors, and attitudes about body and appearance (Gardner, 1996). Eating disorders, such as anorexia nervosa and bulimia nervosa, are thought to develop from a disturbance in body image (Glashouwer et al., 2019). A relationship between positive embodiment and lower body image disturbance has been identified (Cook-Cottone, 2015). For instance, exercise frequency has been associated with higher positive body image (Homan & Tylka, 2014). Piran's developmental theory of embodiment describes five processes to gaining positive embodiment: (1) feeling "at home" in the body and fostering a positive connection, (2) experiencing agency/functionality of one's body, (3) perception and awareness of bodily needs (i.e., hunger), (4) self-care in response to perceived internal needs (e.g.. eating when hungry), and (5) embodying one's body in the first person, as opposed to second or third person (Burychka et al., 2021).

Gaining Autonomy in Childhood

Erikson (1950) argued that during early childhood, a conflict arises between our ability to develop autonomy and whether or not we will experience shame and doubt. Erikson classifies this experience as an essential developmental milestone. Strong resistance to parenting during toddlerhood is considered to reflect a child's healthy attempts to assert needs and control (Erickson, 1963; Kopp, 1982). Autonomy theories argue that children are motivated to be autonomous during toddlerhood and, therefore will begin to resist control by parents. During the second year of life, a goal-directed action to gain autonomy emerges, and they explore at greater distances from parents, check back in with mothers less, and orient play less

toward mothers (Eckerman et al., 1975; Bronson, 1974). Toddlers also begin to desire to complete tasks by themselves and resist being helped (Stipek et al., 1992). Additionally, young children begin to say "no" as well as other forms of resistance to control (Dunn & Munn, 1987). Rather than being seen as a complete act of defiance, this stage has been demonstrated to be an important milestone in developmental growth.

The concept of bodily autonomy has become a more widely discussed topic of political and research interest in the United States within the past decade (Kidd et al., 2021). Parenting behavior has been shown to impact the likelihood of children developing autonomy (Cohn et al., 1986). Researchers argue that an environment in which parents raise their children to feel that they can control certain events and assert action, and in which parents avoid powerful external controls, will help to foster autonomy in a beneficial way (Crockenberg & Litman, 1990).

Baumrind's Parenting Styles

Baumrind (1971, 1991) identified three parenting styles based on two dimensions: control and warmth. Parental control refers to the degree to which parents manage their children's behavior, ranging from high control with strict rules and demands to low control with fewer rules and demands. Parental warmth refers to the degree to which parents accept and respond to their children's behavior. Using these dimensions, Baumrind identified three primary parenting styles: Authoritative, Authoritarian, and Permissive. Authoritative parents encourage independence while maintaining control and boundaries. These parents are both warm and firm, taking into account the viewpoint of the child. Authoritarian parents are highly controlling and demonstrate little warmth, providing strict rules and demands for their children. Permissive parents demonstrate warmth but provide very few demands. Their parenting is described as indulgent and passive. A fourth parenting style was later added, based on the research conducted by Maccoby & Martin (1983). This parenting style identifies parents who are neglectful and uninvolved in their children's lives.

According to Baumrind's parenting styles (1991), authoritative parenting has been shown to best recognize and encourage a child's sense of autonomy (Steinberg and Silk, 2002). Correlations have been found between authoritative parenting and both academic and social competence in school-aged children

(Baumrind 1971, 1991). Additionally, authoritarian parenting (characterized by high levels of controlling behavior) has been associated with low social and academic competence (P. Cowan et al., 1994). Mattanah (2005) argues that autonomy in childhood should not be confused with permissive parenting because active autonomy encouragement involves a high degree of parental involvement rather than giving into the child's every demand. For instance, a parent should listen to the child's desires, and encourage independent behavior and exploration of the environment rather than giving in to the child completely or demanding complete compliance.

Current Study

When children attempt to address bodily needs and wants, they are sometimes met with disapproval. For instance, after dinner, a child tells their mother, "I am hungry," and they are met with, "No you are not; you just ate". This approach is often the result of frustration or impatience; however, in early childhood, this response may foster an ignoring of bodily needs. Although there is significant research indicating the importance of developing and fostering autonomy, there is little research that focuses on how children use their bodies to control autonomy (Ryan et al., 2015). There is a clear and present gap in the literature regarding the influence of autonomous decision-making, supportive parenting, and feeling a sense of ownership and connection to one's body later in life.

For this study, we have chosen three areas of control that children may use to assert their autonomy, all of which involve control over one's body: eating, bathroom, and sleep. We have defined embodiment as an awareness of one's internal bodily sensations and public perception of one's body. Lacking embodiment would mean feeling uncertain in one's body or lacking awareness, which may translate to feeling greater doubt and shame. We aim to demonstrate a correlation between parenting styles in childhood, particularly a sense of autonomy related to control over one's body and feeling a sense of embodiment later in life. We will use Baumrind's parenting styles (1991) to assess the dimensions of authoritative, authoritarian, and permissive parenting styles that the participants received. We will also use the Body Consciousness Scale, developed by Miller et al. (1981), to assess dimensions of private body consciousness (body schema), public body consciousness (body image), and body compe-

tence (body image). We hypothesize that authoritative parenting will correlate with greater private and public body consciousness, as well as body competence.

Method

Participants

Participants were undergraduate students at the Eugene Lang College of Liberal Arts at The New School. Non-English speakers were excluded because the survey was conducted in English, and it was important to ensure participants were fully aware and could understand and interpret what was being asked. There were no exclusion criteria related to ethnicity, race, or gender. In total, there were 56 total participants, but not all participants completed every question. Fifty-two participants were aged 18-24 years, and four participants were aged 25-34 years. Forty-two participants identified as female, four participants identified as male, seven participants identified as non-binary, two participants indicated that they prefer to self-describe (with one identifying as transsexual), and one participant did not complete the question regarding gender identity.

Recruitment and distribution of the study survey occurred through email to the participants. The recruitment email disclosed that participants would need to complete demographic questions, questions related to different parenting situations, as well as two separate questionnaires. It also disclosed that the study should take approximately 30 minutes to one hour to complete, that participation was completely voluntary, and that participants would not receive any compensation from the researchers. Finally, the recruitment email included a link to the Qualtrics survey, and individuals who were willing to participate and fit the criteria were instructed to click on the link and complete the survey. If the participants did not fit the criteria, they were excluded from the data analysis. After being recruited, participants completed the study online via the New School's Qualtrics platform.

Materials and Procedure

This study examines the correlation between parental authority and body consciousness, intending to better understand how parenting style in childhood influences feelings of embodiment later in life. All participants were recruited via email, and participants who met the criteria completed a Qualtrics survey. The survey first asked participants to fill out the following demographic questions: age, gender identity, race/eth-

nicity, and highest level of education. Participants were asked who they considered their primary caregiver(s) through childhood (which we have defined as ages 1-18), mother, father, both, or prefer not to say. They were asked if they were still in contact with their primary caregiver and if they had any children of their own.

The survey then described three hypothetical parent-child interactions presenting a conflict between the parent and child in which the child uses bodily control to gain autonomy in the situation (i.e., bodily control relating to food, bathroom, and sleep). Participants were then asked how they would respond if they were the parent in each situation. The parent-child interactions were created by the authors to reflect common interactions between parent and child that involve the child's attempt to gain autonomy over the situation using bodily control. The responses were created to reflect common responses of parents to children, one following more authoritative guidelines (i.e., greater warmth and autonomy) and the other following non-authoritative guidelines (i.e., less warmth and autonomy). The level of authoritativeness for each response was validated by how participants rated their level of warmth and autonomy.

The first situation was related to sleep and was presented to the participants in the following description:

> For the past few weeks, 2-year-old Emma has been struggling with taking her nap. Every day at naptime, she protests and says she is not tired. She has never had difficulty sleeping on a schedule before, and this has been a new and difficult situation for her parents to deal with.

Two potential responses to this first situation were presented to participants in the following description:

> Response one: Her parents listen when she says she is not tired and let her play longer and take her nap later each day. Response two: Her parents put her in her crib and leave her to fall asleep, even though she cries and protests. The times when she doesn't fall asleep, her parents say she must stay in her crib the whole naptime and stick to her sleep schedule.

The second situation was related to food and was presented to participants in the following description:

> James is seven years old. He is a picky eater and doesn't like to eat any foods that are green. His parents try to get him to eat his vegetables, even when he doesn't want to. One night his parents gave him broccoli with his dinner, and he asked for something else.

Two potential responses to this second situation were presented to participants in the following description:

> Response one: When James refuses to eat broccoli, James's parents ask him to choose which vegetable he wants to replace the broccoli with (i.e., carrots or bell pepper). Response two: When James's parents give him broccoli for dinner, they do not allow him to have anything else and let him know that he cannot have dessert unless he finishes his broccoli.

The third situation was related to the bathroom and was presented to participants in the following description:

> Mia is three years old and has been potty trained for one year. Even though she is potty trained, she prefers to go to the bathroom at home. Sometimes she has accidents at preschool because she does not want to go to the bathroom.

Two potential responses to this third situation were presented to participants in the following description:

> Response one: Her parents say she needs to use the bathroom every day at school. If she does not use the bathroom at school, she does not get a treat when she gets home. If she does use the bathroom at school, she gets to pick out a treat as a reward. Response two: Her parents say it is okay to have accidents while she is learning to use the bathroom but encourage her to go when she is at school. They give her a stuffed animal to bring with her when she tries to use the potty so that she will feel more comfortable.

Participants were asked how much each of these responses conveys warmth and autonomy on a 4-point Likert scale (1 = Strongly Disagree; 4 = Strongly Agree). They were also asked which response they preferred and which response most closely resembled how their parents would have acted. These survey questions were presented to offer a more qualitative approach to better understanding participant's relationship with their parents and how they view parenting styles. These more qualitative questions also serve the purpose of reminding the participants of some of the experiences they may have faced as children to prepare them to answer the quantitative questions regarding parenting styles. Parenting styles

were operationalized with the Parental Authority Questionnaire (Trinkner et al., 2011), and Feelings of embodiment were operationalized using the Body Consciousness Questionnaire (Miller et al., 1981).

Parental Authority Questionnaire

The original Parental Authority Questionnaire (PAQ; Buri, 1991) was developed to measure parenting style as conceptualized by Baumrind (1971, 1991). The original PAQ consists of 30 items, 10 for each parenting style: authoritarian, authoritative, and permissive. This study uses a modified version developed by Trinkner et al. (2012), which adapts the scale to examine both parents, rather than the mother and father separately. This modified version also shortens the scale due to time and space constraints. The modified version was developed by selecting four items for each parenting style that all the authors agreed were the best representations of each original parenting style as conceptualized by Baumrind. The modified version includes 12 statements (i.e., "My parents feel that children can do whatever they like"; "My parents get very angry if I disagree with them"), with a four-point Likert scale (1: "Disagree strongly; 4: "Agree Strongly"). Results are averaged for each parenting style, with higher scores indicating greater use of that parenting style. Each participant's score reflects the extent to which their parents used authoritative, authoritarian, and permissive parenting styles. The modified parental authority questionnaire by Trinkner et al. (2012) can be found in the Appendix. Please note that a potential limitation of this questionnaire is that it does not include neglectful parenting as a fourth parenting style. In 1983, Maccoby and Martin suggested a way of measuring parenting styles using Baumrind's typology and the parenting dimensions: demandingness and responsiveness. They added a fourth parenting style: neglectful. Based on this work, Baumrind expanded her typology to include the fourth parenting style, neglectful parenting (Maccoby & Martin, 1983). This has been left out of the parental authority questionnaire, perhaps because neglectful parenting involves no authority or care for a child's authority at all. Further research is suggested to better understand the relationship between neglectful parenting styles and feelings of embodiment.

The Body Consciousness Questionnaire

The Body Consciousness Questionnaire attempts to modify the psychological dichotomy of public versus private self-consciousness to the body self. This scale is based on a classification of observation of the self into both private aspects (i.e., thoughts, images, memories, motives, and feelings) as well as the public aspects, which can be observed by outside forces (i.e., appearance, manner, style of behavior). Private body consciousness is defined as the awareness of internal sensations and, public body consciousness is defined as the awareness of observable aspects of the body (Miller et al., 1981). The questionnaire also examines body competence and how effectively participants perceive their body functions. Body competence evaluation is positive; those high in body competence endorse items relevant to effective body functioning. This questionnaire properly addresses both disorders of embodiment situated in dysfunction surrounding the perception of body schema and body image. Body image is the primarily conscious system of perceptions, emotional attitudes, and conceptual beliefs regarding one's body. A body schema, however, is the unconscious, automatic sensory-motor capacities and activations (i.e., posture and movement regulation). Therefore, in terms of the body consciousness scale, private and public body consciousness are measures of body image, and body competence is an evaluation of one's body schema. The questionnaire is a 15-point scale with statements relating to all three factors of body consciousness: private, public, and body competence ("I am very aware of my best and worst facial features"; "I am very aware of changes in my body temperature"; "for my size, I'm pretty strong"). Participants were given a 5-point Likert scale (0: "extremely uncharacteristic; 4: "extremely characteristic"), and results were averaged to compare sample means with the means reported in Miller et al. (1981). The Body Consciousness Questionnaire can be found in the Appendix.

Results

Control Analyses

Validity of Parenting Response Measure

We undertook paired samples *t*-tests to assess whether the sample parenting responses differed, as intended, on the degree to which each reflected more or less authoritative parenting. Providing evidence for the validity of the sample parenting responses as a measure, results revealed that warmth and autonomy were greater in the authoritative parenting responses as compared with the

non-authoritative parenting options (see Table 1).

Warmth and Autonomy Correlation

Correlational analyses revealed that warmth and autonomy were significantly correlated with each other in the case of each parenting option (Sleep: r (41) =.58, $p < .001$; Food: r (42) =.77, $p < .001$; Bathroom: r (41) = .40, $p = .005$). The lowest correlation between warmth and autonomy occurred in the case of the bathroom parent-child interaction. Additionally, the responses observed in the case of the food parent-child interaction were skewed in that only one participant preferred the non-authoritative option. For these reasons, further analyses focused solely on the sleep parent-child interaction (see Table 1).

Relationship Between Outlooks on Sleep Parent-Child Interaction

We undertook correlational analyses on perceptions of the authoritative option for the sleep parent-child interaction (see Table 2). In addition to the correlation noted earlier between warmth and autonomy (r (42) = .58, $p < .01$), we also found a negative correlation between autonomy and the response that the participant would choose if this were their own child (r (42) =.37, $p < .05$). Although this latter effect was not predicted, it may suggest that participants valued warmth over autonomy in this particular parent-child interaction. We also observed a significant correlation between what participants would choose for their own child and what they would prefer for themselves (r (43) =.79, $p < .01$), as well as between what participants would choose for their own child and the response, they believe their parents would have chosen (r (43) = .36, $p < .05$) (see Table 2).

Relationship Between Scale Measures and Responses to Sleep Parent-Child Interaction

We undertook correlational analyses examining the relationship between preferred response to the sleep parent-child interaction and the Parental Authority Questionnaire and Body Consciousness Questionnaires (see Table 3). As predicted, participants preferred response in the sleep interaction was positively correlated with the authoritative subscale of the parenting scale (r (40) = .37, $p < .05$), and negatively correlated with the authoritarian subscale of this scale (r (40) = -.40, $p < .05$). No significant correlations were observed between participant's preferred response in the sleep interaction and their score on the Body Consciousness Scale. The only other significant correlation

occurred between the participant's scores on the Authoritarian Parenting subscale and on the Public Body Consciousness scale (r (40) = .35, $p < .05$) (see Table 3).

Discussion

The findings found in all three parent-child interactions indicate that the participant's perception of the positive relationship between warmth and autonomy is congruent with the characteristics of authoritative parenting. As predicted, the participant's preferred response in the parent-child interaction regarding sleep was positively correlated with Authoritative items and negatively correlated with Authoritarian items. Additionally, the positive relationship between the response participants would choose for their own child and the response they believe their parents would have chosen is significant in demonstrating the continuity of parenting ideas across generations.

Within the sleep parent-child interaction, we were surprised to find a negative relationship between autonomy and the response that participants would choose if it were their own child. This may indicate that participants valued warmth over autonomy in this sleep-related interaction. The overall relationship between the Parental Authority Questionnaire and the Body Consciousness Questionnaire was not found to be significant. However, a significant positive relationship was found between the sum of the Authoritarian Parenting Items and the Public Body Consciousness items. This unexpected finding indicates the need for further exploration of the relationship between public body consciousness and an Authoritarian parenting style. There were no relationships found between the preferred parenting option and the body consciousness scale.

An indication of warmth and autonomy in our parent-child interactions is important in providing support for the Authoritative parenting style among participants and across generations. This finding adds to the research supporting warmth and autonomy in conflict related to parent-child interactions. Additionally, it advocates for this parenting style in issues related to the child's bodily decisions. Our interactions involved the child aiming to achieve autonomy through decisions involving food, sleep, and the bathroom. All of these require the child to use control over their body to gain autonomy. Support for all three parent-child interaction scenarios was found but was most significant in our sleep-relat-

ed interaction. This may suggest strong support for parents to use authoritative parenting styles when dealing with conflict involving sleep-related decisions. Participants were more likely to advocate for authoritative parenting involving the sleep interaction and were less convinced about the appropriate way of dealing with the food and bathroom interaction.

We have considered a few reasons behind this finding. The sleep-related scenario may be considered as more of an independent task than the food and bathroom scenarios. For instance, a child choosing not to sleep may be considered less of an interference for other individuals around them. A child choosing to forego meals or having the parent cook them something else involves more dependence on a caretaker. Similarly, a child only willing to use one bathroom also involves greater dependence on caretakers around them, having to take them home to use the restroom or dealing with school accidents. Perhaps participants also believe that the inclination to sleep is something less controllable to the individual. In other words, participants may be more likely to empathize with a child who is physically unable to sleep rather than a child who willingly refuses to use the bathroom or eat a certain food. Further questioning of the reasoning behind the participant's choices is needed to better understand what separates the sleep interaction from the other two. There was also a significant demonstration of parenting ideas supported across generations. Within the sleep interaction, what response participants believed their parents would choose, participant's preference, and what they would choose for their child were all correlated. This information is important as it is indicative of the power of parenting styles to pass down to the next generation.

The relationship found between the Parental Authority Questionnaire and the Body Consciousness Questionnaire was overall insignificant. However, the findings demonstrate a significant relationship between authoritarian parenting styles and public body consciousness. We did not hypothesize this finding, but the results agree with previous research and our understanding of authoritarian parenting style. The findings suggest a link between authoritarian parenting and being highly attuned to how you are perceived in the outside world. We suggest that this is due to participants being forced to adhere to strict parenting and high expectations in order to avoid parental criticism. This finding also supports research that in-

dicates children under authoritarian parenting styles are at a higher risk of experiencing levels of body dissatisfaction (Salafia et al., 2007). Perhaps this research can be better explained by our findings which have suggested authoritarian parenting is correlated with being highly attuned to how others perceive them and their bodies. This may be an indication that hyper-embodiment exists in children who receive authoritarian parenting. We suggest further research to better discover the underlying reasoning for this relationship.

Study Limitations

The Body Consciousness Scale did not correlate with an authoritative parenting style. However, this does not mean that a relationship does not exist between body consciousness later in life and authoritative parenting. In all three parent-child interactions related to bodily autonomy, there was a preference for greater warmth and autonomy, indicating that participants did value authoritative parenting when dealing with embodied situations. There was also further indication that parenting styles get passed down through generations. However, the Body Consciousness Scale may be limited in its grasp of healthy embodiment. Our findings may suggest a need for a more comprehensive scale for measuring healthy embodiment. The Body Consciousness Scale measures how aware an individual is of their internal bodily sensations and observable aspects of the body, as well as how competent the individual believes their body is. We suggest a limitation within our interpretation of the scale, as we assumed high levels of these measures would indicate healthy embodiment. However, an over-awareness of bodily sensations may be better suited to represent a hyper-embodiment. We suggest that this limitation may be why we did not find a correlation between body consciousness and authoritative parenting. In future research, we hope to develop a scale that better encompasses healthy embodiment. However, this research did correlate authoritarian parenting with public body consciousness. This finding is valuable for future work, as the characteristics of public body consciousness may be better suited to demonstrate hyper-embodiment. We did not find any correlations between parenting styles, private body consciousness, or body competence. This may also be due to limitations within the scale itself or could indicate that there is no relationship between parenting styles and these measures. A further limitation is that we did not in-

vestigate neglectful parenting style. The reason for this is that it is not included in the Parental Authority Questionnaire, and it may be a limitation that we assumed our population did not have neglectful parenting. The research would be strengthened by finding a measure that includes this parenting style. Another limitation was found in the lack of complete responses within the Qualtrics survey. Not all participants completed the entire questionnaire, and this may be due to the length of it. If we had found a way to shorten the survey, we may have had a better response rate. Our Qualtrics survey may have also been strengthened by making all scenario variables more independent. The sleep- related scenario, which was the most independent of all three scenarios, was found to have a stronger response to using an authoritative parenting style than the other two scenarios. Further research is suggested that examines parent-child interactions that are considered more independent, meaning less interference for other individuals around the child. Final limitations included a small sample size and time constraints in completing the project before the school year ended.

Conclusion

This project did not result in the expected findings but was beneficial in contributing to the current knowledge and future directions that we should continue to research. The research provided support for the authoritative parenting style in relation to effective parenting when children are using their bodies as a means of gaining autonomy. The results also offered support for the generational transmission of parenting styles. Finally, these findings suggest a better development of an embodiment scale to further understand how parenting styles impact embodiment and future research on the ways authoritarian parenting impacts public body consciousness.

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Table 1

Mean Warmth and Autonomy for Different Parenting Options

	Parenting Option	Mean		t	p
		Warmth	Autonomy		
Sleep	Authoritative	3.26	3.60		
	Non-Authoritative	1.58	1.47	10.05	<.001
Food	Authoritative	3.64	3.60		
	Non-Authoritative	1.74	1.62	14.92	<.001
Bathroom	Authoritative	3.80	3.56		
	Non-Authoritative	2.51	2.27	13.24	<.001

Note. Sleep refers to the sleep related parent-child interaction. Food refers to the food related parent-child interaction. Bathroom refers to the bathroom related parent-child interaction. Authoritative refers to the response that was designed to be more authoritative. Non-authoritative refers to the response that was designed to be less authoritative. Warmth refers to the level of warmth participants rated each response. Autonomy refers to the level of autonomy participants rated each response.

Table 2

Correlations for Sleep Parent-Child Interaction

	Authoritative Warmth	Authoritative Autonomy	Participant Preference	Caregiver Preference	Participant Preference
Authoritative Warmth	--				
Authoritative Autonomy	.58**	--			
Participant Preference	-.006	-.051	--		
Caregiver Preference	-.02	-.04	.29	--	
Participant Choice	-.16	-.37*	.79**	.36*	--

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

Note. Authoritative Autonomy is the response participants indicated had a higher level of autonomy. Authoritative Warmth is the response participants indicated had a higher level of warmth. Participant preference is the response participants preferred. Caregiver Preference is the response participants believe their caregiver would have chosen. Participant choice is the response that participants would choose for their own child.

Table 3

Correlations for Parental Authority Questionnaire, Body Consciousness Questionnaire, and Sleep Parent-Child Interaction

	Sleep Preference	Permissive	Authoritarian	Authoritative	Private	Public	BC
Sleep Preference	--						
Permissive Sum	-.09	--					
Authoritarian Sum	-.40*	-.50**	--				
Authoritative Sum	.37*	.39*	-.711**	--			
Private Sum	.06	-.27	-.02	.11	--		
Public Sum	-.22	-.30	.35*	-.11	.25	--	
Body Competence	.14	-.06	-.07	.29.	.25	.32*.	–

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

Note. Permissive sum is the level of participant caregiver's permissive parenting style that participants received on the modified Parental Authority Questionnaire. Authoritarian sum is the level of participant caregiver's authoritarian parenting style that participants received on the modified Parental Authority Questionnaire. Authoritative sum is the level of participant caregiver's authoritative parenting style that participants received on the modified Parental Authority Questionnaire. Private Sum is the level of private body consciousness that participants scored on the Body Consciousness Questionnaire. Public Sum is the level of public body consciousness that participants scored on the Body Consciousness Questionnaire. Body Competence is the level of body competence that participants scored on the Body Consciousness Questionnaire.

Anxiety Symptoms in a Community During the COVID-19 Pandemic: A Self-Reported Study

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The coronavirus (COVID-19) pandemic has affected many aspects of people's lives, including their mental health. To better understand its impact, the current study looked at how demographic features and beliefs about the pandemic influenced anxiety during this time. Participants included 221 residents of Michigan who predominantly identified as female and White. They completed the Adaptation to Social Stress Questionnaire, a 105-item self-report questionnaire developed to assess participant characteristics, ability to adapt to stress and opinions, beliefs, and experiences related to the COVID-19 pandemic, and two measures of anxiety (the State-Trait Anxiety Inventory and the Generalized Anxiety Disorder scale). Pearson product-moment correlations and independent samples t-tests were used to determine the relationship between anxiety and other study variables. Results show that religious affiliation and older age were associated with lower anxiety scores while living in the subjects' close environment as an infected individual was associated with increased anxiety. Interestingly, thinking someone was to blame for the pandemic, being angered by official message regulations, and not thinking lockdown measures were sufficient increased anxiety. This latter finding implies that consistent with clinical theory, our beliefs about events are connected with our emotional experiences. Recommendations for clinical practice are noted as it is imperative for clinicians to be consistent and direct regarding any protocol changes that may help minimize client anxiety. Lastly, considerations regarding transparent communication from leaders of organizations that are adjusting their policies due to the COVID-19 pandemic are discussed.
Keywords: COVID-19, anxiety, Michigan, pandemic beliefs, social stress adaptation

While pandemics have caused great human suffering over many centuries (Turner, 2020), the COVID-19 pandemic may be the most carefully documented worldwide epidemic in history because of advances in healthcare and in worldwide communications. Greater attention to mental health issues has been one theme of research on the COVID-19 pandemic, and this report attempts to contribute to the literature on mental health effects within the United States, with a particular focus on the state of Michigan. The research reported here was conducted in the spring and summer of 2020, when Americans were between two peaks in disease/death rates, with vaccines only aspirational. By the fall of 2020, the U.S.A. had approximately 12 million COVID-19 cases, compared to about 58 million cases worldwide (John Hopkins University of Medicine, 2020). This was almost three million more cases than India, a country whose population is more than four times the population of the United States.

As COVID-19 spread, states varied widely in terms of their response to the epidemic. In response to the pandemic Michigan's Governor, Gretchen Whitmer, issued executive orders restricting commerce and public activity, while the state legislature (controlled by the other political party) opposed her and encouraged citizens to rebel (Jaffe & Marley, 2022).

Michigan received a great deal of news coverage, not because of particularly high COVID-19 case numbers or death rates in 2020, but because of the strong reactions against the restrictions placed on Michiganders by Governor Whitmer and her Public Health officials.

One of the objections to health restrictions (e.g., mask-wearing, the closing of bars and gyms, discouraging large gatherings, moving schools to online teaching) is that they may protect against infection but create unwanted side effects such as increased levels of domestic abuse, child neglect, anxiety, depression, and other types of mental illness. This assertion is supported by a recent meta-analysis that included 15 studies (11 related to COVID-19 and four related to SARS and Influenza pandemics) on the effects of pandemics on the mental health of people with pre-existing mental illnesses (Neelam et al., 2021). All 15 studies found that people with mental illness experienced more psychiatric symptoms during pandemics compared to control groups (Neelam et al., 2021). The primary symptoms identified included increased anxiety, depression, and insomnia. Researchers hypothesized that the lack of social interaction and difficulty in maintaining a daily routine contributed to these findings (Neelam et al., 2021). Similarly, Marroquín and colleagues (2020) found

that the stay-at-home orders that were implemented in March 2020 were associated with more symptoms of depression, generalized anxiety, acute stress, and insomnia (Marroquín et al., 2020). These symptoms remained despite individuals' levels of perceived social support, which suggests that known protective factors (e.g., social interaction) did not eliminate the impact of social distancing (Marroquín et al., 2020).

Anxiety and Predictors of Anxiety

Research has shown that women are significantly more likely than men to develop an anxiety disorder at some point during their lifespan (Kessler et al., 1994; Pigott, 2003; Jalnapurkar et al., 2018). The National Comorbidity Survey (NCS) conducted from 1990 to 1992 found that lifetime prevalence rates for any anxiety disorder were 30.5% for women and 19.2% for men (Kessler et al., 1994). Various factors are hypothesized to be responsible for the sex differences reported in anxiety disorders, including genetic, neurodevelopmental, environmental, and neurobiological factors (Jalnapurkar et al., 2018). More specifically, fluctuations in estrogen and progesterone levels can substantially influence the severity of anxiety disorders (Jalnapurkar et al., 2018). Furthermore, women have lower gastric acidity, lower body weight, greater percentage of body fat, and lower blood volume compared with men, factors that can affect the absorption and distribution of medications (Pigott, 2003).

Across cultures, the prevalence of Generalized Anxiety Disorder (GAD) is higher in females than in males, at approximately a 1.5 to 1 ratio (Mackinaw-Koons & Vasey, 2000). In the United States, specifically, the US National Comorbidity Survey Replication found prevalence rates of 3.6% for men and 6.6% for women (Kessler et al., 2005). Importantly, these prevalence rates depend partly on age: the sex difference in prevalence rates for GAD is highest in adolescence and declines with age at a faster rate for men than it does for women (Mackinaw-Koons & Vasey, 2000).

Research suggests that age itself is also an important predictor of anxiety, with findings generally pointing to decreasing levels of anxiety as people get older. A literature review by Baxter et al. (2013), for example, found that, globally, adults over age 54 were significantly less likely to be diagnosed with anxiety than adults aged 18-54. Additionally, anxiety seemed to rise dramatically for younger adults (18-25 years of age) in the USA between the years 2008-2018; for adults 50

years of age and older, it remained steady (Goodwin et al., 2020). The researchers hypothesized that poor job prospects and student loan debt contributed to the rise in anxiety for young (emerging) adults. There is cross- sectional research evidence, however, that suggests that these findings may occur because older cohorts are less accurate at identifying and labeling symptoms of anxiety and depression (Wetherell et al., 2009).

Other predictors that have been associated with anxiety include spending increased time online (Weinstein et al., 2015), living in a European or North American country, and living in a developed rather than a developing country (Baxter et al., 2013). Conversely, religiosity is associated with lower anxiety, although results suggest that intrinsic religious orientation is more efficacious than simple religious affiliation (Shreve-Neiger & Edelstein, 2004). Volunteerism or helping others (Waite et al., 1998) and being the recipient of social support (Berkman & Syme, 1979) also predict lower anxiety.

Unique Anxiety Findings under Pandemic Conditions

Although it is difficult to separate anxiety reactions to government restrictions from anxiety reactions to the virus itself, this article attempts to better understand the characteristics, behaviors, and beliefs that were associated with anxiety symptoms early in the pandemic. Other research has found gender and age to be predictors of anxiety during the pandemic (Marroquín et al., 2020; Solomou & Constantinidou 2020). Marroquín and colleagues (2020) found that younger adults, women, individuals with minimal social support, and those who reported being under a stay-at-home order had higher levels of GAD symptoms compared to older adults, males, individuals who identified as having social support, and anyone not under a stay-at-home order (Marroquín et al., 2020). Similarly, Solomou and Constantinidou (2020) found women of younger age (18-29), student status, unemployment status, prior psychiatric history, and those reporting a greater negative impact of the pandemic on their quality of life were at higher risk for increased anxiety and depression.

Large-scale studies have yielded similar results; researchers have found increases in anxiety in younger adults in response to the conditions imposed by the COVID-19 pandemic (Burkova et al., 2021; Kowal et al., 2020). A survey done in June 2020 for the US

Center for Disease Control and Prevention (Czeisler et al., 2020, p. 1049) reported "considerably elevated" anxiety and depression, along with suicide ideation, in young adults aged 18 to 24. Moreover, the impact of one's social support during pandemic conditions may be complex; for example, Kowal and colleagues (2020) found that under the physical isolation mandates of COVID-19, anxiety was worse for people living alone and for people forced to live in overcrowded conditions.

Anxiety Findings in the State of Michigan (USA)

The current authors participated in one of the international studies cited above (Burkova et al., 2021), contributing data from across the USA that were pooled with other samples to form the USA sample for that 2021 publication. It was serendipitous that several hundred of the volunteers came from the state of Michigan. Because, as mentioned above, each state had such a different strategy for managing the pandemic, the authors realized that it might be worthwhile to analyze the Michigan data separately, paying more attention to some of the demographic data that had already been gathered, in order to better understand contextual factors.

Hypotheses

The aim of this cross-sectional study was to examine the characteristics, behaviors, and beliefs associated with increased anxiety during the COVID-19 pandemic. We had six hypotheses and six exploratory goals. Under pandemic conditions, the first hypothesis was that our sample would have higher anxiety levels on the Generalized Anxiety Disorder Scale (GAD-7) and the State-Trait Anxiety Inventory (STAI) compared to normative community samples. Secondly, we hypothesized that anxiety levels would be higher in older individuals because of their increased risk for severe COVID-19-related illness. Similarly, the third hypothesis was that anxiety levels would be higher in people with chronic diseases because of their increased risk for severe COVID-19-related illness. The fourth hypothesis was that higher anxiety was expected in people who identified others in their close environment who were diagnosed with COVID-19. Next, our fifth hypothesis was that anxiety would also be positively associated with the female gender. Lastly, our sixth hypothesis was that anxiety would be positively associated with an absence of religious affiliation. This research also had several exploratory goals in mind: to assess if higher anxiety was associated with living alone, having children, experiencing changes in financial well-being or lifestyle habits, social networking online, or holding certain beliefs about government officials responsible for providing leadership during the pandemic.

Method

Procedure

The data analyzed below are part of a large cross-cultural study that examined possible factors that may be associated with self-reported levels of anxiety during the first wave of the COVID-19 pandemic (Burkova et al., 2021). The larger sample included 15,375 participants from 23 countries which was conceptualized by a team of researchers in Russia. They hypothesized the spread of the pandemic, isolation measures, and restrictions would result in increased depression symptoms and would exacerbate the psychological well-being of people worldwide during the first wave of the COVID-19 lockdown (Burkova et al., 2021). All co-authors of this larger study collected data from their home countries.

Participants in each country were recruited from various university listservs and social networking sites. As stated above, a significant portion of the sample was from Michigan. Thus, the current authors chose to perform a separate analysis on the Michigan sample to better understand the impact of context. Information relevant to the current study is presented below. Approval for all procedures was provided by the university's Institutional Review Board. Data were collected from May 19, 2020, through September 16, 2020.

Participants

Participants were members of the community recruited via convenience sampling methods (e.g. local postings on university and faculty email listservs, Facebook, Instagram, NextDoor, and word of mouth). Postings provided a brief description of the study and a link to the survey hosted on Qualtrics. Participants provided informed consent on the online survey form. There were no incentives given for participation. Participants were included in the current study if they resided in Michigan, were over the age of 18, completed all of the items in the Generalized Anxiety Disorder 7 ($N = 217$) and/or the State-Trait Anxiety Inventory ($N = 200$) questionnaire, and provided at least 50% responses to the other survey questions. Based on these inclusion criteria, a total of 221 participants were retained in the analyses.

Of these participants, 27.1% were male and 72.4%

were female. Regarding ethnicity, 84.2% of the sample identified as White, 5% as African American or Black, 3.2% as Hispanic or Latino, and 1.4% as Asian. Participants ranged in age from 22 to 80 years (M = 45.60, SD = 16.28). Regarding relationship status, 68.3% reported being married or in a committed relationship, while 31.2% reported being single, divorced, or widowed. Regarding religious affiliation, 25.3% identified as Catholic, 33.5% as Christian, 5.9% as Jewish, .9% as Muslim and 30.8% as not religious. On average, participants completed the survey 13.71 (SD = 4.17) weeks after the Michigan stay-at-home order (March 23, 2020).

Measures

Generalized Anxiety Disorder-7 (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006)

The GAD-7 is a seven-item self-report questionnaire that assesses the frequency of anxiety symptoms over the past two weeks. Responses were recorded on a 4-point Likert scale from 0 to 3, where 0 is "not at all" and 3 is "nearly every day." A Cronbach's alpha coefficient of 0.89 was found in a community sample in Germany (Löwe et al., 2008). Construct validity was supported by the relationship between the GAD-7 and the PHQ-2 depression scale, the Rosenberg Self-Esteem Scale, the Questionnaire on Life Satisfaction, and the Resilience Scale (Löwe et al., 2008). Participants' scores were then summed to produce a total GAD-7 score for each participant. Internal consistency was excellent (α = .910).

State-Trait Anxiety Inventory (STAI; Spielberger, 1983)

The STAI is a 40-item self-report questionnaire comprised of 20 items assessing state anxiety and 20 items assessing trait anxiety. For the purposes of this study, the 20 items that measure state anxiety were used to assess participants' anxiety at the time of the survey. Responses were recorded on a 4-point Likert scale from 1 (not at all) to 4 (very much so). Participants' scores were summed to produce a total score for each participant. A Cronbach's alpha coefficient of 0.87 was found in a community sample (Balsamo et al., 2013). Construct validity was supported by the relationship between the STAI and the Beck Anxiety Inventory (Balsamo et al., 2013). Internal consistency was excellent (α = .952).

Adaptation to Social Stress Questionnaire (ASSQ; Butovskaya & Burkova, 2021)

The ASSQ is a 105-item self-report questionnaire assessing individuals' demographic features, ability to adapt to stress and opinions, beliefs, and experiences related to the COVID-19 pandemic (Burkova et al., 2021; Butovskaya et al., 2021; Burkova et al., 2022). Table 1 contains the relevant questions and response options for the current study. This ASSQ was designed specifically for the larger cross-cultural study that the authors participated in at the beginning of the COVID-19 pandemic. All author participants had the opportunity to critique the questionnaire, after which the agreed-upon questionnaire was translated into the local language for each country. The ASSQ included standard demographic questions (e.g., age, gender, occupation, etc.). As of this writing, three articles have been published using the ASSQ (Burkova et al., 2021, 2022; Butovskaya et al., 2021), and more studies are in progress. More information about the testing properties of the ASSQ will be forthcoming in future research reports.

Data Analysis

Because the current study was conducted in response to the global COVID-19 pandemic, it was not feasible to collect data from a control group. However, to provide a sense of the magnitude of the anxiety present in the current sample, single-sample t-tests were used to compare mean GAD-7 and STAI scores in the current sample with mean scores on the GAD-7 and STAI from comparable community samples published in the research literature (Löwe et al., 2008; Spielberger, 1983). To better understand the relationship between anxiety scores and a range of demographic, behavioral, and belief variables, bivariate analyses were conducted. Pearson product-moment correlations were used to determine the relationship between anxiety scores and continuous criterion variables like age and number of weeks into the stay-at-home order. Independent samples t-tests were used to examine the relationship between anxiety scores and dichotomous criterion variables assessed with the ASSQ.

Results

Hypothesis One

In order to assess the magnitude of anxiety in our sample and the inability to have a control group, we compared scores from our sample to scores from previously published community samples. The current sample had significantly higher GAD-7 scores (M=6.41) than both a German sample (M=2.95; Löwe et al., 2008) and a United States pandemic sample (M=5.66;

Marroquín et al., 2020) and significantly higher STAI scores (*M*=41.79) than a community sample of working adults in the United States (*M*= 35.72; Spielberger, 1983). Importantly, scores on the GAD-7 were significantly and positively associated with scores on the STAI ($r = .760$, $p < .001$) in the current sample, suggesting substantial convergence across anxiety measures. Thus, regardless of measure, this Michigan sample was more anxious than comparable community samples.

Hypotheses Two, Three, and Five

To better understand these elevated anxiety scores, we examined their relationship with important demographic and behavioral criterion variables. Regarding demographics for our second hypothesis, both GAD-7 and STAI scores were significantly and negatively correlated with age, ($r = -.330$, $p < .001$) and ($r = -.311$, $p < .001$) for GAD-7 and STAI respectively. Thus, as age increased, anxiety scores decreased. Additionally, our third and fifth hypotheses were not supported in that having a chronic illness diagnosis and biological sex were not associated with GAD-7 or STAI anxiety scores.

Hypotheses Four and Six

Our fourth hypothesis was supported in that having infected people living in your environment ($t(214) = -2.53$, $p = .012$) was associated with higher GAD-7 scores. Our sixth hypothesis was supported by the finding that those who identified as religious reported significantly lower GAD-7 scores ($t(209) = 2.12$, $p = .035$).

Exploratory Goals

In terms of the exploratory goals regarding beliefs, thinking there was someone to blame (GAD-7: $t(213) = -2.794$, $p = .00$; STAI: $t(194) = -2.735$, $p = .007$), feeling angry in response to official message regulations (GAD-7: $t(214) = -2.81$, $p = .024$; STAI: $t(193) = -2.55$, $p = .012$), and believing that lockdown measures were insufficient (GAD-7: $t(209) = 2.03$, $p = .044$; STAI: $t(192) = 2.66$, $p = .008$) were associated with significantly higher anxiety scores.

Other Findings

Lastly, having a history of volunteering prior to the pandemic ($t(213) = -2.16$, $p = .032$) were associated with higher GAD-7 scores. Conversely, those who changed their daily lifestyle habits and believed that virtual social networking was a valuable opportunity to connect with others reported significantly lower GAD-7 scores, $t(211) = -2.13$, $p = .035$, and $t(200) = 2.40$, $p = .017$ respectively. Having children, living alone, and experiencing a change in household income were not associ-

ated with GAD-7 or STAI anxiety scores. Additionally, anxiety was not significantly associated with the number of weeks since the stay-at-home order, suggesting that when participants took the survey, it did not have an effect on their scores. A summary of these findings associated with the GAD-7 can be found in Table 2.

Discussion

As hypothesized, average GAD-7 and STAI scores were higher in the current sample than comparable scores from community samples prior to (Löwe et al., 2008; Spielberger & Gorsuch, 1983) and during (Marroquín et al., 2020) the COVID-19 pandemic. However, it is worth noting that the current sample had approximately 20% more females than the compared community samples. Thus, it is possible that gender played a role in the observed effects in the current sample. The STAI average score exceeded an established clinical cutoff of 40 (Emons et al., 2019), suggesting that state anxiety was elevated to a clinically significant degree. These findings are consistent with the increases in anxiety (Bareket-Bojmel et al., 2020; Hyland et al., 2020; Moghanibashi-Mansourieh, 2020) and other mental health problems found in the current pandemic (Hwang, 2020; Roy et al., 2020; Spoorthy et al., 2020).

To better understand this pattern of findings, we examined the association between sample characteristics, behaviors, and experiences with anxiety. In particular, hypotheses related to variables that increased the likelihood of COVID-19 infection and severe illness (Centers for Disease Control and Prevention, n.d.) were partially supported. Specifically, having infected people living in your environment was significantly associated with higher state and trait anxiety. Research suggests that people experience a fear of contamination related to COVID-19 that is similar to the fear of contamination for other viruses, such as Ebola or H1N1 Influenza (Helleringer et al., 2015; Cheung, 2015; Kim et al., 2015; Knowles & Olatunji, 2021). Therefore, it is possible that those with infected people living in their environment were not only concerned with the well-being of their loved ones but also anxious about contracting the virus themselves. Interestingly, there was not a significant relationship between anxiety and living alone.

Contrary to our hypothesis, however, a number of factors associated with increased vulnerability to COVID-19 were not associated with anxiety

as expected. In particular, age was negatively rather than positively associated with anxiety. Although unexpected, this finding is consistent with a broader literature that finds that as people age, their levels of neuroticism and negative affectivity tend to decrease (Kessler & Staudinger, 2010; Masten & Wright, 2010; Yeung & Fung, 2007; Yeung et al., 2020). Thus, age continues to be a strong protective factor even when facing a virus that disproportionately affects older adults. Similarly, chronic illness was not significantly associated with anxiety. Although past research has found associations between pre-existing conditions and negative mental health outcomes during public health crises (Gayer-Anderson et al., 2020), it is possible that the shift to working from home that occurred in the early months of COVID-19 mitigated many of these negative outcomes. Not only are individuals with disabilities more likely to work from home (which allows them to flexibly attend recurring medical appointments and have access to medical equipment), but working from home itself has become easier and less stigmatized as many workplaces were forced to broaden their views on accommodations for workers in the early months of the pandemic (Schur et al., 2020). Thus, increased flexibility and acceptance of working from home may have contributed to the nonsignificant finding for chronic illness.

Identifying as religious was associated with lower anxiety in the current sample, consistent with our hypothesis. Given that the COVID-19 environment is one in which we are physically and socially disconnected from each other, belief in a higher power might help people remain connected to others through community-specific religious activities and events and through an awareness that one is part of something bigger than oneself. This is consistent with the larger literature, which has identified religion and pro-social behavior as protective factors against psychopathology broadly and anxiety specifically (Gearing & Lizardi, 2009; Greenfield & Marks, 2004; Levin, 2009; Peteet 2020; Smith et al., 2003). Interestingly, individuals who reported a history of volunteering prior to the pandemic endorsed significantly more anxiety than participants who had not volunteered in the past. Although altruism as a whole tends to be negatively associated with anxiety (Elphick, 2020), research suggests that changes in daily lifestyle habits and identity roles can lead to a loss in well-being and the presence of psychologi-

cal symptoms (Giuntella, Hyde, Saccardo, & Sadoff, 2021; Greenfield & Marks, 2004) and this is true for altruistic behaviors specifically (Feng et al., 2020). Given a stay-at-home order was put in place shortly before the data was collected, many altruistic individuals may not have been able to volunteer as they usually would. This may have changed their daily lifestyle, separated them from sources of social support, and had implications for their identity as a volunteer, leading to anxiety.

Perhaps the most intriguing pattern of results may be seen in the three questions that inquire about the perception of failures in leadership. People who endorsed blaming someone "for the current situation in your country" reported higher anxiety scores on both measures. Of the 62% of respondents who felt there was someone to blame, the vast majority identified an entity in national leadership (the CDC, President Trump, Congress, etc.) who they believed was to blame. Further, about half of the sample endorsed feeling angry about official messaging, and 34.7% said that self-isolation measures imposed by authorities were not sufficient. These beliefs similarly predicted higher anxiety. Together, these results are consistent with broader research on organizational leadership. In a meta-analysis by Costello and colleagues (2019), researchers found that the perception of poor leadership within an organization leads to higher stress; the findings were particularly striking in a dementia care home (Vogel et al., 2017), and in nursing homes (Willemse et al., 2012). Similarly, a study of industrial workers (Schmidt et al., 2014) found that leadership perceived as less supportive was associated with higher stress and lower self-perceived health among employees. These findings have been replicated across many occupations, from teaching to the military, in many different countries. As Gabriel (2014) wrote:

We expect our leaders to lead the way, to show moral courage and to embody and articulate values beyond that of efficiency. We expect leaders to talk to us, to address our concerns and to listen to us....Sometimes, we expect our leaders to see clearly, to possess a certain conviction and resoluteness represented by that overused and abused word, vision....We expect our leaders to care – not just in an impersonal manner 'about' a project or 'about' the bottom line, but 'for' the organization and its people, indeed for each and every follower. (p. 319) Importantly, these results are consistent with recent work by Dhanani and Franz (2020), who directly

examined trust in governmental leadership during March, 2020 of the pandemic. Their findings suggest that, at that time, there was a significantly higher level of trust in the Center for Disease Control (CDC) than in President Trump. Moreover, trust in President Trump was significantly correlated with misinformation about transmission and symptoms of the virus, as well as angry feelings towards people of Asian descent. Thus, contrary to prior research identifying mistrust in the government as a barrier to good health behaviors, Dhanani and Franz (2020) concluded that their findings "suggest that trust in governmental leadership can be a hindrance to health literacy when the messages issued by governmental leaders are at odds with those from public health organizations and emerging evidence-based practices...messaging from governmental leaders in the United States may be impeding effective public health responses to COVID-19" (Dhanani & Franz, 2020, p. 10). Together these findings suggest that the absence of clear and consistent messaging from leadership not only makes it more difficult to discern the appropriate course of action but can also directly increase anxiety and mental health symptoms.

Clinical Implications

These results have a number of implications for clinical theory and treatment. First, this study highlights that our beliefs about the COVID-19 pandemic can impact our emotional response and well-being. This is consistent with a major premise of cognitive-behavioral therapy: our thoughts occupy a position of central importance and largely determine our emotions, behaviors, and experiences (Beck Institute, 2021). Transference-focused psychotherapy, a psychodynamic approach, similarly acknowledges that the way an individual views themselves and others influences their interpretation of their experience and contributes to the development of distressing symptoms (Frank Yeomans, 2021). Thus, existing therapeutic approaches are well-positioned to address mental health difficulties related to this novel coronavirus.

The findings also suggest a number of specific therapy recommendations in the current setting. First, being consistent and transparent about changes to protocol and expectations during the pandemic may help minimize client anxiety. This may be particularly true if providers are navigating a shift to telehealth practice or a return to in-person services. Given that clinicians are often viewed as an authority, clear communication

and consistent information can have a profound impact on clients. Additionally, asking about the impact COVID-19 has had on patient's various identities can provide important context for understanding their symptoms. If certain parts of a client's identity have been lost during the pandemic, processing that loss in therapy may be an important part of addressing patient symptoms. Additionally, the results suggest that the associations between symptoms and vulnerabilities to COVID-19 may be more complex than predicted and should be understood from the patient's perspective rather than assumed. Thus, approaching patients with a curious, caring, and empathetic attitude is likely to not only strengthen the alliance between the therapist and patient but also provide important contextual information for understanding the patient's symptoms.

Not only can these recommendations be helpful in a therapeutic setting, but they can also be implemented across all workplace environments. As many companies transitioned to remote work and are now contemplating returning to in-person, specific health and safety guidelines should be enacted. For example, guidelines regarding the requirement of in-person versus remote work, the (dis)use of masks, COVID-19 testing onsite, COVID-19 screeners, etc., should be clearly delineated for all employees. Furthermore, it would be in leadership's best interest to facilitate feedback from their employees to ascertain their level of comfort regarding the potential return to in-office work. The findings from this study clearly demonstrate the importance of transparent communication from leaders.

Limitations and Future Directions

The current study has several limitations. In particular, the current sample consisted primarily of Caucasian women from Michigan who were recruited through a convenience sampling approach. While this provides insight into a specific demographic, it lacks a holistic view of the population of Michigan, which includes diverse racial, ethnic, and socioeconomic backgrounds. Consequently, the results from this study are not generalizable to the whole population of Michigan. Furthermore, the study did not control for potential confounding variables. Capturing information regarding psychiatric history could have provided further information regarding the pandemic's influence on individuals' anxiety levels.

While the political unrest and worsening COVID-19 numbers in Michigan at the time of data

collection provide an interesting sample for study, findings might not be generalizable to other parts of the country where COVID-19 numbers and policies differed or to other stages of the pandemic. That said, findings from the current study are largely consistent with prior research on anxiety and mental health during COVID-19. Another limitation is that this is not an experimental study but, rather, a naturalistic field study. It documents what is happening in the real world, which is a great opportunity for understanding human behavior; however, lacking experimental controls, it provides less evidence of cause-and-effect relationships (Miller, 2017).

Additionally, the current study is part of a larger, global study involving 23 countries. Other countries used either Qualtrics or Google for their online surveys. An attempt was made to get cross-sectional data (different age groups) and diverse populations as much as possible. Readers who wish to learn more about the findings from other countries may read the already published articles from this study (Burkova et al., 2021, 2022; Butovskaya et al., 2021). Future research examining these findings in the international sample could help to clarify the generalizability of these findings.

Further, this study was developed early in the pandemic, when researchers and respondents were unaware of how long the pandemic would last and how costly it would be. Consequently, the findings presented are only applicable to the first phase of the pandemic as the results do not capture the perspectives of individuals as the pandemic progressed. To address this limitation, future work should examine whether findings persist over the course of the pandemic. To that end, a second round of data collection is being conducted. Questions about epidemiological experience, vaccination, personality characteristics, and unexpected consequences of the pandemic will be examined in the second wave of data collection.

Conclusions

Our study revealed factors associated with higher levels of anxiety in a sample of Michigan adults. As to be expected, those who lived with someone infected with COVID-19 had higher state and trait anxiety. Consistent with prior research on anxiety during pandemics, older age and having a religious affiliation were demonstrated to be protective factors against anxiety. Furthermore, those who identified as having volunteered prior to the pandemic denied social networking as a valuable

means to connect with loved ones and had changes to their daily lifestyle habits reported higher rates of anxiety. A possible explanation is that older adults' routines may not have been as affected by the pandemic as younger adults due to their retirement status. Those who were already communicating with friends online (e.g., social media) may have noticed a smaller shift in their social lives as they still connect with friends, albeit in a slightly different context. However, for those who volunteer, consistent face-to-face contact may have been a primary form of social interaction and/or become ingrained in their routine; thus, the inability to volunteer restricted their means of communication.

The findings presented here were from the earlier stages of the pandemic, at a point when no one knew the duration of the stay-at-home orders, thus no shifts to virtual connection were yet established. But as the pandemic continued, more companies, universities, social circles, etc. had to make the adjustment to solely connecting virtually. Therefore, it is possible that had the data been collected at a later time in the pandemic, some may have adjusted to the "new normal," and, consequently, these factors would not have contributed to higher reporting of anxiety symptoms.

The results of this study should be interpreted within the context of certain limitations. One important limitation of the current study includes but is not limited to, the lack of representation from diverse racial, ethnic, and socioeconomic backgrounds. Accordingly, the results are not generalizable to the whole population of Michigan. This study, along with prior studies, demonstrates the negative impact pandemics have on individuals' mental health. The effects of the COVID-19 pandemic are far-reaching and will likely take time to fully understand. The current study adds to the conversation of the mental health sequela resulting from COVID-19 and highlights important implications for organizational leaders and clinical practice.

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Table 1

Frequency of Adaptation to Social Stress Responses and Mean Anxiety Symptom Ratings by Group

Question	N (%)	GAD-7		STAI	
		M	*SD*	*M*	*SD*
What is your biological sex?					
Female	160 (72.1)	6.57	5.25	41.76	12.88
Male	60 (27)	5.97	4.82	41.67	13.44
Which religious group do you belong to?					
Religious	145 (65.3)	5.94	12.78	40.77	12.78
Non-religious	70 (31.5)	7.56	13.34	44.43	13.34
Do you have children?					
Yes	120 (54.1)	5.81	4.95	40.34	12.91
No	101 (45.5)	7.14	5.26	43.46	12.95
Do you have any chronic diseases?					
Yes	58 (26.1)	6.54	5.35	42.0	12.18
No	162 (73.0)	6.39	5.07	41.71	13.89
Do you live alone?					
Yes	42 (18.9)	5.74	4.89	38.74	12.86
No	179 (80.6)	6.59	5.18	42.55	12.95
Have you been a volunteer before the current coronavirus situation?					
Yes	137 (61.7)	6.91	5.48	42.60	13.07
No	82 (36.9)	5.39	4.16	40.41	12.84
Has your household income increased due to restrictions from the coronavirus?					
Yes	21 (9.5)	6.10	5.83	39.83	15.86
No/no change	200 (90.1)	6.45	5.06	41.99	12.70
Has your household income decreased due to the restrictions from the coronavirus?					
Yes	60 (27.0)	7.24	4.68	43.98	14.12
No/no change	161 (72.5)	6.12	5.26	40.98	12.54
Do you have infected people infected with the coronavirus in your close environment?					
Yes	41 (18.5)	8.24	4.85	48.16	12.01
No	179 (80.6)	6.03	5.10	40.44	12.73
Have your daily lifestyle habits changed during the coronavirus period?					
Yes	202 (91.0)	6.60	5.08	42.21	13.29
No	15 (6.8)	3.73	4.11	36.73	6.97
Virtual social networking is a valuable opportunity to be with friends:					
Yes, I agree	175 (78.8)	5.89	4.76	41.14	12.54
No, I disagree	31 (14.0)	8.19	5.74	45.43	15.14
Do you think someone is to blame for the current situation in your country?					
Yes	138 (62.2)	7.07	5.01	43.68	13.19
No	81 (36.5)	5.11	4.96	38.38	12.01
Do official messages and regulations cause you to feel angered in any way?					
Yes	110 (49.5)	7.24	5.35	44.25	12.04
No	110 (49.5)	5.67	4.77	39.59	13.46
Are these lockdown measures regarding self-isolation, imposed by authorities, sufficient?					
Yes	138 (62.2)	5.89	4.88	39.88	12.78
No	77 (34.7)	7.36	5.32	44.97	12.93

Note. M = mean, *SD* = standard deviation.

Table 2

Group Differences in GAD-7 and STAI Anxiety Scores

	Comparison	GAD-7		STAI	
		t	df	t	df
What is your biological sex?	Female vs male	-0.77	214	-0.04	193
Which religious group do you belong?	Religious vs non-religious	2.14*	209	1.81	189
Do you have children?	Yes vs No	1.91	215	1.68	194
Do you have any chronic diseases?	Yes vs. No	-0.19	214	-0.13	194
Do you live alone?	Yes/No	0.96	215	1.64	194
Have you been a volunteer before the current coronavirus situation?	Yes/No	-2.16*	213	-1.15	194
Has your household income changed due to the restrictions from the coronavirus?					
Increased	Yes vs No/No change	0.30	215	0.67	194
Decreased	Yes vs No/No change	-1.43	215	-1.44	194
Do you have people infected with the coronavirus in your close environment?	Yes/No	-2.53***	214	-1.15	194
Have your daily lifestyle habits changed during the coronavirus period?	Yes/No	-2.13*	211	-1.58	194
Is virtual social networking a valuable opportunity to be with friends?	Yes/No	2.40*	200	1.67	193
Do you think someone is to blame for the current situation in your country?	Yes/No	-2.79**	213	-2.76**	194
Do official messages and regulations cause you to feel angered in any way?	Yes/No	-2.28*	214	-2.55*	193
Are these lockdown measures regarding self-isolation, imposed by the authorities, sufficient?	Yes/No	2.03*	209	2.66**	192

Note. *p <.05, **p <.01, ***p <.001

The Role of Social Support in Determining Perinatal Anxiety and Depression Outcomes for Black and Latina Women

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Racial and ethnic minoritized groups in the United States face higher maternal morbidity and mortality rates and elevated risks for postpartum depression and other perinatal mood disorders. Social support (SS) protects against perinatal mood disorders, particularly for Black and Latina women. This study aimed to determine if having two or more SS people was related to perinatal anxiety and depression outcomes in a convenience sample of Black and Latina women. Mothers (n = 51) with children between ages zero and three completed a socio-demographic and mental health status (PHQ4) survey. A two-way ANOVA was performed to analyze the effect of high SS and race on mental health scores. There was no significant difference in mental health scores for those with two or more social supports versus those with one or fewer social supports (p = 0.4865). Two-group comparison generally showed that mothers with high SS had a lower mental health score (M = 0.39) and mothers with low SS had a higher score (M = 0.60). There was a significant relationship between SS and both race and age (p = 0.0498, race, p = 0.0010, age). Therefore, this study found no relationship between having two or more SS people and perinatal anxiety and depression outcomes. Future studies should examine how other contextual factors impact SS and mental health outcomes for Black and Latina mothers.
Keywords: maternal morbidity, perinatal depression and anxiety, Black and Latina women

Black and Hispanic mothers in the United States face higher maternal morbidity and mortality rates and more elevated risks for postpartum depression than their white counterparts (Gennaro et al., 2020; Howell, 2018). Black mothers are three times more likely to die from birth to their child's first year of life, and Latina mothers are 2.5 times as likely to experience the same outcome (Hoyert, 2023). Social support (SS) protects against perinatal mental health issues among these groups (Pao et al., 2019).

Maternal Health Disparities for Black and Latina Women

Severe maternal morbidity (SMM) has increased by 200% in the United States from 1993 to 2014 (Liese et al., 2019). SMM, or unintended consequences of pregnancy that could pose short- or long-term health issues, are 50 to 100 times more common than maternal death (Liese et al., 2019). SMM rates disproportionately affect racial and ethnic minoritized groups in the US, and this disparity has continued to widen over the last century (Howell, 2018). Risk of pregnancy-related deaths in some regions of the U.S. for Black women in particular is similar to risk for women in low- and middle-income countries (Howell, 2018). Ethnically/racially minoritized women are disproportionately affected by multiple pregnancy complications. Black and Hispanic women

have a 50% greater risk of having a baby at low birth weight and a 20% greater risk of having a preterm baby (Borrell et al., 2016; Gennaro et al., 2020).

Black women have a significantly higher maternal mortality rate than their White counterparts. Approximately 42.4 deaths occur out of every 100,000 live births for Black women as compared to 13.0 deaths per 100,000 live births for White women (Center for Disease Control, 2008). Similarly, Latina women are 20% more likely to experience severe maternal morbidity than non-Hispanic White women. The risks that Black and Latina women experience in the perinatal period are driven by the numerous manifestations of structural racism. Ethnic/racial minoritized groups have unequal access to healthcare, education, housing, stress, and implicit bias (Liese et al., 2019). Racism harms health through physical, social, and economic pathways along with maladaptive coping strategies and stereotype threats (Bailey et al., 2017). Racism is considered a social stressor, which leads to neurobiological and behavioral responses that impact mental and physical health, while chronic exposure to racism elevates the changes occurring in the brain and metabolism in response to prolonged stress (Bailey et al., 2017). Poor birth outcomes have been linked to racial discrimination and psychosocial stress through early health deterioration or weathering (Bediako

et al., 2015). *Weathering* is defined as the cumulative impact that repeated exposure to social or economic adversity and marginalization have on health (Geronimus et al., 2006). When underserved groups perpetually practice high-effort coping strategies in response to acute and chronic stressors, physiological deterioration results (Geronimus et al., 2006). Therefore, maternal and child health are intertwined with the mother's experiences of racial discrimination and chronic stress that are unique to women of color.

Perinatal Mental Health Outcomes in Black and Latina Women

Pregnancy can encompass a period of elevated stress, anxiety related to the pregnancy or fetus, and pain during labor and birth, posing significant stress on the body that increases vulnerability to mood disorders (Alfayumi-Zeadna et al., 2021). The general population has a postpartum depression prevalence of 10-15%, which is disproportionately lower than rates for minoritized communities (Pao et al., 2019). For Latina women, the prevalence of perinatal depression is estimated to be between 54.2-60% (Center for Disease Control, 2008; Lucero et al., 2012; Shellman et al., 2014). Similarly, over 40% of Black women experience postpartum depression, over double the rate of the general population (Hernandez et al., 2022; Wisner et al., 2013). Furthermore, women of color experience more serious and chronic symptoms of depression than White women, despite meeting comparable criteria for mental illness (Guintivano et al., 2018; Mukherjee et al., 2018; Parker, 2021). Black and Latina women are more likely to experience complications throughout their pregnancies, making the provision of perinatal mental health screenings and intervention services especially important for these groups.

Social Support Determines Perinatal Anxiety and Depression Outcomes

Although all pregnant women, especially ethnic or racial minorities, are at risk of perinatal mental health disorders, risk is substantially reduced when protective factors such as social support are present. Social support, or psychological and material resources provided by friends, family, and romantic partners, has been found to protect against perinatal mental health disorders (Cohen & Wills, 1985). For the purposes of this study, social support is defined as the number of support people a person reports having in their life (Shiba et al., 2016). A mother's satisfaction with her social support is dependent on maternal needs and expectations that vary across the perinatal period; thus, the quality of and satisfaction with social support is crucial (Li et al., 2017). Perceived social support is associated with stress, coping, and distress/depression. Both lack of positive support and presence of negative interpersonal relationships have been linked to depression (Coyne & Downey, 1991; Mendelson et al., 2013).

Numerous studies have focused on the protective nature of social support, finding that increased social support and greater satisfaction with the support protects against symptoms of anxiety and depression (Alfayumi-Zeadna et al., 2021; Coburn et al., 2016; Lefkovics et al., 2018; Li et al., 2017; Pao et al., 2019; Razurel et al., 2017). Similarly, lowered social support or dissatisfaction with support significantly increases risk of perinatal depression and raises the levels of depressive/anxious symptoms experienced (Nisar et al., 2020; Ohara et al., 2017; Shakeel et al., 2018; Sheng et al., 2010; Terada et al., 2021; Umuziga et al., 2020; Verreault et al., 2014; Zhou et al., 2021). For example, having a lower number of support people during the perinatal period significantly predicted scores on measures of depression and mother-infant bonding in a prospective study of 494 women (Ohara et al., 2017). Social support has been found to have a direct relationship to perinatal depressive/anxious symptoms, postpartum depression, and other mood outcomes (Ngai & Chan, 2012; Racine et al., 2018).

Based on research findings that suggest social support directly predicts symptoms of anxiety and depression during the perinatal period, social support must be discussed during perinatal visits to better screen for mental health risk. Assessing support in primary care visits during the perinatal period may allow providers to link mothers of highest need with relevant community resources (Barr & Caruso-Mcevoy, 2018).

Importance of Social Support Among Black/Latina Women

Many studies show that the majority of research conducted on social support and mental health has been performed in predominantly White samples (Garthus-Niegel et al., 2022; Wenzel et al., 2021); however, social support is extremely relevant to the well-being of Black and Latina women. In collectivistic cultures, significant cultural values include social connection, intergroup harmony, connectedness, and interdependence (Boroş et al., 2019). Collectivistic

cultures also place more weight on close relationships among family, friends, and community members than Western cultures, which are typically individualistic (Her & Joo, 2018). Research on racial/ethnic minorities in the U.S. indicates that social support may be used in order to reduce the psychological distress that discrimination causes, especially for those from collectivist cultures (Steers et al., 2019). Both Black and Latinx communities rely on close social ties for support and have reported stronger and more supportive relationships with family, friends, and others than White individuals do (Ai et al., 2014; Erving, 2018). When family stress is present, Latinas may be particularly vulnerable during pregnancy based on the violation of cultural expectations about relationships and the role of the family (Coburn et al., 2016).

Significance, Hypothesis, and Study Questions

In Washington, D.C., women die from pregnancy-related causes at a higher rate than anywhere else in the country, at 36 deaths per 100,000 live births (MedStar Health, 2021). African American women are three times more likely to die of pregnancy-related causes than White women. Washington, D.C.'s African American infant mortality rate is the highest in the nation, at 59.7 deaths per 100,000 live births (Roberts et al., 2020). However, White women in D.C. have the lowest maternal mortality ratio in the US; thus, adequate maternal care, which includes mental health support, is not equally available to all residents in the District (Roberts et al., 2020; Zubatsky et al., 2018). Despite the existence of high-quality maternal healthcare in D.C., racial disparities in access to care put Black and Latina women at risk of severe maternal mortality. In response to the severe maternal mortality crisis in D.C., the D.C. Safe Babies, Safe Moms (SBSM) initiative delivers pre-conception, pregnancy, delivery, postpartum, and family care up to a child's third year of life. This study aimed to assess maternal mental health and social support in the context of primary care visits for two critically underserved groups of women. For the purposes of this study, symptoms of anxiety and depression as reported on a self-report measure constituted measurements of maternal mental health. Exploring the role of social support in perinatal anxiety and depression outcomes can facilitate better understanding of the relationship between social support and mental health during and after pregnancy. Our objective was to determine if a significant relationship between social support and perinatal anxiety and depression outcomes exists. We hypothesized that women who had two or more social support people in their lives would report fewer symptoms of anxiety and depression after giving birth. This is one of the first studies examining D.C. SBSM outcomes and the first of this regional sample to evaluate social support and anxiety and depression outcomes.

Method

Sample and Procedures

This study was part of standard clinic care encompassed within a larger program supported by the SBSM/HealthySteps program at a large health system on the East Coast. Institutional Review Board Approval was obtained through the Georgetown University IRB on December 23, 2021. This study includes participants who attended well-child checks for their children during the first 6 months of enrollment into the SBSM/HealthySteps program. The convenience sample initially consisted of 58 Black and Latina mothers with infants or toddlers ranging from age zero to three who received their care at a primary care clinic within the hospital system. Mothers were invited to participate in this study during their child's well-child checks and primary care visits as part of standard of care procedures. Overall primary care screening and assessment for children occurred by physicians, and mothers were screened for various social determinants of health issues, mental health concerns, and social support status by mental health faculty and staff.

Families were screened using the Family Health Survey (FHS), a demographic survey assessing the social determinants of health. The FHS was administered depending on the child's age, at one month, 16 months, 24 months, and 36 months. This survey also assessed social support and mental health status. The survey took approximately 15 minutes to complete. The practitioner explained what the survey included and why it was being given so that the care team could better meet the patient's needs. When this study launched, the FHS was not yet available online. The final 18 participants in this study completed the survey online once it was made available. For participants completing the electronic survey, a link to the survey was generated and sent to the participant automatically when their child was scheduled for a visit; they would then click on the link to complete the

survey. Online surveys could be completed outside of well-child checks, allowing participants to complete the survey at home. For surveys completed by hand for parents who spoke Spanish, an interpreter assisted with administering the survey in Spanish over the phone. Surveys administered on paper were filled out during the well-child checks within the clinic.

We report how we determined all data exclusions, sample size, and measures in this study in compliance with reporting standards for non-experimental quantitative research (American Psychological Association, 2020). This study is consistent with the Transparency and Openness Promotion (TOP) Guidelines at level one for all eight aspects (Nosek et al., 2023). All data, analysis code, and research materials are available by emailing the corresponding author. This study's design and its analysis were not pre-registered.

Measures

Demographics

Socio-Demographic Characteristics. Socio-demographic information was assessed through the Perinatal and Family Health Survey, which included information such as age, race, gender, educational attainment, employment status, and living arrangements. Race was assessed by asking participants to select one of the following racial groups that they identified with, which included the following options: Black/African American, White, Asian/Asian American, American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, multiracial, or other race. Ethnicity was assessed by asking participants to select either Not Hispanic/Latino/a or Hispanic/Latino/a.

Perinatal and Family Needs

Perinatal and Family Needs. In order to determine family needs, the FHS was administered. The full survey assessed social determinants of health, experiences with racism, and other aspects of the family's current social and health needs. For the purpose of this study, only the measures of social support and mental health were utilized in analyses. The independent/ predictor variable was social support, measured by a mother's open-ended answer to the question "Who are your most important support people?" When two or more people were listed, this was counted as "yes," or having two or more social support people. Having fewer than two support people listed was counted as "no." The dependent variable was experiences with anxiety and depression symptoms after giving birth.

For the purposes of this study, anxiety and depression outcomes were measured by a combination of 5 items from the Personal Health Questionnaire-Two (PHQ-2), PHQ4, and GAD7 (Kroenke et al., 2009), and the ninth question about self-harm on the PHQ-9. Participants rated four statements on a 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day); the first two statements comprise the anxiety score (PHQ1 and PHQ2), and the remaining statements comprise the depression score (PHQ3 and PHQ4). Statements measuring anxiety included "feeling nervous, anxious, or on edge" and "not being able to control or stop worrying." Statements measuring depression included "feeling down, depressed, or hopeless" and "little interest or pleasure in doing things." Scores were summed to yield a total mental health outcome variable, which comprised the fourth variable of the mental health score. The fifth question asked participants if the thought of hurting themselves has occurred to them in the last seven days; the yes/no answer choices were coded as yes = 1, and no = 0. Internal consistency of the PHQ4 is 0.82 (Mendoza et al., 2022).

Analytical Strategy

All analyses were conducted using R 4.1.3. Statistical significance was set as $p < 0.05$. Seven mothers with missing values for either social support or mental health outcomes were removed from the dataset: two participants lacked social support information, three participants lacked data for all PHQ questions, one participant lacked data for PHQ3, and one participant did not have data for PHQ4. After removing seven participants from the analysis due to missing data, we had a final sample of $n = 51$ used in analyses. The mean mental health scores, anxiety scores, and depression scores were computed and compared between mothers with and without social support using the two-sample t-test.

Fisher's exact test was used to compare the proportion of race between groups, the proportion of educational levels between groups, the proportion of mothers who have completed a physical exam or well-woman's exam in the last year between groups, and the proportion of relationship status between groups. Pearson's chi-squared test was used to compare the proportions of mothers who worked outside the home between groups. The two-sample t-test was used to compare age between groups. A two-way ANOVA was performed to analyze the effect of having high social support and race on the mental health score. Two-way ANOVA is

suitable for assessing the impact of categorical independent variables (social support and race) on a continuous dependent variable (mental health scores). Two-way ANOVA was chosen for its ability to highlight main effects, vital for understanding individual contributions to observed variations in mental health scores.

Results
Demographic Characteristics of Participants

The demographic characteristics of the study cohort are reported in Table 1. Thirty-one mothers had two or more social support people, and 20 mothers had one or fewer social support people. Thirty-seven percent of the sample were Black women, 43% were Latina, and 18% were categorized as "Other" races. There are two mothers whose race was both Black and Latina. One mother in the low social support group was missing a race value; one mother in both social support groups were missing values for physical exam status. Additionally, 24 caregivers were missing values for age.

On average, mothers with high social support were 28.47 years old (SD = 4.45), and those with low social support were 35.5 years old (5.02); there was a statistically significant difference between age (p = 0.0010). There was a slightly statistically significant difference between races (p = 0.0498). The three racial groups were not uniform in social support reported. There was a similar distribution of Black and Latina mothers across the two social support groups; for the other race group, there were more people with no social support than with two or more social supports.

The results of the two-way ANOVA are presented in Table 2. Simple main effects analysis showed that the levels of race did not have a statistically significant effect on the mental health score (p = 0.4942). Simple main effects analysis showed that the levels of high social support did not have a statistically significant effect on the mental health score (p = 0.2439). We also verified that there was no statistically significant interaction between the effects of high social support and race (p = 0.5802, not included in Table 2).

Relationship Between Social Support and Perinatal Mental Health Outcomes

The two-sample t-test was run to compare mental health scores between the two groups; the means, standard deviations, and p-values for the overall mental health score and stratified by each question are reported in Table 3. Cronbach's Alpha for the study

was α = 0.378. In this study, the maximum score on the PHQ-4 for our sample was four. Mothers in our sample did not endorse thoughts of self-harm; thus, the p-value for the self-harm question measure is not applicable as the mean score is zero. The two-sample t-test for the mean mental health score across the two groups yielded a p-value of 0.4865. Thus, there is no statistically significant difference between the mean mental health scores of mothers with and without social support. The results of the two-sample t-test for anxiety and depression similarly did not demonstrate statistical significance. There was no difference between anxiety scores for those with and without social support (p = 0.4872), and no difference between depression scores for those with and without social support (p = 0.7137). The distribution of responses to each mental health question measure for both social support groups is illustrated in Figure 1.

Discussion

This study aimed to determine if having two or more social support people was related to anxiety and depression outcomes after giving birth in a sample of predominantly Black and Latina women within the context of primary care visits. This study is one of the first to examine   outcomes from the D.C. SBSM initiative, which delivers perinatal and family care up to a child's third year of life, and the first of this regional sample to evaluate social support and anxiety and depression outcomes. We found no significant difference in mental health scores for those with two or more social supports versus those with one or fewer social supports. Our hypothesis was that women who had two or more social support people in their lives would report fewer symptoms of anxiety and depression after giving birth. We expected to find a significant relationship between social support and perinatal anxiety and depression based on prior literature in largely White populations, but did not find a statistically significant difference between anxiety and depression symptoms of mothers with high versus low social support. Despite lacking statistical significance, two-group comparisons generally showed that mothers with two or more support people had a lower mental health score, and mothers with one or fewer support people had a higher mental health score (Figure 1). This general trend must be interpreted with caution due to high variability (high standard deviation) in both groups.

It is important to continue discussing mental health and social support in primary care visits with Black and Latina mothers. Practitioners must recognize that minoritized communities often under-report mental health struggles for a variety of reasons. A study found that African Americans' recent experiences of discrimination predicted unique variance in beliefs about mental health problems and higher concerns about stigma (Williston et al., 2019). Since mental health concerns may be viewed as a point of stigmatization, study participants may have hesitated to disclose mental health symptoms in fear of being further discriminated against (Williston et al., 2019). For many Latina individuals, psychological distress often manifests physically (e.g. shortness of breath, elevated heart rate); thus, Latina participants may not report symptoms on the PHQ-4 due to the lack of somatic symptom assessment (Abarca et al., 2022). Additionally, Latinx cultural constructs such as "susto" or "nervios" refer to somatic symptoms experienced due to significant life stressors; thus, participants may not report symptoms as these words are not directly translated on the Spanish version of the PHQ-4 (Abarca et al., 2022; Matías-Carrelo et al., 2003).

Of further note is the significance of family ties and collectivism when discussing social support and mental health in Black communities in particular. Seminal work posits that Black families' strong ties provide a buffer against the mental health implications of structural and systemic disadvantages (Stack, 1975). Current research has continued to demonstrate that Black Americans' mental health is associated with perceived closeness to family and friends such that family closeness is associated with lowered odds of 12-month major depressive disorder among African Americans (Taylor et al., 2015). Outside of family dynamics, Black Americans rely on support from church members and fictive kin networks. Black Americans attend church more frequently than White Americans and rely more on loosely defined networks of family that go beyond biological relatives. The utility of fictive kin networks for Black individuals provides an important source of resilience and, historically, an adaptive response to economic difficulties (Chatters et al., 1994; Chatters et al., 2009; Roxburgh & MacArthur, 2020; Stack, 1975).

Our study found a difference between the two social support groups in terms of race, where those in the Other race/ethnicity category experienced less so-cial support than Black and Latina participants. Black and Latina mothers were distributed similarly across the two groups, whereas the Other race/ethnicity category had a larger ratio of participants in the one/no social support group. However, we did not find a statistically significant interaction between race and social support that impacted mental health scores. Limited prior research generally shows that racial and ethnic minority groups tend to report lower levels of social support, but our study had more Black and Latina participants with high social support than the Other category, which included White participants (Roxburgh & MacArthur, 2020). Thus, likely due to our racially diverse sample, we found that our Other group participants had lower social support. Prior literature has shown that, despite Black individuals reporting less closeness in friendships, this type of social support is more salient for Black than for White participants (Roxburgh & MacArthur, 2020). Minoritized groups often place high value on things like family, collectivism, and interdependence; thus, because Black individuals in particular have highly interconnected cultural beliefs, they may be more susceptible to the effects of social support (Assari & Lankarani, 2018).

In a prior study, the associations between familialism with social support and stress were larger for Latina women than for White women (Campos et al., 2008). Latinos also report greater reliance on and disclosure to family than to friends compared to Whites and Asian Americans; similarly, their friend support significantly predicted mental health service utilization (Chang et al., 2014). Since Black and Latina women may value interpersonal relationships more than White participants, placing unique emphasis on their friendships and family ties compared to Whites, they may be more likely to have more social support.

There were significant age differences between the two social support groups. On average, mothers with high social support were younger than those with low social support. This may be partially due to how different age groups seek out social support. For example, prior research has found that older adults sought less explicit social support, particularly instrumental social support, despite using a similar amount of implicit social support during stressful experiences (Jiang et al., 2018). Older adults were more worried about social costs than younger adults, and thus sought less explicit social support. Additionally, research has shown that

perceived social support is most strongly negatively associated with depression and loneliness at younger ages (Anderson, 2019). Thus, older adults may have underreported social support as they perhaps relied more on implicit support than younger adults, viewed social support as potentially costly, and were concerned about social implications of seeking help.

As individuals become more involved in their social networks or communities, there may be hesitancy to disclose symptoms of mood disorders. Black individuals in particular report learning early in life that mental illness is a topic to be avoided, and to keep mental health issues within the family (Alvidrez et al., 2008). Thus, there may be hesitancy to disclose symptoms to loved ones. Social responses to illness must be considered when examining the role of social support on mental health: based on one's perception of the impact of stigma, one may view their social support differently (Kondrat et al., 2018). Individuals experiencing symptoms of depression or anxiety, in this case, may expect rejection, devaluation, or discrimination upon disclosing mental health concerns (Kondrat et al., 2018). Racial and ethnic differences in the role of social support, as noted previously, are evidenced through differences in social embeddedness of Black and White Americans. As stigma varies across cultures, racial and ethnic minoritized individuals may vary in disclosing mood problems to their communities based on their involvement in these groups. Our insignificant results may be further explained by the nature of conducting research studies within the context of primary care visits. Participants may have felt rushed, not have read through the study information thoroughly, or experienced response bias. The survey consisted of a large number of questions that may have been taxing for participants to undertake, and their responses may not be as accurate as if they were to take the survey outside of their care visits (Booker et al., 2021).

Limitations

There are several limitations to consider in this study. First, the small sample size (n = 51) limited the statistical power of analyses. Due to the study's timing, which fell during the first six months of enrollment into the SBSM/HealthySteps program, there were only 58 participants enrolled before analysis and seven needed to be removed due to missing data. This yielded a low-power sample after removing missing data from participants, limiting the ability of the anal-

yses to find true effects (Button et al., 2013). Smaller sample sizes confer larger variability, as seen in our wide standard deviations. Secondly, the non-random nature of the sample limited the reliability of the study. Convenience sampling was used because mothers were screened as part of standard of care during their primary care visits, and thus the variability and bias cannot be measured or controlled (Acharya et al., 2013). The generalizability of the results is limited beyond the sample (Acharya et al., 2013). Thirdly, our assessments were made across electronic and paper surveys. Not all participants were offered the electronic mode of survey completion, as it became available after many participants had already completed pen-and-paper versions (Booker et al., 2021). Web-based surveys allow participants to complete studies in a more comfortable environment, without time constraints, and are more convenient (Booker et al., 2021). Many questions asked were of high sensitivity (e.g., mental health symptoms), which is linked to lower response rates in patient surveys, which might have been improved if the participant could have taken the survey electronically in a private space (Booker et al., 2021). Lastly, despite the advantages of the two-way ANOVA, it is important to acknowledge that this method may not be capable of including more confounders in the analysis. Our study emphasized group differences rather than predictive potential, thus factoring additional confounders into the model was beyond the scope of our current investigation. Additionally, our low Cronbach's Alpha (α = 0.378) may be attributed to our survey's small question set (total of five questions for mental health scores).

Future Directions

Despite limitations, this study highlights important areas for next steps in perinatal mental health research for Black and Latina women. Future studies must examine how racism and discrimination, on the interpersonal and systemic level, impact birth outcomes and complications in women of color, particularly Black and Latina women. Understanding the pathways by which discrimination impacts infant health, in addition to maternal outcomes, will be instrumental in reducing maternal and infant mortality. In terms of statistical analysis approaches, future research topics may consider the application of regression analysis to delve deeper into the relationships between social support, mental scores, and other confounders, particularly for predictive modeling. Such an approach

could provide a more comprehensive understanding of the factors influencing mental well-being within our target demographic. Future research should consider a more comprehensive approach to understanding mood outcomes by taking into account additional variables within a broader scope. Additionally, future studies might incorporate covariates in predictive modeling for a more comprehensive understanding of these relationships. Although we did not find a significant relationship between social support and perinatal anxiety and depression outcomes, this is still an important relationship to explore in perinatal research.

Conclusion

This study found a significant relationship between social support and both race and age, which may suggest that there are other points of intervention for similar communities. Given how contextual factors such as race, socioeconomic status, and the like intersect within health care systems, placing Black and Latina moms at a disadvantage in receiving equitable perinatal support, future studies should examine how everyday racism impacts social support and mental health outcomes. In places such as Washington, D.C., where access to adequate perinatal care is disparate, initiatives such as SBSM may improve mental health care accessibility. More research is needed on how to best examine patients' social support and mental health symptoms during primary care visits, the mechanisms by which racism and discrimination impact health outcomes, and the influence of resilience on perinatal outcomes for Black and Latina women.

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Table 1

Sociodemographic Characteristics of Participants

Baseline Characteristic	High Social Support		Low Social Support		*p*-value
	n	%	n	%	
Race					0.0498
Black	15	48	4	20	
Latina	13	42	9	45	
Other	3	10	6	30	
Education Level					0.5768
Less than high school	7	23	8	40	
High school diploma	13	42	8	40	
Some college	8	26	3	15	
College degree	3	10	1	5	
Employed	16	52	6	30	0.2180
Completed a physical exam	24	77	16	80	1.0000
Relationship status					0.6560
Married	12	39	5	25	
In a committed relationship	13	42	9	45	
In a casual relationship	2	6	1	5	
Single	4	13	5	25	
	M	SD	M	SD	
Age	28.47	4.45	35.5	5.02	0.0010

Table 2

Means, Standard Deviations, and Two-Way Analyses of Variance in Race and Social Support

	Mean Mental Health Score				Anxiety Score				Depression Score			
	M	SD	F	p	M	SD	F	p	M	SD	F	P
Race			0.73	0.49			1.36	0.27			0.31	0.73
Black	0.63	1.01			0.32	0.67			0.32	0.67		
Latina	0.41	0.96			0.23	0.69			0.18	0.39		
Other	0.33	1.00			0.00	0.00			0.33	1.00		
Social support			1.42	0.24			1.84	0.18			0.28	0.60
High	0.39	0.80			0.16	0.45			0.23	0.50		
Low	0.60	1.19			0.30	0.80			0.30	0.80		

Table 3

Relationship Between Social Support and Anxiety or Depression Scores

Logistic Parameter	High Social Support		Low Social Support		t(49)	*p*
	M	*SD*	*M*	*SD*		
Total mental health score	0.39	0.80	0.60	1.19	0.7045	0.4865
Total scores from PHQ-4	0.39	0.80	0.60	1.19	0.7045	0.4865
Self-harm score	0.00	0.00	0.00	0.00	N/A	N/A
Anxiety score	0.16	0.45	0.30	0.80	0.7045	0.4872
Depression score	0.23	0.50	0.30	0.80	0.3706	0.7137

Figure 1

Relationship Between Social Support and Mental Health Score
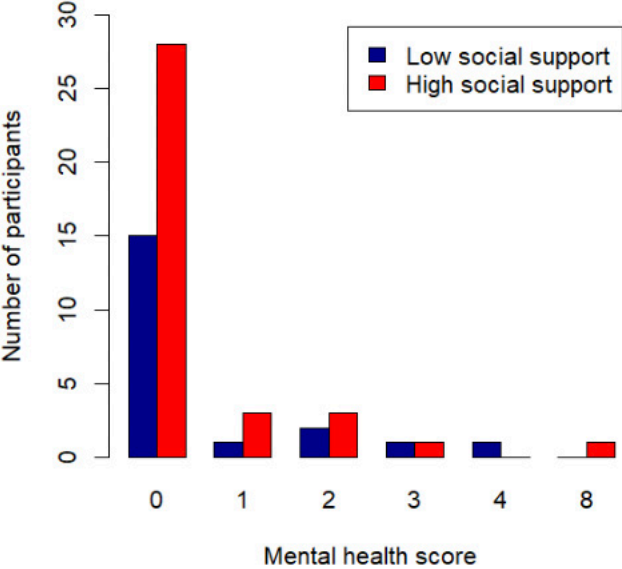
Beyond Language and Culture: A Qualitative Exploration of Mental Health Barriers for Chinese International Students Seeking Therapy in the U.S.

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This qualitative study explores the experiences and attitudes of Chinese international students in the U.S. towards psychotherapy, with an emphasis on identifying potential barriers and facilitators to their mental health treatment. Data were drawn from individual experiences of undergraduate and graduate Chinese international students who had engaged in therapy in the U.S. A grounded theory approach was employed to dissect these experiences and assess their attitudes towards psychotherapy. The grounded theory identified several themes from the students' therapeutic experiences such as: the inconsequential role of language barriers, the significant yet not prohibitive impact of cultural differences, the critical role of health insurance, the influence of therapists' professional demeanor, and the correlation between mental health knowledge and attitudes towards therapy. Interestingly, the study also unveiled an emergent theme concerning professional boundaries within therapy. These findings suggest that while language and cultural differences might not be direct obstacles to therapy, factors such as therapists' backgrounds and attitudes, insurance coverage, and accessibility can pose substantial challenges to Chinese international students seeking mental health treatment. Importantly, a heightened level of mental health knowledge was associated with more positive attitudes towards therapy. As a culmination of these findings, we formulated a triadic model emphasizing cultural understanding within the therapeutic setting, service accessibility, and mental health knowledge as key influences on the psychotherapy experiences of Chinese international students.

Keywords: psychotherapy barriers, attitudes towards treatment, mental health knowledge, Chinese international students, grounded theory

International students are individuals who enroll in educational institutions outside their country of origin (Altbach & Knight, 2007). The United States continues to be a top destination for international students, hosting 914,095 in the 2020-2021 academic year according to the Institute of International Education's Open Doors 2021 Report. Chinese students constitute the largest cohort among these, making up 34.7 percent of the total international student. Given their sizable representation, Chinese international students (CIS) bring with them unique cultural, academic, and personal experiences, creating a diverse landscape within U.S. educational institutions. Consequently, this significant demographic necessitates in-depth understanding and focus from educators and researchers, especially in addressing the unique challenges faced by this group of students.

CIS face significant mental health challenges. A recent report revealed that nearly half of these students experience moderate stress, depression, and anxiety. Shockingly, 70% have never sought mental health services. Furthermore, 40% primarily resort to emotional suppression as a coping mechanism, and one-third report having had suicidal thoughts. Of those contemplating suicide, merely 40% have reached out for mental health support. The Covid-19 pandemic intensified these problems: 60% noted a decline in their psychological health,

and 20% faced challenges accessing mental health services (The White Paper on Mental Health, 2020).

Despite the evident need for mental health support, existing research has not adequately explored the unique challenges CIS encounter when seeking mental health treatment in the U.S. Gaining insight into these barriers is critical to devise effective interventions and strategies to support their mental well-being. This study seeks to answer: What barriers do CIS face accessing and using psychotherapy services in the U.S., and how do these barriers influence their attitudes toward mental health treatment?

A comprehensive meta-analysis conducted by Jing et al. (2020) assimilates data from 3,685 pertinent journal articles published between 1900 and 2018, providing invaluable insights into the global landscape of international student studies. This extensive body of work enriches our understanding of the demographic central to our current investigation. The marked increase in articles since 2006 underscores a growing research interest in international students. Key topics covered in these articles include second-language acquisition, cultural difference and stigma, and mental health knowledge. These factors dovetail with the challenges that CIS frequently face when studying in the U.S. Not only do these barriers shape their experience as international students, but they also have potential ramifications on their

mental health. This intricate relationship further influences their attitudes towards, and engagement with, mental health treatment in a foreign setting.

Second-language Acquisition

While proficiency in the English language is often viewed as a key factor in international students' adjustment to both life and education in the U.S. (Alharbi & Smith, 2018; Park et al., 2016), many CIS still grapple with self-doubt regarding their linguistic capabilities. This persists even after they have demonstrated English fluency through various language tests for college admission. For example, in a focus group study, Chinese international graduate students identified English proficiency as a significant issue despite researchers' observations that the students expressed themselves effectively in English (Swagler & Ellis, 2003). Notably, O'Reilly et al. (2010) found that engaging with university's mental health service—which involves in-depth English conversations with a psychologist or healthcare professionals—could facilitate international students' adjustment. This finding emphasizes the dual role of second-language acquisition: facilitating not only academic and social adjustment but also accessing mental health care.

Cultural Difference and Stigma

Cultural practices between China and the U.S. are often seen as opposites on a cultural continuum, implying a maximum level of cultural distance (Hofstede, 2011; Samovar & Porter, 1997). Consequently, CIS are at a heightened risk for psychological issues (Lian & Wallace, 2018).

Hofstede's cultural framework underscores the disparities between Chinese and Western cultural norms, pointing out how these differences might shape the perspectives of CIS towards psychotherapy (Juneja, 2015). China is characterized by a large power distance, reflecting a societal structure that considerably values authority. This factor could shape how CIS perceive and interact with mental health professionals, who are often regarded as authority figures. The collectivist nature of Chinese society might also prompt students to prioritize group harmony over individual mental health issues, potentially discouraging them from seeking help (Juneja, 2015). While there are similarities between China and Western societies in terms of gender equality, China's high uncertainty avoidance index indicates a preference for adhering societal norms and expectations (Wang, 2021). This tendency might defer CIS from seeking therapy, as it can be seen as a departure from traditional values. Lastly, the long-term orientation intrinsic to Chinese culture, characterized by a focus on future outcomes, perseverance, and respect for tradition, could further impact their perceptions of therapy, making them potentially more hesitant to seek help for mental health challenges (Juneja, 2015).

In Chinese culture, mental illnesses are often linked to personality flaws, moral deficiencies, genetic anomalies, or retribution for misconduct (Shi et al., 2020). This perspective contrasts with Western views where mental illnesses are often seen as temporarily linked to challenging life events (Li et al., 2014). These contrasting belief systems between U.S. and Chinese cultures influence attitudes towards mental health help-seeking behaviors. While Western beliefs tend to promote a favorable view of mental health services, traditional Asian beliefs may deter such behaviors (Chen & Mak, 2008). Chinese cultural values, such as valuing emotional restraint, evading shame, and upholding one's reputation, could make self-disclosure and emotional expression—central to American therapeutic approaches—more challenging (Shea & Yeh, 2008). Furthermore, De Vaus et al. (2017) highlight that cultural disparities between Eastern and Western societies influence the strategies used to manage negative emotions.

The notable underuse of therapy services by CIS, despite a clear psychological need, can be attributed to cultural factors. Lu et al. (2013) posit that these students often perceive seeking mental health support as a potential source of shame and loss of esteem, especially if their engagement with such services becomes known among peers. This fear of humiliation decreases their likelihood of holding positive attitudes towards seeking help (Chen et al., 2014; Yakunina, 2011), using mental health services (Li et al., 2016), initiating discussions about personal issues (Chen & Mak, 2008), or conveying personal emotions to mental health professionals (Mak & Chen, 2006). Numerous studies emphasize that stigma linked to mental issues plays a significant role in influencing help-seeking behaviors across diverse samples (Corrigan et al., 2014; Vogel et al., 2017). As a result, it's vital to implement programs tailored to Chinese cultural perspectives on emotional distress and mental well-being (Lian et al., 2020).

Mental Health Knowledge

Mesidor and Sly (2016) found that a student's perception of available resources plays a significant role

in their intention to seek mental health services. Several studies have noted that the level of mental health awareness and knowledge about available help-seeking options within the university student community, especially among international students, is less than optimal (Lu et al., 2013; Raunic & Xenos, 2008; Shea & Yeh, 2008). Ensuring that international students are both knowledgeable about and comfortable with accessing these services is paramount (Chen et al., 2020). Institutions of higher education must proactively educate international students about the advantages of counseling services (Onabule & Boes, 2013). Yet, there is limited research investigating the determinants that influence international students' awareness of these services. This gap is noteworthy, given the crucial impact that the availability and accessibility of on-campus mental health services have on shaping students' help-seeking intentions and behaviors (Lian et al., 2020).

Study Aims

The goal of this study was to investigate the experiences, perceptions, and attitudes of CIS toward mental health, mental health treatment, and stigma in the U.S. The study aimed to answer the following questions: (1) What are the barriers CIS encounter throughout the treatment process? (2) To what extent do language or cultural differences present obstacles during treatment? (3) How can we enhance their attitudes toward mental health treatment and improve psychotherapy integration for second-language speakers?

Given the reluctance of CIS in seeking mental health help and their suboptimal utilization of such services (Lian et al., 2020), it is imperative to continuously address their mental health needs. Limited awareness about mental health and available resources within the university community might exacerbate existing psychological challenges. This study emphasizes the significance of addressing communication barriers, Chinese cultural attitudes, beliefs, and strategies to elevate mental health services awareness. By examining the factors influencing the therapy experience of CIS, this research aims to address their perceived barriers to psychotherapy and foster a more accommodating approach to utilizing mental health services.

Method

The present research adopted a qualitative design, utilizing semi-structured interviews to explore the psychotherapy experiences of CIS studying at U.S. universities. Participants included undergraduate and graduate individuals who were at least 18 years old, born and raised in China, currently studying full-time in the U.S. on an F-1 student visa as international students. These individuals had engaged in at least one psychotherapy session with a non-Chinese therapist while pursuing their education in the U.S. These individuals were reached out to through a coordinated effort between the research team and international student offices at randomly selected universities across the U.S. The international student offices facilitated the recruitment process by forwarding the recruitment email to their respective listservs of international students. The study obtained approval from Adelphi University's Institutional Review Board, with all participants provided written informed consent prior to enrollment in the study.

In the initial phase, participants were drawn from respondents to an electronic survey investigating their basic demographic details and The Mental Health Knowledge Schedule (MAKS). The MAKS is designed to assess knowledge in mental health, encompassing six stigma-related areas: help-seeking, recognition, support, employment, treatment, and recovery. Additionally, it includes six items pertaining to knowledge of mental health conditions. The MAKS uses an ordinal scale from 1 to 5 for scoring. A "Agree Strongly" with a correct statement yields a score of 5, while a "Disagree Strongly" receives a score of 1. "Don't know" responses are neutrally scored as 3. Notably, items 6, 8, and 12 are reverse-coded. The scale has an overall test-retest reliability of 0.71, as indicated by Lin's concordance statistic. Item retest reliability varies between 0.57 to 0.87, suggesting moderate to significant agreement over time. For items 1 to 6, the internal consistency, reflected by a Cronbach's α of 0.65, is moderate (Evans-Lacko et al., 2010). Sample MAKS items include: "Most people with mental health problems seek paid employment" and "Most people with mental health issues consult a healthcare professional". Given its focus, MAKS is particularly apt for our study, aiding in understanding the mental health perceptions of college students, with an emphasis on CIS.

This survey also contained an invitation for a Zoom interview, with participants providing contact details and available schedules. Eligible participants were approached via the email provided to schedule Zoom interviews. A total of

nine individuals participated in the interviews.

The interview guide was centered around the participants' mental health treatment experiences and attitudes. The participants were first asked to recall their past psychotherapy experiences. The following questions were aimed at eliciting their views on the effectiveness of treatment, perceived barriers during treatment, the impact of language and cultural differences, the necessity of psychotherapy, and future psychotherapy intentions. All interviews were conducted in Mandarin Chinese, the participants' native language, ensuring an open and comfortable space for expression.

The interviews were conducted by two research assistants (RAs) who were master-level graduate students from a psychology program. Both RAs identified as Chinese international students and were bilingual, with Mandarin Chinese as their first language and fluent English proficiency. They received rigorous training in conducting semi-structured interviews. All interviews were conducted in Mandarin Chinese, recorded (with participants' consent), anonymized, and transcribed verbatim in Chinese. To preserve the accuracy of participants' narratives, the translated English transcripts were prepared only after all coding had been completed, ensuring a faithful representation of the original Mandarin Chinese responses. Upon transcription, the original recordings were deleted.

In the analysis of our qualitative data for this study, we employed the grounded theory methodology. Grounded theory is a systematic qualitative research methodology that emphasizes generating theory from data (Glaser, 1965). We initiated our analysis process with open coding. This phase involved carefully reading the interview transcripts and assigning distinct codes to data segments representing unique concepts (Charmaz, 2006). We then proceeded with axial coding, where we sought relationships between the identified open codes, grouping them into categories based on these connections (Corbin & Strauss, 2008). For instance, if several codes related to various aspects of "language barriers" were identified during the open coding (e.g., 'misunderstanding concepts', 'difficulty expressing emotions in second language', 'struggle with cultural translation'), these could be grouped into a broader category titled "Language and Communication Challenges". This allowed us to organize themes or categories and understand their interrelationships. The subsequent stage of selective coding involved refining these categories into a theoretical framework. We identified a core category, and all other categories were related to this central theme (Glaser, 2017). Throughout the coding process, we consistently wrote memos capturing emerging ideas, potential hypotheses, and connections (Tie et al., 2019). Finally, theory development was the last stage, which culminated in an explanatory framework accounting for the identified patterns in the experiences of CIS accessing mental health services (Glaser, 2017).

It's noteworthy to mention that our analysis process was iterative. Insights gained during selective coding often necessitated a return to the data for further open or axial coding. We also employed the constant comparative method throughout the process, continuously comparing new data with prior data and codes to refine our categories (Glaser, 1965). By employing grounded theory, we ensured that our analysis was thorough, and our findings were truly reflective of our participants' experiences, thus generating a theory that is grounded in our data.

Data coding was conducted by a team of 10 RAs under the supervision of the principal investigator. Each of the RAs is a master's student currently enrolled in a U.S. psychology program, with a shared background of being CIS. This distinctive profile—native Mandarin Chinese speakers who are fluent in English, holding at least 6 years of education in the U.S., and possessing specific training in the field of psychology—equipped them with the ability to connect with the experiences of the participants on a deeper level. This shared cultural perspective facilitated their understanding and interpretation of the data, enabling them to capture subtleties that may be otherwise overlooked, and thus contributing crucial depth to the analysis.

To ensure the reliability of our coding, we utilized the concept of inter-rater reliability. Each transcript was independently coded by two RAs, and any discrepancies in their assigned codes or identified themes were resolved through discussion until consensus was reached. If necessary, the principal investigator would intervene to provide a final judgment. This rigorous process ensured that the resulting codes, categories, and themes accurately represented the participants' experiences and perspectives while minimizing potential individual biases.

Further, the principal investigator of this study was an international student from China and spent

a decade studying psychology in the U.S., bringing an essential insider perspective to the research. This shared cultural and educational background with the study participants allows for a profound understanding of their experiences, enabling nuanced interpretation of the data. The researcher's advanced psychological training further complements this cultural lens, providing robust analytical capabilities and comprehension of the psychological processes in play. Nevertheless, the shared experiences of the principal investigator and RAs as CIS in the U.S. also pose a potential for bias, as prior experiences and cultural backgrounds might influence the interpretation of the findings. To manage potential bias, reflexivity was practiced throughout the research process. This involved weekly team meetings in which the researchers reflected on and discussed their thoughts, reactions, and potential biases that might have arisen during interviews and coding. It is through this continuous self-examination that we aimed to preserve the integrity of the research and maintain a balanced and objective perspective on the participants' experiences.

Results

The following description of themes combines and summaries answers from all interviews. Table 1 provides the demographic details of the participants involved in this study. Out of the nine participants, seven were female, highlighting a significant gender skew in the sample. Age ranged between 18 to 30 years, with a majority falling within the 18-22 and 23-26 age brackets. In terms of socioeconomic status (SES), scores varied from five to seven on our scale. The students hailed from diverse locations, though there was a higher representation from New York. As for their academic details, four were graduate students while the rest were either college seniors or freshmen. The primary academic majors were psychology and social science, though biology and education were also represented. Lastly, the duration of their stay in the U.S. varied, with most having spent between two to nine years, and one participant having spent over nine years in the U.S. All participants in this study identified as Han Chinese, the dominant ethnic group in China, and their preferred language was Mandarin Chinese without any regional dialects. The participants in our study sought psychotherapy primarily due to distressing events they encountered while studying in the U.S. These experi-

ences, such as ending a romantic relationship, having conflicts with friends, or facing issues with family communication, caused feelings of depression, stress, and anxiety, which prompted their search for professional help. The therapeutic journey for all participants began within their respective university counseling centers. This set the stage for their interaction with an array of therapists, ranging from full-time professionals to interns and externs working at these centers. While these therapists had diverse ethnic and cultural backgrounds, none identified as Asian/Chinese or fluent in any Chinese language. The lack of Chinese-speaking therapists provided a unique opportunity to delve into the cultural dynamics and potential language barriers within the therapeutic context. Some participants chose to expand their mental health treatment into community resources for ongoing treatment.

Language Barrier Dissolution

Our findings suggested that language, despite not being their native tongue, did not constitute a barrier during psychotherapy for most participants. Communication between participants and their therapists, none of whom were conversant in any Chinese dialect, transpired entirely in English. This implies that mutual comprehension between client and therapist can potentially neutralize the language impediments in the treatment process:

"I don't think language is not a barrier. I think it's actually okay. I can tell my own experience in English."
"I did not perceive any language barriers. I can understand the therapist and the therapist can understand what I was talking about."

"In terms of language, I think it's okay. I came to America at a very young age and since then I use English for all communication. Sometimes I feel hard to expressed myself clearly in English, but no major communications barriers. I think it is not a big problem in psychotherapy."

"Language is not a big problem, because I have been in the United States for a long time, and now our department has no other Chinese students beside me, and there are no Chinese speakers around. Friends around me, they all speak English, I have no issues with speaking English with my therapist."

We propose that these findings may be influenced by the participants' length of residency in the U.S., a factor that could affect their language proficiency and comfort in communicating in English. Notably, all

participants in this study had resided in the U.S. for at least two years before their participation. This tenure, coupled with their academic engagement, likely necessitated substantial English language use, fostering their fluency and comfort in communication. Consequently, most participants expressed comfort and relative ease in English-mediated communication, indicating a reduced perception of language as a barrier in their psychotherapy sessions. Such findings lead us to hypothesize a potential correlation between the duration of U.S. residency and the perception of language barriers in psychotherapy. Specifically, it is plausible that a longer period of residency, and hence greater immersion in an English-speaking environment, may diminish perceived language barriers in psychotherapy. This hypothesis necessitates further exploration in future studies with larger and more diverse sample sizes.

Importance of Therapist's Characteristics in Therapy Selection and Perception

Our findings highlighted that the participants prioritized certain factors such as the therapist's therapeutic orientation, cultural background, and gender when choosing their therapists and evaluating their therapeutic experiences:

"I can't seem to work with a CBT oriented therapist. I might prefer other orientations. I think it is very important to see which orientation the therapist uses. I know which ones are suitable for me and which ones are not suitable for me."

"CBT...is more biased...I am less focused, and I am more resistant to this therapy. And then I didn't stick to it at all."

"I want an Asian therapist, someone with an oriental background. I think a therapist with the same cultural background is more useful in terms of the treatment."

"We talked about visas, and then the policy and so on. At that time, it was more difficult to talk to American therapists, they don't know much about this aspect. Ummmm, there are limitations. I prefer someone from relevant to my culture."

"Because I was more inclined to choose a female therapist at the time. And I was more inclined to find such therapists who were more experienced in psychodynamics."

"The communication feels a little bit safer with the male therapist, which is what he might have been able to do..."

Based on our participants' experiences, the characteristics of therapists, specifically therapeutic orientation, cultural background, and gender, substantially impacted their experience within psychotherapy. These factors shaped how they perceived their therapeutic relationship and, in turn, influenced their overall satisfaction and progress within the treatment.

While participants in this study expressed a preference for therapeutic orientations distinct from CBT, it is essential to recognize that efficacy of psychotherapy is not limited to a single orientation. Research has shown that both psychodynamic and CBT approaches, among others, have proven effectiveness in various settings (Driessen, 2013; Julien & Connor, 2016). The expressed preference in this study does not undermine the potential effectiveness of CBT or any other orientation. Instead, it emphasizes that therapeutic orientation is a significant factor in these participants' therapy experience and satisfaction levels. It is important to understand that the synergy between therapist and client is integral to therapeutic effectiveness. Within this synergy, aspects like therapeutic orientation, understanding of cultural backgrounds, and even therapist's gender plan a role. Therefore, these findings should not be interpreted as a general statement about the superiority or inferiority of particular therapeutic orientations, but rather as an emphasis on the significance of individual alignment in psychotherapy.

Cultural Difference: A Significant Factor, not a Barrier

Our participants largely did not perceive cultural differences as an impediment to their therapy process. Instead, they recognized it as an influential element within their therapeutic experiences. Most participants reported that having a therapist from a similar cultural background could potentially enhance the treatment experience, but they did not consider a different cultural background as an obstacle negatively impacting therapy outcome.

"Cultural differences are not a barrier, because the topic itself is not a relatively cultural specific topic."

"Although the therapist is not Chinese, they still understand what I said about discrimination."

Interestingly, some participants believed that cultural diversity within the therapeutic relationship could potentially yield more positive outcomes. They appreciated the unique perspectives that therapists of different cultural backgrounds could provide.

"Because my psychologist is an American, and they

know the American school system very well, they also gave me a lot of useful advice. Different cultures are sometimes a good thing."

"He (the therapist) has a unique world view that was not an Eastern or traditional Chinese view, but I felt that he could understand more of me."

These observations illustrate the nuanced role that cultural differences can assume in the therapeutic relationship. The findings suggest that therapists' cultural congruity with their clients might foster a deeper, immediate understanding of clients' culturally specific, thus potentially facilitating rapport building and therapeutic alliance.

Our findings also highlight that cultural differences, rather than serving as an obstacle, can enrich the therapeutic process. The intersection of diverse cultural backgrounds between the therapists and the clients can foster a milieu of exchange, introducing unique viewpoints, fresh insights, and broadened perspectives. Moreover, these cultural differences can offer clients the chance to assimilate new coping techniques not common in their native culture, bolstering their adaptability and resilience. Such results emphasize the imperative for therapists to exhibit cultural sensitivity, skillfully harnessing these differences to further therapeutic goals.

School Counseling Services: Time Limitations and Focus Concerns

Participants shared mixed feelings about their experiences with school-provided counseling services. A recurring concern revolved around the limited number of sessions offered by these services.

"There is a limit to the sessions that the school offering for each quarter. You can only see a therapist for a couple of times, which cannot be done for a long-term treatment."

"I am less interested in the school provided counseling services due to time restrictions of the sessions. I hope the schedule can be more flexible. Most of the time there are only one therapist available."

"But at that time, the school's... emm... the support for students' mental health was not very strong."

Furthermore, some participants expressed concern about what they perceived to be a disproportionate focus on suicide prevention during therapy sessions:

"I feel that the therapists from our school only care about the suicidal prevention rather than what I really want to talk about during the session."

"I personally feel that 'thoughts to hurt others' or 'suicidal thoughts' are key points during the sessions. I think because the school must focus on this."

These findings highlight potential challenges within school-provided counseling services, which could significantly influence students' therapeutic journeys and eventual outcomes. Limiting the number of therapy sessions, for example, might not fully accommodate students needing extended treatment, leading to inadequately care or unachieved therapeutic goals. While the emphasis on certain topics such as suicide prevention is essential, there is a risk of sidelining or diminishing mental health concerns that students want to discuss. Such perceptions can cause students to feel misinterpreted or overlooked, potentially affecting the therapeutic alliance. This could result in students feeling dissuaded from seeking help or continuing their therapy, thereby limiting the effectiveness of such services.

Health Insurance: A Key Player in Psychotherapy Access and Continuity

Participants unanimously emphasized the pivotal role of health insurance in their therapeutic experiences, highlighting its influence in their choices and decisions at various stages of therapy. This indicates the relevance of financial aspects when accessing mental health services, affecting both the selection of the therapist and the continuity of treatment.

"The one therapist I chose at the time was largely influenced by my insurance... Our insurance was too limited, so there was not much room for me to choose...... The first three months where I didn't have insurance, so I had to stop it (the previous treatment)."

"Insurance. They (the therapists) must take my insurance."

"I still want to try it (psychotherapy), but of course if it doesn't takes my insurance, I'd rather not go if I need to pay for the sessions."

These statements bring attention to the significant impact of health insurance coverage on accessibility to psychotherapy for CIS. Clearly, the scope of insurance coverage can influence therapist selection, possibly limiting the therapeutic options accessible to students. Moreover, the extent of insurance coverage can decide the treatment's continuity, with a lack of coverage posing a financial burden that may lead to interrupted or discontinued therapy. The fact that all participants mentioned health insurance indicates its crucial role in their psychotherapy journey,

suggesting a broader systemic issue at play. Access to affordable mental health services is a major concern, highlighting the need for policies and practices that address these financial barriers. This might involve increasing the mental health coverage provided by insurance companies, making therapy more affordable, or exploring alternative funding options that can help CIS maintain continuity in their treatment.

Therapist's Professional Boundaries

The theme of 'Therapist's Professional Boundaries' emerged in an unexpected way through our participants' accounts of their previous therapy experiences. Several of them shared instances where they perceived their therapists' behavior as unprofessional, ultimately leading to the termination of treatment.

"My therapist may not be very on time for the sessions, he is always may be 10 minutes late., but he will apologize every time."

"He (the therapist) will eat in the middle of my session, and he will drink coffee. Coffee is fine because it's like water. But I noticed he will also eat oatmeal. Oatmeal is... is like very solid food. I was surprised at the time, but I didn't say much."

"One time after I left, I forgot to take my backpack, and then I came back...my therapist was crying... and talking to other colleague because she (the therapist) thinks I treat her like an emotional trash can...Oh, I heard this accidentally...I felt embarrassed, really...I never went to any therapy after that...It feels wrong."

These incidents underscore the importance of therapists maintaining professional boundaries during therapy sessions. An infringement of these boundaries can significantly affect clients' trust, therapeutic experience, and willingness to continue treatment.

Limited Accessibility to Therapy

While all participants initially sought treatment through their respective school counseling centers—services that they accessed free of charge—their narratives painted a picture of the considerable challenges they faced as international students in accessing therapeutic services beyond these initial provisions. Furthermore, although some participants were able to continue their therapy—either via referral to community resources from their schools or through their insurance—the process was not straightforward for all.

"I discontinued the sessions because the semester was almost over. They (the school) said that it is possible to come back and continue in the second year. But it never

does."

"Yes, I thought about finding a therapist outside of the school, but it is hard to find. It was inconvenient because I do not have a car."

"School counselling is useful and inspiring for future search for psychotherapy. I want to find someone outside the school through insurance. But I do not know how to do it... and I do not think my insurance support it?"

These narratives emphasize the need to enhance the accessibility and support structures for CIS when they seek and continue therapeutic services beyond initial school counseling. The lack of easy access, as well as potential service fees, could adversely affect their mental health and overall well-being. These insights accentuate the critical role universities and related institutions play in addressing this issue to better support their international student population.

Knowledge of Mental Health Enhances Treatment Attitudes

The MAKS is designed to gauge a person's understanding of mental health conditions and awareness of related stigmas (Evans-Lacko et al., 2010). According to Evans-Lacko's work, these higher scores signify a more informed understanding of mental health, potentially including the nature of mental health conditions, recognition of symptoms, and understanding of appropriate treatments and coping strategies. Participants with higher MAKS scores exhibit a greater degree of knowledge and awareness about mental health issues. Table 2 reflects participants' MAKS scores and attitudes toward mental health treatment.

In our study, participants with higher MAKS scores generally expressed more favorable attitudes toward mental health treatment. Their responses reflected a better understanding of the therapeutic process, a greater openness to seeking and continuing therapy, and a more nuanced perspective on its potential benefits and challenges. These attitudes may stem from their higher level of mental health literacy, suggesting that knowledge can enhance individuals' attitudes towards mental health treatment, making it more likely that they seek help and engage actively in their own therapeutic process. This finding underscores the potential benefits of mental health education programs for students. By increasing students' knowledge about mental health, we may enhance their perceptions of therapy, encourage help-seeking

behavior, and ultimately improve their mental health outcomes. Further research is needed to confirm these findings and explore the most effective ways to increase mental health literacy among students.

Building on these findings, our subsequent analysis and synthesis of the data revealed a more comprehensive framework that encompassed the broader determinants influencing CIS' perception and engagement with psychotherapy. This led us to the formulation of a triadic model, which we introduce and unpack in the discussion.

Discussion

Utilizing grounded theory, our study culminated in the formulation of a triadic model titled "Cultural Understanding, Accessibility, and Mental Health Knowledge: Key Influences on Chinese International Students' Perception and Engagement in Psychotherapy." This conceptual model proposes that the triad of cultural understanding within the therapeutic setting, service accessibility, and knowledge about mental health collectively shape the psychotherapy experiences of CIS. The various themes that emerged from our analysis find resonance within this theoretical structure.

Our findings challenge traditional assumptions about cultural differences being a barrier in therapy (Leong & Kalibatseva, 2011). A recent comprehensive literature review demonstrates how culture influences mental health care in multifaceted ways, often posing considerable barriers to effective treatment (Ahad, 2023). However, the perspectives shared by our CIS participants offer an alternative viewpoint. Rather than seeing cultural differences as a barrier in therapy, they viewed them as influential *factors* that can be either beneficial or detrimental, depending on the issues addressed in sessions.

It is vital to differentiate between the notions of "barrier" and "factor" in this context. According to the American Psychological Association, a "barrier" restricts, impedes, or obstructs progress or the attainment of a goal. In contrast, a "factor" influences an outcome or holds a causal relationship with a phenomenon or event. In psychotherapy, while a "barrier" negatively impacts treatment progress or outcomes, a "factor" can be either adverse or beneficial.

This revelation aligns with the principles of Culturally Responsive Therapy (CRT), which posits that cultural differences can be harnessed as assets rather than barriers in the therapeutic process (Asnaani & Hofmann, 2012). CRT and similar approaches in multicultural therapy emphasize the significance of understanding, respecting, and integrating clients' cultural backgrounds into the therapeutic framework (Zigarelli et al., 2016). By doing so, therapists can foster a stronger alliance with clients and pave the way for more meaningful therapeutic outcomes (Lee, 2010). Recent studies further highlight the potential of cultural differences as tools for deeper understanding and richer, tailored psychotherapy experiences (Barnett & Bivings, 2002). Hence, while some view cultural differences as challenges (Edge & Lemetyinen, 2019), our findings underscore their potential as valuable tools for therapeutic transformation.

Building on the cultural understanding dimension, our participants stressed the importance of various therapist characteristics during their assessment of therapeutic experiences. These characteristics included cultural background, gender, and therapeutic orientation. A preference for non-Cognitive Behavioral Therapy (CBT) was identified in our study. This reflects a trend identified by Huang and Kirsner (2020), wherein modern Chinese individuals demonstrate an increasing openness towards psychoanalysis and psychodynamic psychotherapy as potential solutions to psychological difficulties and internal conflicts. Furthermore, our study found that students with a more sophisticated understanding of mental health treatments exhibited a preference for specific therapist genders and therapeutic orientations, a finding that aligns with prior research (Blow et al., 2008). This deepens our understanding of cultural sensitivity in the context of mental health services, highlighting its importance in fostering therapeutic relationships and facilitating meaningful treatment experiences for CIS.

Interestingly, language was not perceived as a barrier in psychotherapy for international students, a finding that contrasts with Karp and Vögele's (2016) assertion that language significantly impacts the practice and success of psychological interventions. Our participants felt capable of expressing themselves adequately and of understanding their therapists in English. In instances where they lacked the appropriate English words to express their feelings, they found alternate ways to communicate their emotions and thoughts. This contrasts sharply with several studies that emphasize the efficacy of conducting

psychotherapy in a patient's dominant language to access deeper cognitive processes (Cofresi & Gorman, 2004; Marrero et al., 2002; Shamsi et al., 2020).

However, this finding might be significantly influenced by several factors, including language development, the age at which international students arrived in the U.S., their duration of stay, and English proficiency. A prior linguistic study suggested that second language grammar-learning ability is optimally retained until approximately 17.4 years of age, after which it steadily declines (Hartshorne et al., 2018). In our study, we lack specific data on the age at which participants were exposed to a native English-speaking environment and other linguistic context details. Various factors could shape these outcomes, highlighting the need for a broader, potentially quantitative, study in future investigations.

The second crucial component of the triad shaping CIS' psychotherapy experiences is accessibility. This theme is underpinned by three sub-themes: the role of school counseling services, limited accessibility to therapy, and health insurance. According to the 2019 Annual Survey conducted by the Association for University and College Counseling Center Directors (AUCCCD), approximately 90% of counseling center directors reported a rise in students seeking services, with about 44% of college counseling centers adding staff in response (Leviness et al., 2019). College counseling centers, as primary mental health resources, are often the first point of contact for international students seeking mental health support (Lipson et al., 2022). In our study, participants identified two main concerns with school counseling center (SCC) services: (1) schools providing a limited number of sessions for international students, which could lead to suboptimal treatment outcome, and (2) a perceived overemphasis on suicide prevention in the interventions of SCCs.

Addressing the first concern regarding the optimal number of therapy sessions, a review of literature reveals varied findings on the optimal number of sessions for psychotherapy outcomes. Some studies suggest a minimum of 20 sessions are necessary for students to exhibit noticeable change (Hansen, 2002), while others indicate that bi-weekly sessions are more effective than weekly ones (Cuijpers et al., 2013). Certain research posits that the duration of psychotherapy has minimal correlation with its outcome (King, 2015). Given these varied findings, the impact

of therapy duration, intensity, and session count on both treatment outcomes and therapeutic experiences is multifaceted (De Geest & Meganck, 2019).

Most participants from our study felt the limited sessions provided by their SCC adversely impacted their therapeutic experience. However, data from the AUCCCD (2019) reveals that 54.4% of SCCs do not impose session limits on students, and 36.7% have flexible limits. Further correlational investigations are needed to fully understand the number of sessions provided by the SCC and the therapy experiences of international students.

Several participants expressed criticism regarding the second point of concern, a perceived overemphasis on suicide prevention within the interventions of SCCs. They felt that the SCCs overly focused on suicide prevention, often overshadowing their specific concerns and issues. It's essential to note the limitations of our study, as our sample size may not be sufficient to provide a definitive conclusion on this matter. However, considering the gravity of the issue, the emphasis may not be misplaced. A study by Drum et al. (2009) shows that over a 12-month period, 69% of undergraduates and 63% of graduate students reported considering suicide more than once, with a substantial number formulating specific plans or gathering materials for suicide. Research indicates that risk management strategies employed by SCCs can significantly reduce the incidence of suicide within educational settings (Paschall & Bersamin, 2018). Thus, it is crucial that SCCs maintain a vigilant focus on potential suicidal ideation, balancing this concern with addressing the diverse mental health needs of the student population.

When SCCs are unable to meet students' needs, they often turn to external resources. Due to the high costs associated with psychotherapy, most participants opted to find therapists through their health insurance (Cummings, 2015). However, this approach elicited concerns among international students, as many are unfamiliar with navigating U.S. insurance systems. As such, the onus lies with the school's mental health department to educate students about the importance of mental health and the accessibility of services both on and off campus. The development of initiatives aimed at increasing international students' understanding of available resources within their community could prove highly beneficial. Research indicates that increased accessibility to mental health

treatment promotes greater participation in mental health interventions and encourages self-help behaviors (Lattie et al., 2022). Potential interventions could include public seminars, informational outreach sessions, comprehensive resources on school websites, and the distribution of informational brochures.

In discussing the third element of the triad, mental health knowledge, we observed two clear connections: a distinct link between higher mental health knowledge and more favorable attitudes towards therapy, as well as a similar connection with attitudes towards psychotropic medication. The participants' understanding and perceptions of mental health significantly shaped their attitudes towards therapeutic interventions. It became evident that a deeper knowledge about mental health can profoundly influence an individual's attitude towards and engagement with therapeutic services and treatments.

Prior research, including a survey on CIS by Lu et al. (2013), indicates that common barriers to seeking professional mental health treatment are multifaceted including: limited knowledge of available mental health services, lack of recognition of psychological distress symptoms, and underestimation of their severity. This finding was echoed in a study by Forbes-Mewett and Sawyer (2016), revealing that international students, due to unfamiliarity with western therapeutic approaches, limited access to local medical systems and facilities (Cheng, 2020), and insufficient knowledge about available services (Skromanis et al., 2018), were less likely to use mental health services compared to their domestic peers. Our findings align with this pre-existing research. Higher mental health knowledge in our study population was associated with more positive attitudes towards mental health treatment. Students majoring in psychology or those with a greater understanding of mental health reported better experiences with the treatment process and exhibited more positive attitudes towards therapy options. These results not only offer valuable empirical evidence for clinicians working with CIS but also inspire us to consider integrating psychoeducation within and prior to the treatment process. Such an integration could potentially foster improved attitudes towards mental health treatment.

The unexpected emergence of a theme related to therapists' professional boundaries presents an intriguing dimension for future exploration and could potentially be integrated into our grounded theory with further research. Professional boundaries are fundamental to conducting therapy, significantly influencing students' treatment experiences and attitudes toward psychotherapy (Wilmots et al., 2019). Many of our participants reported instances where they perceived their therapists as unprofessional during sessions, citing behaviors such as eating during the session, leaving the door open, answering phone calls, and being overheard when discussing the client's case. While our findings might be skewed due to the limited sample size, it raises interesting questions. For example, do these situations arise due to underlying factors? Would different student populations experience the same issues? Does the nature of the session, whether remote or in-person, impact these incidents? Future research with larger sample sizes is warranted to address these intriguing questions.

To conclude, this grounded theory highlights the interplay between three factors and how they influence the psychotherapy experience for CISs. It emphasizes the need for cultural sensitivity, accessibility, and mental health education in creating a supportive and beneficial therapeutic environment for this population.

Clinical and Research Implications

Based on the findings of our current study, there are several strategies and recommendations to enhance therapeutic engagement with CIS in treatment. Grounded in our research findings, the following clinical implications are proposed:

1) Cultural Acknowledgement: Therapists should recognize the significance of a student's cultural background. Establishing a therapeutic alliance may be facilitated when therapists share a similar cultural background with the student. Rather than viewing cultural differences as barriers, therapists can see them as opportunities to better understand and connect with students.

2) Language Considerations: If mutual understanding exists between the student and therapist, language barriers may not necessarily hinder the treatment process.

3) Educational Empowerment: Encourage students to acquire additional knowledge about mental health through educational resources. This understanding can enhance their engagement in therapy.

4) Extended Mental Health Care: Many international students require more extensive mental health

care than what school counseling centers currently offer. Providing additional resources or referrals might bridge this gap.

5) Professionalism and Compassion: Therapists should offer care that extends beyond suicide prevention and always maintain professional boundaries. Conducts, such as eating during the session or leaving the door open, can impact student's therapy experience negatively.

This study serves as a small-scale exploratory qualitative investigation. To establish the generalizability of these findings, larger-scale quantitative studies will be necessary. As attitudes are known to shift over time based on experiences, future research could benefit from employing a longitudinal approach. This study underscores the potential utility of pre-therapy psychoeducation interventions to improve treatment outcomes and empower school counseling centers to cater to more students with mental health needs. Administratively, furnishing additional information about available mental health resources could potentially benefit the international student population. Further investigation into the institutional barriers obstructing Chinese international students from accessing needed mental health support could prove insightful, providing opportunities for improvements in both governmental and institutional educational policies. Future researchers might consider conducting a randomized controlled trial to examine the efficacy of combining psychoeducation with therapy for international students. Such a strategy could potentially enhance treatment outcomes and enable school counseling centers to accommodate more students requiring mental health support. Additional studies could further explore the accessibility of mental health resources for international students and identify the institutional-level hurdles preventing them from availing mental health support. Addressing these challenges could provide valuable insights for improving the mental health outcomes of international students.

Strengths and Limitations

Our study might face limitations due to its sample size and potential sampling bias. Those who volunteered might have had predominantly positive experiences with psychotherapy, making them more inclined to participate and share their insights. Such individuals might also be naturally more expressive and perhaps face fewer challenges when accessing psy-

chotherapy services, thus skewing the data towards positive experiences. Additionally, the gender imbalance in our sample due to a significant majority being female, further compounds this bias. This disparity could have influenced the results as male perspectives and experiences might be underrepresented. However, we mitigated these limitations by reaching out to as many schools as possible across the U.S., thereby including participants from diverse regions of the country. There is a risk to the validity of the findings if participants were not entirely candid in their responses. To counter this, we employed strategies like allowing participants to use preferred names and ensuring them of the anonymity of their data, reducing the inclination to provide socially desirable answers. During the interviews, we conversed with the participants in their native language to ensure their comfort in expressing their thoughts, experiences, and attitudes fully. Our coders, fluent in both Chinese and English, ensured a smooth and accurate translation and coding process.

Our study contributes to the currently sparse qualitative research focusing on the psychotherapy process, filling a significant gap. The qualitative approach also enhances the flexibility of our research, allowing participants to provide greater detail and depth to our findings, as well as contributing unique perspectives.

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Table 1

Participants' Demographic Data

	Demographic characteristic						
	Gender	Age	SES	Location	Education	Major	Year in US
1	Female	18-22	5	Indiana	College Senior	Social Science	2
2	Female	23-26	6	New York	Graduate	Psychology	9
3	Female	18-22	7	California	College Senior	Psychology	3
4	Female	27-30	6	Texas	Graduate	Psychology	9+
5	Others	18-22	7	New York	College Senior	Biology	6
6	Male	23-26	6	N/A	Graduate	Education	7
7	Female	18-22	7	New York	College Freshman	Psychology	5
8	Female	23-26	6	Wisconsin	Graduate	Biology	7
9	Female	23-26	6	New York	Graduate	Social Science	6

Table 2

Participants' MAKS Scores and Attitudes toward Mental Health Treatment

The Mental Health Knowledge Schedule (MAKS)

Participant	MAKS	Attitude (response)
1	43	"I personally I am...doubtful of therapy or the power of therapy...I have not experience therapy for longer term, so might be biased, but I don't know how effective therapy is."
2	40	"When I first started it...emm..it varies from person to person. So it is possible that this therapist is not helpful to me..."
3	42	"I will try therapy in the future... I am also interested in doing more therapy with more flexible schedule."
4	53	"So I actually experience with doing therapy both remote and in person, so therapy is a good experience for me...they still have a good influence on me...there is a therapist with such knowledge and understanding and give me perspective to understand and have a better understanding of yourself."
5	50	"I find it's very helpful. I think therapy also works as a preventive role."
6	36	"That is, I actually didn't feel particularly comfortable during therapy...It was difficult for me to accept (therapist) analysis or opinions."
7	42	"This process is slow...(therapy) is a long process. I don't know if it will be helpful or not."
8	50	"I think (therapy) is very helpful, because I myself have also taken psychology classes... I think this is very helpful."
9	51	"I feel that the therapy is useful...I feel that the therapist can understood me a little bit better when connecting our background together. I am looking for a long-term therapist now."