Social Anxiety among Canadian Undergraduate Students: An Analysis of Symptom Trends, Severity, and Experiences over the Years.

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Thesis submitted to the University of Ottawa

in partial fulfillment of the requirements for the

degree of Doctor of Philosophy in Clinical Psychology

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Faculty of Social Sciences

University of Ottawa

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ABSTRACT

Social Anxiety among Canadian Undergraduate Students: An Analysis of Symptom Trends, Severity, and Experiences over the Years.

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University of Ottawa, 2026

The two following studies sought to better understand the social anxiety experience among Canadian undergraduate students. Social anxiety (SA) is characterized by fear or anxiety in social situations that carry the potential for negative evaluation from others. People typically avoid the anxiety-inducing social interaction or endure it with distress. Not only can SA be incredibly impairing, but it is also one of the most common mental health challenges. Challenges with SA occur more among young adults than other age groups, and are therefore prevalent among undergraduate students, who must navigate numerous novel social demands. Understanding symptom severity of SA over time and symptom presentation in this population is crucial to better inform mental health resource allocation. In Study 1, I addressed claims that mental health difficulties are worsening by examining social anxiety symptom severity across time among Canadian undergraduate students. I conducted a systematic review of studies that reported SA mean scores among this population using PRISMA-P guidelines. Two independent reviewers engaged in article screening, data extraction, and quality assessment, and I ultimately included articles that were in English or French, used a Canadian sample of undergraduate students, were empirical articles or theses, included individual data sets, and reported a mean score of SA and its standard deviation with the use of a well-validated SA measure (i.e., good psychometric properties, repeatedly validated). Next, I ran a series of meta-analyses and meta-regressions based on the 149 articles found in the search using the most commonly used measures of SA according to the systematic review (Social Interaction Anxiety Scale: 26 samples; Social Phobia Scale: 19

samples; Social Phobia Inventory: 14 samples; Leibowitz Social Anxiety Scale: 7 samples). I found that the mean SA score increased significantly over time only on the Social Phobia Inventory, yielding a very small increase. Methodological factors that may have impacted these results are discussed. The findings further suggested that although SA severity does not appear to be increasing among Canadian undergraduate students, many report SA symptoms above the clinical threshold. Furthermore, the Covid-19 pandemic had significant mental health impacts worldwide. Quantitative research suggests increased social anxiety symptoms in adults during the pandemic, without a clear understanding of the experience. The unique experience of intersecting social demands of undergraduate studies and their stage of emerging adulthood, requires a more nuanced understanding of whether social anxiety is worsening, how undergraduates are coping, and how the pandemic has impacted symptoms and experiences. In Study 2, I conducted a qualitative study to gain an in-depth understanding of how socially anxious students (Social Phobia Inventory Score>15) experienced the pandemic (including lockdowns and return to in-person learning) during their undergraduate studies. Students were recruited via online ads and a pre-existing lab database. I included 14 semi-structured interviews ($\bar{x}$ age = 21.28 years, SD = 1.13; 10 women, 2 men, 2 non-binary) in the reflexive thematic analysis. The average SPIN score was above clinical threshold with more than half of participants scoring in the severe or very severe social anxiety range. Using reflexive thematic analysis, we generated 6 themes and 18 subthemes centered around social engagement, academic success, support, identity, and pandemic-related symptoms. Our findings suggest that Canadian undergraduate students are not only experiencing high levels of social anxiety symptoms, but also that the pandemic heightened these symptoms in a multitude of ways across various domains. Overall, in the last several years, Canadian undergraduate students have consistently experienced elevated social anxiety symptoms. The pandemic may have maintained or heightened these symptoms, affecting many areas of life.

While many are starting to return to pre-pandemic experiences, challenges with identity, socialization, and academics are presented in new, challenging ways. These findings highlight a population with unique needs compared to other age groups and differing demands, and who have experienced heightened distress in the wake of a pandemic. As such, we must consider how this added understanding impacts current theoretical models, clinical approaches, and use of tools (e.g., technology) at this stage of life.

ACKNOWLEDGEMENTS

I am more grateful than words could express for the support of my research supervisor, Dr. Allison Jane Ouimet. She was an unexpected bright star during such a difficult time of unexpected transitions. I came into the lab in an unconventional way, and you did everything in the world to make me feel like I belonged and like I could persist. Thank you, Allison, for not only being an excellent research supervisor, but as a mentor in parenthood. Not only did you understand and normalize how this impacted my academic journey, but you helped me as I learned how to become a mom and understood that that came before all else. Thank you.

I would like to thank my former and current committee members Dr. Andrea Ashbaugh, Dr. John Hunsley, Dr. Fanny-Alexandra Guimond, and Dr. Serena Corsini-Munt for their dedication to my thesis. Your contribution has been most valuable. I am very grateful for the expertise of Dr. John Hunsley, Dr. Veronika Huta, Dr. Michael Borenstein, and Patrick Labelle who I was able to consult with as I learned and navigated new methods and analyses. Your perspectives, teachings, and patience were appreciated and immensely helpful.

I am thankful for being part of the Cognition and Anxiety Disorders Research Laboratory and meeting so many lovely, supportive and bright individuals. Thank you to the volunteers and colleagues who took the time to support and help on this project in various ways: Tara Snyder, Jaidon MacLean, Jeremy Oueis, Yasmine Benjelloun, Alexandra Haddad, Phoenix Holt, Talia Dixon, Kayleigh Angrove, Cynthia-Maria Kanaan, and Gabbe Albert, Amelie Burla, Dani Leclair, Sasha El-Abrak Nassif, Beatriz Lima, Simon Gagne, Shaun Owen-Usher, and Noura Elmawazini. Thank you to Dalainey Drakes for consultation on methodology and openness to contribute as needed. Thank you to Shawn Sanders and Jon

Samosh for their consultation and support of the project while in the trenches with me! Very importantly, thank you to the students who participated in my study.

Thank you to Dr. Julie Desjardins for supporting me as my clinical mentor and sticking with me throughout this entire process.

To Lauren Stenason, my program bestie. I am so thankful that we met and were able to ride the waves of this program and beyond together during some of the most important times in our lives.

To my parents who always believed in me and listened through the self-questioning, overwhelm and excitement of it all.

Thank you, Nolan, for supporting me in every step of my career and this journey. You agreed to "us" before you had a clear picture of what this would look like. It hasn't always made our lives easy and your belief in me has carried me through. Thank you for being my partner in life and for becoming the father to our children through it all. I love you always.

Pacey and Linden, I hope you always follow your dreams, as you held my hand and guided me through all of mine. You are my greatest accomplishments. I love you. You are everything.

DEDICATION

I dedicate this thesis to my mom who always said I could do anything I dreamed of. Who believed in me when I didn't believe in myself. Who has always been my person. And who is the strongest person I have ever known, in ways I will never fully understand. Love you more.

CONTRIBUTION OF AUTHORS

The dissertation outlined in this document comprises two manuscripts:

Study 1 (Chapter 2): Clow, K.-A., Gardam, O., & Ouimet, A. J. (2026). Are Social Anxiety Experiences Among Canadian Undergraduate Students on the Rise? A Systematic Review, Meta-Analysis, and Metaregression. *Canadian Psychology / Psychologie Canadienne*, *67*(3), 252–269. https://doi.org/10.1037/cap0000410

Study 2 (Chapter 4): Clow, K.-A., MacLean, J., & Ouimet, A.J. In depth analysis of social anxiety experiences among undergraduate students during and after the pandemic

I developed the concepts for both studies in collaboration with my research supervisor, Dr. Allison J. Ouimet. This process included creating the research plan, conducting literature reviews, planning the methodologies and data analyses plans, and writing the initial thesis proposal. I received feedback from my committee at the time (Dr. Andrea Ashbaugh, Dr. John Hunsley, and Dr. Fanny-Alexandra Guimond) during the initial dissertation proposal and during consultation for Studies 1 and 2. Dr. Serena Corsini-Munt replaced Dr. Guimond at the pre-read stage for administrative-related reasons and joined Dr. Ashbaugh and Dr. Hunsley to provide feedback on the pre-read of the final dissertation. I was responsible for study development, coding all interview data, submitting ethics, developing the semi-structured interview, contacting and interviewing participants, data preparation and analysis, consultations on methodology and analyses, and the writing of the initial draft of this thesis. I also oversaw all research assistants and their training and wrote both manuscripts in their entirety.

For study 1, Olivia Gardam (co-author and research assistant) contributed significantly to data collection, including the initial search, uploading of articles, and abstract and full-text screening. She helped train additional screeners, reviewed the literature on the population of interest, consulted on methodologies and coding manuals, and contributed to revisions of the submitted manuscript. Research assistants Tara Snyder, Jaidon MacLean, Jeremy Oueis, Yasmine Benjelloun, Alexandra Haddad, Shawn Sanders, Amelie Burla, Dani Leclair, and Noura Elmawazini all contributed to article screening and some formatting of documents. I received consultation with Dr. John Hunsley, Dr. Veronika Huta, and Dr. Michael Borenstein to enhance my understanding of the required statistical analyses.

For study 2, Jaidon MacLean (co-author and research assistant) contributed to drafting the ethics proposal and its revisions, organizing the data, developing and managing recruitment material, and exporting and organizing Qualtrics data. Research assistants Phoenix Holt, Talia Dixon, Kayleigh Angrove, Cynthia-Maria Kanaan, and Gabbe Albert contributed to the transcription of participant interviews. Sasha El-Abrak Nassif (research assistant) contributed to the organization of codes and quotes, and some formatting. Beatriz Lima (research assistant) contributed by creating tables of data. Shaun Owen-Usher and Simon Gagné (research assistants) contributed to formatting and mild revisions of the thesis document. Please note all study contributors are mentioned in the acknowledgement section.

Both manuscripts described were submitted for anonymous peer review, with one published in *Canadian Psychology*. The two manuscripts are very similar to those found in Chapters 2 and 4 of the thesis. However, some revisions were made in the first study based on pre-read and post-defense feedback from the dissertation committee. Moreover, some of the information in supplementary materials of the articles (which were included as appendices) were added to the main text for ease of reading. For instance, my justification for

using percent agreement and for using a random effects model in my meta-analysis was relocated to the methods section of the main document, rather than included as an appendix.

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CHAPTER ONE:

GENERAL INTRODUCTION

Social anxiety is a well-understood and common mental health challenge. Most individuals with social anxiety disorder will develop some symptoms by their emerging adulthood years (e.g., Leigh and Clark, 2018). What remains to be understood is how the patterns of symptom severity among this population have changed over time, especially given concerns regarding increasing mental health problems. Catastrophic statements are being made about mental health and anxiety symptoms increasing substantially in the population, particularly among young people (McMaster, 2020; Tucci & Moukaddam, 2017; Young, 2024). This outcry elicits fear in the community as well as uncertainty about how to manage resources accordingly. Although concerns around anxiety symptoms persist, research has focused more on capturing rates of depression and experienced distress than any other mental health challenges (Richter et al., 2019). There are various types of data to support these claims, however these data tend to range across disorders, examine short timeframes or over-interpret scores on certain measures (e.g., Duffy et al., 2019; Goodwin et al., 2020; Odega et al., 2025). Moreover, although some findings contribute to our understanding of anxiety over time, they typically do not address specific types of anxiety symptoms (e.g., Parodi et al., 2022). Indeed, changes across time in anxiety disorder classification can complicate interpretation of research findings. There is a need to understand patterns of anxiety in the population, particularly with more common mental health problems like social anxiety. Meta-analysis and meta-regression offer an opportunity to examine these scores over the course of many years and across many studies to better understand the pattern of symptom severity. It is crucial to understand how social anxiety symptoms have changed over time to better identify current challenges, determine needs, and inform resource allocation.

Although terms such as anxiety epidemics, crises, and increases appear across media reports, the defined focus of the concern remains unclear. Whereas some authors describe increasing anxiety disorder rates or prevalence, others fail to clarify the type of increase to which they are referring. Thus, prior to describing the details of this dissertation, it is important to clearly define what is being measured and how this measurement differs from other important types of data. In Study 1 specifically, I evaluated how symptom severity has changed over time. Specifically, I assessed mean scores on questionnaires, which include items related to the number of symptoms, associated distress, and impact on functioning, which can sometimes predict whether a set of reported symptoms meet diagnostic criteria (Zimmerman et al., 2019). Epidemiologically speaking, incidence refers to the frequency of new cases of a disorder, rates refer to how quickly new cases arise, and prevalence refers to the proportion or percentage of a population that has a particular disorder at a specific time (Spronk et al., 2019). Thus, our current analysis cannot determine the prevalence, rate, or incidence of social anxiety, but rather aims to characterize the pattern of symptom severity over the decades.

Moreover, when examining social anxiety (SA) symptom trajectory in the last 2-3 decades, it is important to consider how the COVID-19 pandemic impacted symptom presentations. Unsurprisingly, there are numerous quantitative studies that support increasing difficulties with psychopathology during the pandemic often related to social restriction severity, pre-pandemic mental health, institutional support, and loneliness (Kauhanen et al., 2023; Kindred & Bates, 2023; Legros & Boyraz, 2025). A richer understanding of how socially anxious emerging adults experienced their undergraduate studies before and after the pandemic informs how we currently understand and treat social anxiety, as well as the academic and social needs of current undergraduates.

The goal of the two studies that comprise this dissertation was to determine how social anxiety symptoms have presented over time in Canadian undergraduate students and to further understand how those symptoms impacted young people during this stage of life during a pandemic. I elected to examine social anxiety symptoms in undergraduate students to better understand how some of the most common mental health symptoms are impacting young people. Given that undergraduate populations largely comprise emerging adults who are often able to participate in research, studying patterns of symptoms in this population allows for more accessible data over several years while also clarifying the significant statements around worsening mental health. The following two studies sought to better understand social anxiety experiences among a sample of Canadian undergraduate students, and in what way the pandemic did or did not impact those experiences.

Study 1 examines the pattern of social anxiety symptom severity over time among this population via a systematic review, meta-analysis, and meta-regression. We collected the earliest available data up until 2021 because of the potential confounding impact of the pandemic on symptom severity. Although quantitative methods are appropriate and useful in understanding the relation between time and symptom severity, along with the impact of symptoms on functioning, qualitative methods can provide further understanding of the mechanisms by which social anxiety can change across time. Therefore, in Study 2, I conducted a qualitative study to understand the lived experience of socially anxious undergraduate students, and to examine how these presentations were impacted during and after the pandemic. I wanted to explore what obstacles or supports developed from the pandemic during this difficult and vulnerable developmental stage. Overall, I examine how the findings from my dissertation studies reflect current cognitive-behavioural models (see section on theoretical understanding of SA), where adaptation may be needed, and how those adaptations may influence clinical and other applied implications.

Literature Review

Anxiety disorders have the highest prevalence of all mental health disorders, with social anxiety disorder (SAD) as the most common (Salari et al., 2024). Anxiety disorders include a range of diagnoses characterized by excessive and disproportionate anxiety, fear, or worry that persists over time, are focused on imminent or future threats, and often result in avoidance of the anxiety-provoking situation. Specific anxiety disorders are distinguished by the nature of these fears, and they are frequently comorbid with others (APA, 2022). Over the years, and across many versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM; APA, 2022), anxiety disorder diagnostic criteria and categorization have changed. For instance, obsessive-compulsive disorder and post-traumatic stress disorder were classified as anxiety disorders in the DSM-IV (APA, 1994). In the current version, the DSM-5-TR (APA, 2022), however, those disorders are now classified within other categories. Other disorders, such as social anxiety disorder (SAD), have remained categorized as anxiety disorders, but with modifications to criteria such as symptoms and duration. Despite having clear diagnostic criteria, the changing changing criteria in manual updates can complicate the evaluation of disorders over time, impacting the way in which the disorder is classified and identified among the population.

Social anxiety (SA) symptoms are characterized by an intense fear or discomfort in social situations. Symptoms of SA are common; with many experiencing anxiety at some point in their life during a social situation (Ruscio, 2010). Social anxiety-inducing situations include speaking with authority figures, eating in public or public speaking, among many others. Social anxiety is therefore believed to exist along a spectrum of severity, where subthreshold levels also cause discomfort and impairment (Fehm et al., 2007). Indeed, Hofmann and Roth (1996) raised questions around the accuracy of studies comparing people

with social anxiety to those in a control group, given their own findings that control participants reported subclinical symptoms of social anxiety.

Distinguishing symptoms vs normative experiences of social anxiety is challenging, especially for highly common experiences that can be distressing and impairing. For example, perimenopause and menopause symptoms are considered part of a normative developmental transition; however, the experience can be highly distressing and impairing for some (Arar & Erbil, 2023). A key consideration relates to how to balance missing important experiences that may require clinical care with avoiding pathologizing normative developmental experiences. Indeed, Xiao et al. (2023) noted increasing pathologizing language over time when discussing mental health, and Horwitz and Wakefield (2012) indicated that misdiagnosis of adaptive anxiety presentations is common. Moreover, symptoms as a concept is not clearly defined in most diagnostic manuals but typically requires levels of describing distress and impairment (Phillips, 2009). Although SA symptoms discussed are a common experience within emerging adulthood, they may also signal a change of state that can develop without a specific trigger, they often lead to discomfort, distress, or impairment, and they can lead to longstanding challenges without treatment. Thus, I chose to use the term “symptoms” to describe what may also be normative in the context of this dissertation.

Symptoms of SA are characterized as a disorder when the level of distress or avoidance reaches a particularly high threshold of intensity and frequency. According to the DSM-5-TR, SAD is diagnosed when 1) there is an intense fear or anxiety about one or many social situations, 2) the fear is out of proportion to the situation, 3) the person feels they will be negatively evaluated in the social context, 4) the situation almost always provokes fear, 5) the situations are avoided or lead to extreme distress, 6) the fear or avoidance has been

present for at least 6 months, and 6) causes clinically significant distress or impairment in areas of functioning (American Psychiatric Association, 2022).

Social anxiety typically emerges in adolescence or early adulthood (APA, 2022). Over 80% of people diagnosed with SAD experience symptom onset by age 20 years (Stein & Stein, 2008) with 14% of males and 12% of females experiencing SAD at some point in their lifetime (Kessler et al., 2012). SAD has a chronic course when untreated, with the lowest probability of remission of all anxiety disorders (Bruce et al., 2005). It can be recurring and impact many areas of quality of life such as relationships and employment (Keller, 2006; Lochner et al., 2003). Individuals with SAD are more likely to experience comorbidities, most often depression or other anxiety disorders, than those with other mental health diagnoses. Some research findings suggest that SAD often precedes other comorbidities, implying that SA can be a risk factor for other mental health problems over time (Fehm et al., 2007). For instance, SAD is the only anxiety disorder that leads to an increased risk of an alcohol use disorder, likely in part due to its frequent use as a safety behaviour in social contexts (Rosenström & Torvik, 2023). Rates of treatment seeking for SAD are generally low (Patel et al., 2022), with a delay of over 15 years for seeking treatment from time of onset (Ertekin et al., 2015).

Theoretical Understanding of Social Anxiety

A solid theoretical foundation for social anxiety has been established over the years to understand the mechanisms underlying the behaviours and to inform treatment. The Biopsychosocial model posits that SAD develops from many contributing factors (and thus necessary treatment targets) that include biological, psychological, and social factors (Jokinen & Hartshorne, 2022). Biologically, individuals are born with a set of vulnerabilities that include their genetics and neurochemistry. Psychosocial vulnerabilities include the impact of early childhood experiences such as traumatic events, negative peer relations, or

socioeconomic status, on the way one sees the world. Although many factors that lead to later SA symptoms occur early in life, other unpredictable or impactful events (e.g., COVID pandemic, traumatic events) may have specific impacts on mental health, and specifically social anxiety among certain populations (e.g., adolescents, undergraduate students; Rosellini et al., 2013).

Evolutionarily speaking, social anxiety was likely an important mechanism that protected our ancestors from each other (Gilbert, 2001). This fear may have helped people cope with threats from other humans, enabling them to develop an adaptive "alert system" to ensure the protection of their resources and themselves (Gilbert, 2001). Worrying or avoiding social interaction served an important purpose of circumventing conflicts, danger, or risk of being excluded from a group. Although evolutionary theory helps us understand how social anxiety was, at one time, an adaptive strategy, unwarranted fear in environments when risk is low is no longer adaptive and can become harmful. This perspective can help us understand why many people report feeling anxious in social situations (Furmark, 2002; Jefferies & Ungar, 2020; Purdon et al., 2001); sometimes this anxiety causes little to no impairment and can be helpful in terms of motivating effort, but at other times it can be extremely debilitating.

Several theoretical models have been developed to explain persistent social anxiety symptoms (e.g., self-determination, interpersonal, psychodynamic). Cognitive-behavioural (CBT) models have been described as the gold standard approach to SA treatment based on the large body of evidence supporting its theoretical plausibility and treatment efficacy (Mayo-Wilson et al., 2014). Indeed, much of our understanding about the development and persistence of social anxiety operates through the lens of CBT models (Clark & Wells, 1995; Moscovitch, 2009; Rapee & Heimberg, 1997). Although theoretically similar, each CBT model has important distinctions. For example, Clark and Wells (1995) posit that individuals

with SA shift their attention inward with an observer-focused perspective in social situations, whereas Rapee and Heimberg (1997) posit that they divide their attention between both internal (as in Clark and Wells) and external cues, such as from others. Unlike other models, Moscovitch (2009) argues that an individual's fear is not centered on negative judgement from others but rather the risk of a self-perceived flaw or inability being exposed (and therefore validated). CBT models were initially developed to explain adult presentations of SA, though given SA's age of onset, researchers have since elaborated on how it applies to adolescents (e.g., Leigh & Clark, 2018; Ranta et al., 2014). Leigh and Clark (2018) propose that a developmentally sensitive use of the model can also contribute to effective treatment in adolescence.

Through this lens, social anxiety occurs in situations where people perceive that social evaluation is possible and expect others to be highly critical, while believing that meeting others' expectations is unattainable (Moscovitch, 2009). People with SA perceive flaws within themselves, which leads to fears of judgement and negative evaluation from others if the flaws are exposed, and ultimately the development of SA symptoms. Cognitive-Behavioural theory proposes the interconnection between thoughts, feelings, and behaviours (Greenberger & Padeskey, 1995). A situation elicits thoughts that lead to feelings and bodily sensations, and in turn, result in an action or behavioural response. The behavioural response reaffirms the thoughts and feelings experienced in the moment, often referred to as a feedback loop. When the thoughts experienced are maladaptive or unhelpful, this feedback loop can then lead to the maintenance of negative thinking patterns and unhelpful behaviours (Clark & Wells, 1995). In the case of social anxiety, one may experience maladaptive thoughts associated with fears of judgement or possible rejection (Rapee & Heimberg, 1997). Because these thoughts elicit feelings of anxiety or discomfort, the person engages in behaviours that may minimize the discomfort experienced. These behaviours can include

avoidance of the situation that elicits challenging thoughts and feelings, isolation to avoid any negative feedback about their discomfort, increased reactivity as a means to protect the self, or the use of safety behaviours (e.g., safety person, avoiding eye contact, rehearsing a script) in attempt to manage symptoms (Rapee & Heimberg, 1997). Post-event processing often occurs after more ambiguous interactions whereby people will mentally review the interaction in detail and often with negative perceptions (Clark & Wells, 1995). This type of cognitive processing then impacts future interactions, where people's thoughts focus on past perceived negative experiences, further maintaining their SA symptoms.

Safety behaviours exist as an important maintaining factor across CBT models. People frequently use safety behaviours (McManus et al., 2008) to stop or reduce negative outcomes that could arise from feared social situations, such as negative evaluation. People use safety behaviours widely because they create a sense of "safety", however they typically maintain or worsen SA symptoms. Safety behaviours fall under two categories: Impression management and Avoidance (Hirsch et al., 2004). These behaviours can include, but are not limited to, avoiding a situation, reducing eye contact, sticking with a person that feels safe, wearing headphones in public, or using a substance to cope in social situations. Safety behaviours, ironically, increase awareness and social discomfort regarding any possible social threats and prevent the individual from challenging their anxiety-inducing maladaptive thoughts (Evans et al., 2021; Gray et al., 2019). Safety behaviours can also produce the feared outcome itself, by making people appear 'standoffish' or disinterested, thus reducing social engagement and inclusion, further confirming their predictions (Evans et al., 2021). These patterns of behaviour may be particularly relevant in the context of increased novel social demands, such as when young people establish more independence.

Undergraduate Students and Social Anxiety

Erikson's Psychosocial Development Theory (1963) originally posited that identity developed throughout adolescence in stage 5 of his theory, *Identity versus Role Confusion*, wherein teenagers explore their own values and goals to establish a sense of self. After *Identity versus Role Confusion* comes *Intimacy versus Isolation* wherein adults develop and work to maintain intimate friendships and partnerships. Montgomery and Arnett (2015) estimate that based on Erikson's description, the focus on forming relationships takes place at about 20-40 years.

The stages of development suggested by Erikson were sequential, based on the various influences one experiences in their lifetime. Although it was once believed that people developed their sense of self in adolescence, followed by a significant influence and desire to form social relationships in the first phase of adulthood, there has been a shift in this understanding. Society and its demands present very differently than they did at the time his theory was developed. Today, developmental challenges present at a slower pace; identities have opportunity to explore and develop well into young adulthood and often coincide with the development of new relationships (Montgomery & Arnett, 2015).

A newer theory, proposed by Arnett (2000) coined the term "Emerging adulthood" to describe a distinct stage of development. Arnett (2000) suggests that emerging adulthood is a period of life between the ages of 18-25 years vital to identity exploration, which involves the task of making crucial life decisions in all areas of life based on what opportunities are available. Arnett (2000) highlights that this is a period of instability, wherein relationships and work undergo frequent and rapid changes. It is a unique time point when individuals are no longer dependent children but often have yet to face deeper commitments and responsibilities. Emerging adults face an unprecedented set of life experiences (Arnett, 2024). Indeed, industrialization in developed societies and cultures has created a shift in expected roles, and major life events have become delayed (Arnett, 2011). Arnett et al. (2024)

proposed five features that comprise the stage of emerging adulthood: 1) identity exploration, 2) instability, 3) self-focus, 4) feeling in-between, and 5) possibilities and optimism. Some of these features may play a significant role in social interactions and experiences given the interplay between how people view themselves and how they engage with others.

In the most recent report, the mean age of undergraduate Canadian students was 22.8 years, falling in the emerging adult stage of development (Statistics Canada 2007). In 2024/2025, 49% of the general public aged 18-24 years of age in Canada participated in post-secondary education (Statistics Canada, 2025). Arnett (2024) describes what he calls the "age of possibilities" which tends to occur alongside the identity exploration stage. This term captures the optimism and high expectations that things (e.g., career, financial stability, romantic relationships) will work out positively, particularly for those in higher education. Many emerging adults who engage in undergraduate studies are anticipating possibilities without yet having responsibilities and limitations. Emerging adults may go into university settings with a particular image of "university life", which typically involves socializing, increased independence, and positive experiences. Many emerging adults begin university anticipating a particular level of success upon completion of their degree.

The age range of emerging adults falls not only within the average age of undergraduate students, but also after most would experience the onset of SAD. Psychopathology appears to impact notable areas of life such as relationships and identity development (American Psychiatric Association, 2022). Galambos et al. (2006) found that depression symptoms and self-esteem challenges appeared to improve throughout the emerging adult phase. Yet, researchers have identified the worst levels of adjustment among emerging adults who were shy or anxious (Barry et al., 2013). Barry et al. (2013) also highlighted a need to better understand reasons for social withdrawal among emerging adults. It is common for students' academic path to change during their undergraduate studies,

possibly impacting their mental health and well-being (Arnett, 2024). Although these changes may be driven by shifting interests, students' change in program trajectory may alternatively reflect safety behaviour use, attempts to accommodate their SA symptoms, or avoidance, particularly in courses that require public or social engagement as a form of evaluation. Both American and Canadian studies have found associations between psychopathology and academic failure and prematurely leaving school (Kessler et al., 1995; Stein & Kean, 2000), highlighting the need to better understand mental health challenges among this demographic to improve long-term outcomes.

Although studying mental health problems broadly among undergraduate students is important to understand well-being and possible needs, it is also vital to focus on specific mental health problems to inform targeted prevention and intervention programs. As such, I chose to examine the social anxiety experience among undergraduate students specifically for several reasons. First, SA is the most common anxiety disorder, and one of the most common mental health disorders among young people (Fehm et al., 2005); understanding its nuances could thus have wide reaching positive effects. Second, University exposes young people to very specific social tasks where they are expected to learn to navigate and balance academic performance (including social expectations), building connections with the campus community, and engaging in personal development (e.g., often first exposure to independence and managing several responsibilities). Third, although many disorders may disrupt normal development in emerging adulthood, social anxiety among this group is particularly relevant in our understanding of young undergraduate students based on age of onset intersecting with identity development and social demands. However, not all emerging adults go to university. The participation rate of young adults in post-secondary education is rising, with about 49% of emerging adults attending (Statistics Canada, 2025). I focused specifically on emerging adults in undergraduate programs; thus, my findings cannot extend to emerging adults who

do not engage in undergraduate programs. Indeed, young adults who have severe SA may avoid attending university altogether to avoid the multitude of social demands the university setting is commonly associated with (Jystad et al., 2024). If SA symptoms and severity have changed in recent decades, understanding the factors that contribute to impairment and academic challenges will be important to support the growing number of students in post-secondary institutions.

It is thus vital to explore to what degree mental health challenges impact the experience of university life among emerging adults. There are well-established models of social anxiety that have been applied to various populations. These models rest heavily on one's maladaptive beliefs about themselves and their abilities (e.g., Clark & Wells, 1995; Moscovitch, 2009, Rapee & Heimberg, 1997). The social pressures and expectations (e.g., living in residence, large classrooms, public cafeteria) associated with university institutions may impose unique challenges and experiences for those who experience social anxiety. Strict pandemic restrictions on campus limited students from interacting in residence and in social settings (e.g., cafeteria), reduced or removed social events that promote connection, and changed the mechanism by which young people were able to communicate (e.g., discussion groups, email) (Sahu, 2020). The way the pandemic disrupted this crucial stage of development must be understood to better support our young adults. My dissertation's first study focuses on patterns of symptom severity prior to the pandemic, given that scores recorded during the pandemic would be an important statistical confound. However, because the pandemic had such an influence on mental health (e.g., Santomaura et al., 2021), the second study set out to understand how undergraduates' social anxiety was impacted during and after the pandemic.

The Role of Technology in Social Anxiety

As we continue to understand social anxiety and its pattern across various populations, we are also faced with many other societal influences that have undoubtedly played a role in how SA is understood, impacted, and treated. With many of these findings coming from North America, recent research findings emphasize the role of technology on mental health. This evolution is particularly important given large-scale technology use increases during the pandemic (Wavrock et al., 2022). Technology use has been found to impact sleep quality (Small et al., 2020), which can impact mental health. In a review examining the technological impact on adolescent well-being, Dienlin and Johannes (2020) found that both low and frequent use were related to decreased well-being, but that more moderate use was related to an increase in well-being. A more recent study examining adolescents found that screen use increased challenges with depression and anxiety symptoms (Zablotsky et al., 2025). To date, there is limited literature related to technology use and social anxiety specifically. However, based on our theoretical understanding of social anxiety, we might expect technology use to function as an avoidant safety behaviour (e.g., playing on a phone at a party, communicating primarily by text rather than in person), potentially maintaining or increasing symptoms (Hansen et al., 2024). Beyond technology use, young people increasingly use social media, which can impact mood, anxiety, and self-esteem given the vast amount of information at their disposal (Khalaf et al., 2023; Sadagheyani & Tatari, 2020; Saleem et al., 2024; Shannon et al., 2022). If social media and technology negatively impact young people, an increase in SA symptoms concomitant with increased technology use is plausible. Alternatively, social media may allow for a simpler and more widespread mechanism to share personal challenges, in turn affecting the perception of increased rates of mental health challenges.

Technology also has considerable benefits for mental health treatment and support. Since the pandemic, teletherapy has become a mainstream way of delivering therapeutic

services. Research findings highlight that teletherapy increases access to services for individuals who may not otherwise receive support, makes scheduling appointments more manageable, and creates solutions for other traditional barriers (Wolitzky-Taylor & LeBeau, 2023). A meta-analysis found that teletherapy can produce treatment outcomes comparable to in-person treatment (Lin et al., 2022), though it also showed greater attrition rates. Technology is being used in a range of ways to treat SA-related symptoms. For instance, virtual reality is increasingly used to successfully treat symptoms (Tan et al., 2025), as well as to face challenges with public speaking (Yuen et al., 2019).

Regardless of the benefits and risks, emerging adults rely heavily on technology in the context of work, school, and social interactions. Internet and social media use continues to increase, with a particularly large increase in reported use during the pandemic (Rouleau et al., 2023; Wavrock et al., 2022). The pandemic essentially forced undergraduate students to rely even more heavily on technology to access education. It is important that we understand how the increased usage, along with being used as the only method to learn and communicate with others, impacted undergraduate students academically, socially, and emotionally.

The Pandemic and Undergraduate Students

A global pandemic was declared by the World Health Organization in 2020 that led to a series of physical and social restrictions (World Health Organization [WHO], 2020). The Covid pandemic had a significant impact on people and industries worldwide. Moreover, it impacted people's social engagement and well-being (Gabet et al., 2023; Montero-Marin et al., 2023) and specifically affected those with pre-existing mental health challenges (Lewis et al., 2022). Growing evidence emphasizes the role the pandemic played in people's mental health (Liyanage et al., 2021; Santomaura et al., 2021) though few address social anxiety specifically (Kindred & Bates, 2023).

The pandemic greatly impacted academic institutions in a variety of ways. Universities had to face challenges with faculty adapting to the use of technology and teaching on a virtual platform, alongside insufficient infrastructure and resources (Sahu, 2020). Students were expected to shift all aspects of their lives to follow enforced restrictions while maintaining their education through a completely new approach to learning. Studies that explored the pandemic's impact on undergraduate students documented increased mental health challenges (Russell et al., 2024; Zarowski et al., 2024). Undergraduate students with social anxiety (SA) reported challenges in communicating with instructors, presentations, student experiences and social skills, attention, and social-emotional functioning (e.g., Archbell & Coplan, 2022; Russell & Topham, 2012). With these pre-existing challenges and tight restrictions on social opportunities, alongside a change to e-learning, socially anxious students were at a heightened mental health risk.

Given that emerging adulthood is a crucial time for identity exploration, the pandemic likely interfered with this development, with potential longstanding impacts. Indeed, in quantitative studies, community participants who were socially anxious pre-pandemic reported increased loneliness during the pandemic (Ho & Moscovitch, 2022). Student populations also reported not seeking support from the university during the pandemic when in need (Legros & Boyraz, 2025). CBT models of SA might predict that more social isolation and time at home could increase student knowledge and grades given a reduction in required social contact and thus in social anxiety symptoms. Moreover, we might expect that young people with social anxiety would feel relief from the reduced social demands of university life, despite the negative impact on their SA symptoms long term. Although several quantitative studies have described the pandemic's negative impact on mental health and the university experience (Cielo et al., 2021; Kindred & Bates, 2023; Legros & Boyraz, 2025), we continue to lack a nuanced understanding of undergraduate students' lived experience of

the pandemic with respect to social anxiety, supporting a qualitative approach to complement existing quantitative evidence. Whether using a quantitative or qualitative approach, the way we measure social anxiety is crucial to how we interpret findings and understand patterns of symptoms.

Quantitative Methods to Understanding Social Anxiety

Understanding symptom rates and severity is a crucial part of research and clinical practice. Understanding the rate or prevalence of symptoms of a disorder enables us to better understand the phenomenology of a disorder and to ensure proper resource allotment and clinical care. There are diverse ways to measure symptoms and other psychopathological characteristics. However, many instruments and approaches to clinical assessment are not supported by empirical evidence, leading to significant concern around the accuracy of reported findings (Hunsley & Mash, 2007). Proper selection of an assessment tool with strong psychometric properties is essential to research quality, both in terms of construct validity and accurate interpretation.

There may be benefits to having multiple measures for a single disorder or set of symptoms. For example, assessing cognitive, behavioural, and emotional components of social anxiety via separate questionnaires may enable researchers to determine the main contributing factors to specific symptoms. However, diverse foci across independent measures may also lead to complications, including confusion about whether a measure assesses symptoms or diagnostic categories, and potential for a selected measure targeting something other than the stated research goal. For instance, the Fear of Negative Evaluation Scale measures a fear that is often relevant to social anxiety, but sometimes is used to measure social anxiety broadly, which can lead to the misinterpretation of findings (e.g., Brewer et al., 2024).

Whether in a research or clinical capacity, professionals using quantitative measures to assess a clinical construct must ensure they evaluate up-to-date psychometric information, which includes population-based normative data and cut-off score criteria for meaningful interpretation (Eignor, 2013). Hunsley and Mash (2008) developed guidelines to evaluate the appropriateness of a measure. These guidelines include evaluating norms, internal consistency, inter-rater reliability, test-retest reliability, content and construct validity, validity generalization, sensitivity to treatment, and clinical utility. When measuring a construct like social anxiety, one must consider the various dimensions and symptom presentations of the disorder. It is particularly important to consider the population from which normative data were derived when selecting a measure (Hunsley & Mash, 2008). Normative data were developed to ensure that results of a measure could be generalized to a population beyond their sample, by comparing the respondent's score to similar others (Achenbach, 2001). If we use a measure to assess a construct among individuals from a population within which the measure has not been normed, we cannot accurately interpret individuals' scores. This challenge further extends to other constructs such as socioeconomic status, cultural background, and other important factors such as possible neurodivergence.

Self-report measures also frequently use cut-off scores to categorize respondents as having a diagnosis or a specific certainty level. Cut-off scores act as a benchmark for possible clinical significance and the severity at which someone is experiencing symptoms. Cut-off scores are not absolute, in that researchers and clinicians must use their judgement to understand scores that may fall slightly over or under a highlighted cut-off (Purgato & Barbui, 2013). There are several methods that can be used to determine the cut-off score for a measure. The Receiver Operator Characteristic (ROC) curve is a typical gold standard to determine such cut-offs (Roumeliotis et al., 2024). The ROC curve plots the sensitivity against the specificity to determine the optimal threshold for classification and does not in

itself provide a cut-off point. Sensitivity describes the likelihood that someone who meets a threshold is identified as doing so (true positive), and specificity is the probability of someone who does not meet a classification is appropriately identified as such (true negative) (Smits et al., 2007). Two commonly used and more recently developed SA measures used the ROC curve method to establish cut-off scores: the Social Phobia Inventory (SPIN; Connor et al., 2000) and the Liebowitz Social Anxiety Scale (LSAS; Mennin et al., 2002). Another method that is used to identify cut-off scores in measures where higher scores signal a diagnosis, is the MEAN ± 2SD. This method has been more commonly used in psychopathology questionnaire development, including measures such as the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) and the Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969). In this approach, the mean score + 2 standard deviations provide a 95% specificity, while the mean score – 2 standard deviations demonstrate the 95% sensitivity. A value is identified as the point of intersection of these two curves (Sharma & Jain, 2014). Cut-off scores are very important in helping us classify psychopathology and symptom severity using questionnaire scores. However, the measure used must have been normed in samples representing the individual completing the measure (e.g., cultural groups, age ranges). Normative data are defined as values that allow for comparison of individual scores to their representative group both within clinical and non-clinical settings (Innocenti et al., 2023). For example, the LSAS is an appropriate measure for clinical samples because it was developed for psychiatric patients, providing clinical normative data are available (Heimberg et al., 1999), yet it may not be considered appropriate for non-clinical groups such as North American university students, because it has not been normed with this population. Using this measure and its clinical norms with a general sample of undergraduate students risks misinterpretation of the meaning of the score.

Self-report Measures of Social Anxiety

Researchers use self-report measures often because they are inexpensive and a convenient way to capture a person's subjective experience of symptoms. In Chapter 2 (Study 1), we provide detailed information on the most commonly used measures of SA. In my review of measures (see Study 1), it was clear that many SA measures use different norm groups and cut-off scores, have different areas of interest, and are frequently used for populations outside of the specified norm groups. Although quantitative data can provide us with helpful information regarding symptoms, their severity, and their frequency, the nuances behind their presentations can only be captured using qualitative measures.

Qualitative Methods to Understanding Social Anxiety

Properly validated self-report measures are essential to accurate research findings; however, their ability to provide a rich and detailed picture of people's lived experience is more limited. Thus, qualitative research is also vital to help make sense of disparate findings. Although quantitative research is more common in psychology, qualitative research has increased three-fold in the field (Stecyk et al., 2025). Qualitative research is increasingly viewed as a useful approach in psychology with a focus on the depth of the information it can provide (Beg, 2025). When we take a qualitative methods approach, we can understand the complex circumstances of human behaviour and fill in the gaps, or the "why", that remain from quantitative work (Lim, 2025).

Braun and Clarke (2006) argue that a rigorous qualitative approach depends on reflexivity and the ability to reflect on how researchers themselves impact the interpretation of results. Thematic analysis (TA) is a widely used approach to analyse qualitative data. Using TA allows for a flexible approach to organizing rich data and analysing that data to identify patterns, otherwise identified as themes (Braun & Clarke, 2006). In the context of TA, themes do not emerge but rather are generated by the researcher and their analysis of the data, unlike grounded theory, which aims to generate theory. Reflexive thematic analysis

(RTA) is a unique type of TA, as it does not rely on a predetermined codebook. Rather, codes depend on the subjectivity of the researcher. Themes are an outcome of data analysis and reflect patterns of shared meaning, rather than a summary or topic (Braun & Clarke, 2021). This approach allows for richer information and context to better understand a specific relationship or finding recognized in quantitative work. Although there is an increasing number of qualitative studies examining undergraduate mental health, there lacks an examination of specific disorders making it difficult to detect clinically relevant presentations early and tailor appropriate and timely treatment. Current research has focused on generalized well-being, mood disorders or anxiety as an umbrella term (Al-Najdi et al., 2025; Woof et al., 2021). It is important to have a richer and targeted understanding of social anxiety among undergraduate students, by means of qualitative research, to better understand how symptoms persist and how resources can be allocated more effectively.

Current Studies

I designed the following studies to better understand current experiences of social anxiety among undergraduate students. In Study 1 (Chapter 2), I set out to assess SA severity patterns over time among undergraduate students in Canada by conducting a meta-analysis and meta-regressions. With minimally substantiated, but highly publicized claims of mental health epidemics and rising rates (e.g., Osorio & Hyde, 2021; Sutton, 2019; Tucci & Moukaddam, 2017), it was vital to ascertain a clear and data-driven picture of social anxiety symptoms over time. The results of my study provide researchers, clinicians, and universities with essential information relevant to symptom measurement, university infrastructure, resource allocation, and treatment needs. Indeed, we clarified the intensity of SA experiences among these emerging adults, emphasizing a need to better understand the lived reality of undergraduate students facing such challenges while attending universities. I elected to stop data collection for meta-analysis in 2021, given the significant confounding potential of the

pandemic on social anxiety symptoms, which would likely raise more questions than answers. Thus, in Study 2 (Chapter 4), I developed an exploratory qualitative study to not only understand the lived reality of social anxiety among Canadian undergraduate students, but also to explore how the pandemic impacted their social anxiety experiences.

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CHAPTER TWO: STUDY 1

ABSTRACT

Recent claims that mental health difficulties are rising need to be tested by research. Social anxiety (SA) symptoms are prevalent among undergraduate students, who must navigate novel social demands. Understanding the pattern of SA over time in this population is important to better inform mental health resource allocation. We examined whether SA severity has increased over the last two decades, in Canadian undergraduate students, using a systematic review and meta-analysis of reported mean SA scores. A comprehensive search of the literature was conducted using PRISMA-P guidelines. Article screening, data extraction, and quality assessment were completed through two independent reviews. I included articles that were in English or French, used a Canadian sample of undergraduate students, were an empirical journal article or Masters/Doctoral thesis, included individual data sets, used a well-validated tool of SA, and reported a mean score of SA and its standard deviation. I retrieved 149 articles. Four meta-regressions were conducted to explore changes in mean scores over time on questionnaires identified during the Systematic Review with sufficient studies to justify a meta-analysis (Social Interaction Anxiety Scale: 26 samples; Social Phobia Scale: 19 samples; Social Phobia Inventory: 14 samples; Leibowitz Social Anxiety Scale: 7 samples). Mean SA scores increased significantly over time only for the Social Phobia Inventory, though this finding may be attributable to methodological factors. Our findings further suggest that Canadian undergraduate students report SA symptoms above the clinical threshold; however, SA severity does not appear to be increasing among Canadian undergraduate students across all measures.

ARE SOCIAL ANXIETY EXPERIENCES AMONG CANADIAN UNDERGRADUATE STUDENTS ON THE RISE? A SYSTEMATIC REVIEW, META-ANALYSIS, AND METAREGRESSION

Statements have been made in both scientific literature and traditional media that mental health difficulties are on the rise, with many going as far as referring to mental illness as an epidemic (Angell, 2011; Kim et al., 2011; Tucci & Moukaddam, 2017). However, there is debate about whether the claims match the data. Understanding whether mental health challenges have changed over time is critical to assess patterns of behaviour, inform clinical practice, and identify needs for resource allocation.

In a recent meta-analysis using repeated cross-sectional data, Richter et al. (2019) found a small but significant increase in the global prevalence of mental health issues over time. They further highlighted that to date, researchers have disproportionately focused on depression and distress and reported increases in psychopathology typically referred only to suicide rates or to rates of treatment seeking behaviour. Many of these studies included small samples, which creates issues with representativeness and limits capacity to explore specific types of disorders beyond depression and the umbrella term of anxiety. Thus, these findings omit a range of symptoms and struggles that persist in society, leading to a possible misunderstanding of the true mental health landscape. The lack of mental health supports for those with mental health challenges in Canada has been well-documented (Moir & Barua, 2021). The economic impact, when considering factors such as medical costs, job loss, and quality of life has been estimated at $50-51 billion per year (Lim et al., 2008). Direct costs from healthcare, social services, and income support are conservatively projected to increase substantially over the next 30 years (Mental Health Commission of Canada, 2016). About 75% of mental health challenges surface by 24 years of age (Kessler et al., 2005), with the possibility of worsening symptoms when left untreated (Hidalgo et al., 2001). These findings

highlight an important need to better understand mental health among young people, to potentially intervene with appropriate resources early on.

Anxiety disorders are the most prevalent mental health disorders (Penninx et al., 2021). Many studies in the last couple of decades point to a suspected increase in anxiety disorders (De Graaf et al., 2011; McEvoy et al, 2011; Goodwin et al., 2020; Parodi et al., 2022). Yet, in their meta-analysis of 87 studies across 44 countries, Baxter et al. (2014) challenged the idea of a mental health "epidemic". They reported a global prevalence of anxiety disorders of 7.3%, but saw no increase over time between the 1980's and 2000's. However, a rise in proportions was observed for people between the ages of 15-35 years, suggesting that any increase in anxiety disorder prevalence may depend on age group or developmental period assessed. More recently, an online report (Sutton, 2019) described anxiety disorders as a new "epidemic" (*p*. 1) based on preliminary findings from an American study conducted in 2019. They report that rates of anxiety doubled among college students between 2008 and 2016. Fear-invoking language such as "epidemic" used by Sutton and many others should be used with extreme caution, particularly when addressing preliminary or minimal data. Before making these types of impactful claims, we require further research that addresses clear patterns of symptoms over time, using a consistent methodology and analytic approach, while being mindful of any historical changes symptoms and diagnoses have undergone over the years. Moreover, this approach should be applied to specific mental health problems to more accurately gauge the existence and/or nature of any trend over time. It makes sense to begin by examining trends in commonly experienced challenges, such as social anxiety.

In the current study, I examined social anxiety symptom severity over time to better capture the pattern of this mental health challenge that is highly prevalent among young people. I examined these trends in Canadian undergraduate students for a few reasons. First,

few studies examine patterns of anxiety symptoms among Canadians. Some research further suggests that levels of social anxiety may differ between countries (Gök et al., 2026). Potential reasons include differences in rates of childhood trauma and rejection sensitivity, as well as differences between individualistic versus collectivist societies. Second, undergraduate students fall into a unique stage of development with respect to their age and significant life transitions, while also being immersed in an environment with many social demands. Understanding social anxiety symptom severity over time in this population is vital to ensure resources are appropriately allocated and treatment needs are met prior to increased severity, thus reducing the associated economic burden and deleterious trajectories. I conducted a systematic review and meta-analysis to answer this research question, enabling me to directly explore the relation between time and reported means of social anxiety symptoms as they were identified in a range of studies.

Social Anxiety Disorder

Social anxiety disorder (SAD) is one of the most common mental health disorders (Salari et al., 2024). SAD is defined as a distinct fear or anxiety when in social situations (American Psychiatric Association, 2022). People with SAD fear negative judgment or scrutiny by others, which are often accompanied by feelings of embarrassment or shame. As a result, they frequently avoid situations that may expose them to possible negative evaluation, such as eating in public or speaking in a small group of people. When obliged to be in such a situation, they can experience extreme distress. The anxiety is often out of proportion to the situation and impairs aspects of daily life (American Psychiatric Association, 2013). SAD is characterized by the intensity of the symptoms, the level of distress experienced by the symptoms, and the degree to which functioning is impaired (or not).

However, feeling nervous or embarrassed when performing or interacting with others is also a relatively normative experience. Most people will experience anxiety in some social situations (e.g., public speaking, eating around others; Ruscio, 2010). Although researchers tend to focus on SAD symptoms that meet clinical threshold for a diagnosis, subthreshold levels of social anxiety can still be quite impairing (Fehm et al., 2007). Given the range of social anxiety symptoms and its normative presence, some researchers argue that social anxiety is better understood along a spectrum of severity rather than as a binary or categorical diagnostic threshold with defined subtypes (Crome et al., 2010; Davidson et al., 1994; Stein et al., 2000).

Self-report measures are a cost-effective and commonly used tool to examine social anxiety symptom severity. However, these measures do not all evaluate social anxiety in the same way. Social anxiety self-report measures often focus on different aspects of social anxiety such as performance-related fears or avoidance behaviours. These distinct foci can lead to complications when the measure selected targets something other than the stated goal in a research capacity. For example, some researchers have used the Fear of Negative Evaluation Scale as their only measure of social anxiety, when this scale assesses a cognitive construct relevant to social anxiety, rather than social anxiety severity, *per* se (e.g., Brewer et al., 2024). In the methods section, we describe a list of measures that were identified by the systematic review as most frequently used.

Rates of Social Anxiety Disorder

SAD has been identified as a public health concern due to its higher prevalence in the general population (Furmark, 2002). The age of onset for SAD is generally early- to mid-adolescence or early adulthood (McEvoy et al., 2011); the onset of SAD rarely begins after age 25 (Heimberg et al., 2000) and it has a chronic course that continues throughout adulthood when untreated (Keller, 2006), with some reports of an average of 25 years in

duration (DeWit et al., 1999). Lifetime rates of SAD range from 7-13%, likely impacted by variability in methodologies and diagnostic criteria (Furmark, 2002). Kessler and colleagues (2005) found a 13.3% prevalence rate of SAD in young adults between 18 and 29 years of age. Jefferies and Ungar (2020) found that rates of SAD varied between countries in their cross-sectional study examining 16 to 29-year-olds. In addition, these authors found that more recent rates of SAD among young people exceeded previous data and found higher levels of subthreshold social anxiety, with over one in three participants scoring above the clinical threshold (Jefferies & Ungar, 2020). The 18–24-year age group scored significantly higher in terms of symptom severity than the other age groups.

Emerging Adulthood

Recent advances in developmental psychology have included the concept of *emerging adulthood*, which is considered a distinct stage of development that typically unfolds between ages 18-25 years (Arnett, 2011). Theory and research to date highlight a stark developmental difference between adulthood, emerging adulthood, and adolescence (Arnett, 2011; Schulenberg et al., 2004; Steinberg et al., 2009). Between adolescence and adulthood, people are likely to experience major life events and transitions, including changes in jobs, relationships, and residence (Arnett, 2011), as well as situational and social role changes (Schulenberg et al., 2004). There is limited research, however, regarding the impact of this unique transitional period on functioning and well-being. Arnett et al. (2014) argued that although the mental health field does not yet fully recognize this more-defined stage of life, emerging adulthood can include greater challenges with mental health and current systems in place, which in turn impact notable areas of life such as relationships and identity development (American Psychiatric Association, 2013). The median age of university students in undergraduate programs in Canada falls into the emerging adulthood life stage, with a median of 22.8 years in 2007 (Statistics Canada, 2010). In fact, more than 75% of

postsecondary students were 17-27 years of age. Undergraduate students are commonly used as convenience samples in research (e.g., Rad et al., 2018, Wild et al., 2022). However, some researchers also study undergraduate samples to better understand this unique population (Barry et al., 2013). Young adults beginning undergraduate programs are exposed to a range of novel situations, such as new social interactions, performance evaluations, and diverse socially driven events. Although some events may be voluntary or easily avoided, demands on campus (e.g., required presentations in class) do not always allow for avoidance behaviour or lack of participation. With over 1.4 million students attending Canadian universities in 2019 (Universities Canada, 2020), there are a substantial number of potentially vulnerable young adults faced with difficult social transitions (e.g. moving, student debt, new social connections) that occur during emerging adulthood.

Research including data from the Canadian Campus Wellbeing Survey highlight how undergraduate students are at greater risk of mental health challenges when compared to the general public due to high pressures and demands, new life transitions, the typical age of onset for mental health disorders, and the opportunity to explore a range of possibilities (Stewart & Mandrusiak, 2007; Weatherson et al., 2021). Indeed, Adlaf et al. (2001) suggest that mental health difficulties are more common among university undergraduate students than the general population. Reports of increases in mental health difficulties among Canadian post-secondary students are exceedingly common (Thorne, 1996; Xiao et al., 2017). SAD tends to onset just before or during emerging adulthood (McEvoy et al., 2011), and social interaction and relationship building are both critical aspects of this stage of development. Thus, social anxiety may be particularly relevant to undergraduate students' lives, considering its potentially debilitating impact on emerging adults' identity exploration. Research findings suggest that students' symptoms and challenges with social anxiety are often dismissed or unrecognized (Stewart & Mandrusiak, 2007; Russell & Topham, 2012).

Although few studies' primary goal is to report on prevalence rates of social anxiety symptoms or SAD among students in higher education, those that have indicate notable levels of SAD (Bella & Omigbodun, 2009; Russell & Shaw, 2009; Russell & Topham, 2012). In addition, a qualitative report on student participants (n = 8) not screened for clinical social anxiety suggests that subclinical and undiagnosed levels of SA are associated with impairments for university students (Lee et al., 2022). Studies outside of North America have examined social anxiety as a spectrum and found that social anxiety experiences are extensive among university student populations, reporting challenges with avoidance and school difficulties leading to functional impairment, particularly as severity increases (Dell'Osso et al., 2014; Filho et al., 2010).

It is vital to empirically investigate whether social anxiety symptom severity has increased over time among undergraduate populations. If means have increased, additional supports and resources are needed. If not, perhaps there exists a need to better consider how to best utilize the resources currently in place to appropriately meet identified needs. Further, determining whether the severity of social anxiety experiences have increased since this new concept of "emerging adulthood" was developed will increase our understanding of how transitions and life events that take place during this life stage relate to social anxiety overall.

The Current Study

In this study, I aimed to better clarify patterns of social anxiety, by examining severity experienced by undergraduate students via a systematic review and meta-analysis of mean social anxiety scores on commonly used social anxiety measures among Canadian undergraduate students. By focusing on social anxiety symptoms, rather than SAD prevalence rates, I explored social anxiety symptoms even when social anxiety was not the target of a given study, to capture more accurately the pattern of social anxiety within

selected and unselected student populations. My objectives were to: 1) identify Canadian studies that have reported on the degree of severity of social anxiety experiences, and 2) determine whether there has been an increase in social anxiety severity among undergraduate students over time. My decision on the number of analyses to conduct depended on the number of measures that yielded enough studies for the analysis to be meaningful. Each dataset included scores from only one measure, given the nature of the analyses. I conducted meta-regressions to address our main objective of determining SA scores over time. I am currently unaware of any other study that has evaluated the pattern of social anxiety severity among Canadian undergraduate students. Given the equivocal nature of the findings to date related to changes in symptom severity over time, this was an exploratory study with no specific hypotheses.

Method

Literature Search

A comprehensive search strategy was developed using the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA-P) guidelines (Moher et al., 2009), in collaboration with a research librarian from the University of Ottawa. Search terms were developed based on the search strategies used by similar reviews and adapted for the current study (e.g., Ibrahim et al., 2013; Lemyre et al., 2018; Spain et al., 2018; Storrie et al., 2010; Vadeboncoeur et al., 2015). This search process, including adaptations for syntax rules based on the databases used, were tracked and recorded (i.e., date, number of studies found). The search was conducted using the following electronic databases: PsycINFO, MEDLINE, Cochrane Central Register of Controlled Trial, Scopus, Web of Science, and ProQuest Dissertations and Theses. In addition to searching databases, studies were also identified by reviewing reference lists from (a) related reviews and meta-analyses, and (b) key journals to ensure a comprehensive search. The original date of the search was May 29, 2020. The search

was updated with an additional review for any new articles towards the end of the systematic review in July 2021. The deadline for our search strategy was selected to ensure we did not add the possible confound of the impact of the COVID pandemic on reported SA. For this reason, data collection was promptly terminated in 2021 to ensure data being retrieved from individual studies were likely collected in 2019 or before. A table of the search syntax for each database can be found in Appendix A.

Screening Procedures

Two phases of article screening took place with two independent reviews by a total of five reviewers for all extracted studies to maximize reliability and reduce the risk of bias (Higgins & Green, 2011). Raters were undergraduate and doctoral-level student research assistants who were trained with a coding manual (see Appendix B). Any discrepancies were resolved by the first author as the third-party reviewer. All articles collected from the search were exported into Covidence (Covidence Systematic Review Software, 2022), a web-based software platform that streamlines the screening process for systematic reviews. Duplicate studies were automatically detected and removed once imported into Covidence. Each study identified in the search was screened by title and abstract, or additionally, by full-text review to determine eligibility based on the predetermined criteria. I chose to be overly inclusive in the first phase of the review (see Appendix B) to include any studies that had been used to measure social anxiety. In phase two, we identified studies that met the criteria of "well-validated" which was defined as any measure that demonstrated good psychometric properties and had been repeatedly validated. Once this was complete, I reviewed any remaining measures to ensure they appropriately measured at least one component or construct of SA prior to moving towards data analysis.

Title and Abstract Screening

In this phase, the reviewers examined the titles and abstracts of the collected articles. An initial pilot test was conducted with a small sample of the articles (n = 20) by the two main reviewers involved in phase one, to determine whether certain criteria needed to be refined before beginning the complete review of the articles. Percent agreement has been identified as a convenient and easily interpretable method of assessing inter-rater reliability, though it risks not accounting for 'guesses' made by the reviewers and yielding an overestimation of agreement (McHugh, 2012). I chose this method as opposed to other methods, for example, Cohen's kappa statistic, which does consider the issue of "guessing" in its calculations but can lead to erroneous assumptions. Kappa is suspected to lower the calculated agreement substantially based on its assumptions. It is also not easily interpreted (McHugh, 2012). McHugh (2012) suggests that researchers can rely on the percent agreement calculation if raters are well trained in the coding manual. Thus, the percent agreement was used for both stages of reviewing. The percent agreement upon completion of the pilot test yielded 100% agreement.

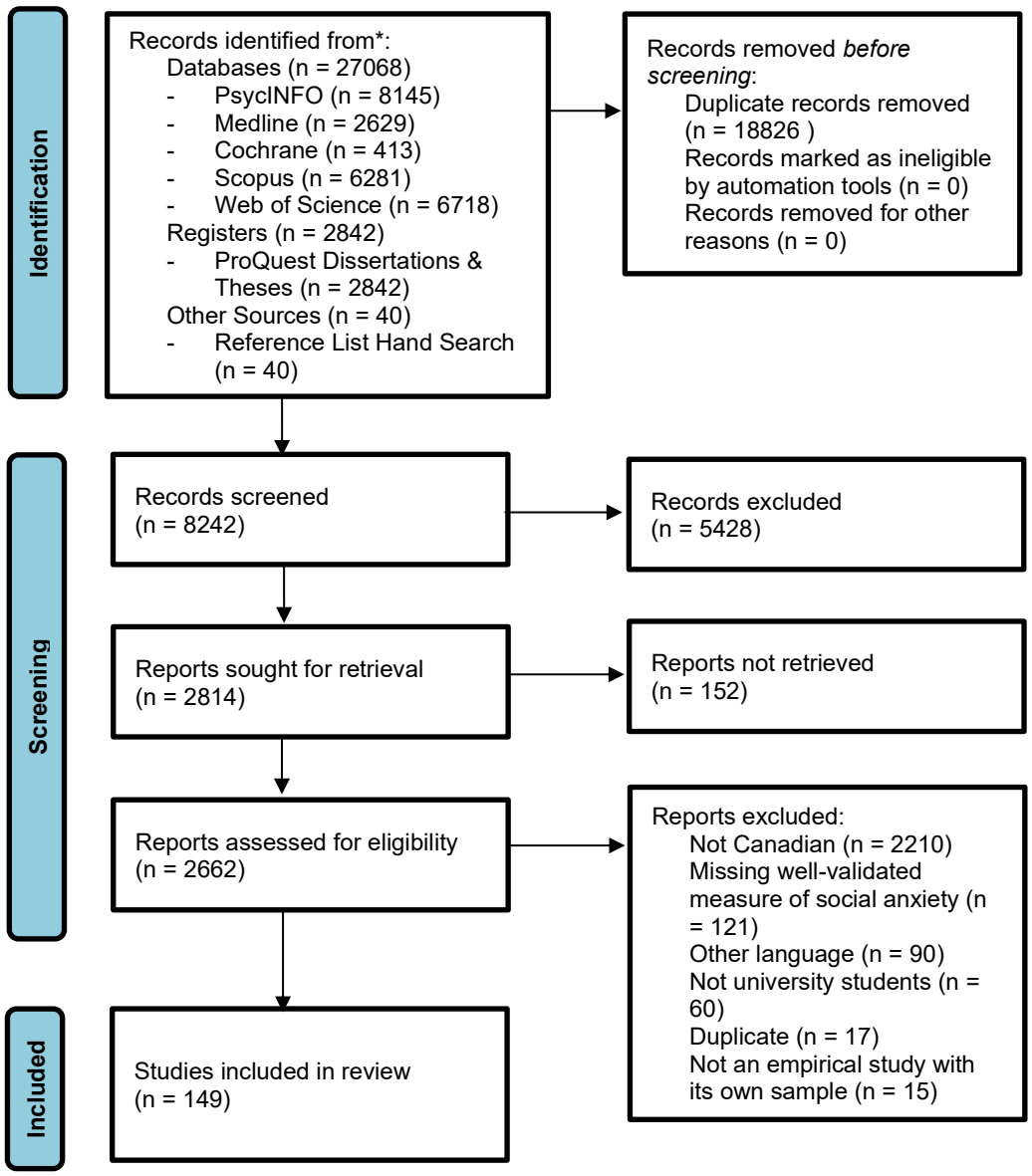
Full Text Screening

Phase two consisted of a more thorough review of the full text for each study that passed the initial Title and Abstract screening. The first 20 full-text articles were screened by all four reviewers during the pilot test, and the percent agreement was calculated to gauge inter-rater reliability. A decision tree (Appendix C) helped each reviewer identify their reason for exclusion and document their process. The overall calculated percent agreement for inclusion/exclusion decisions was 99% signifying excellent reliability. Any discrepancies were discussed and resolved prior to continuing. Coders categorized each article as "Yes" or "No". If the reviewer was uncertain whether the article met inclusion criteria, I was consulted and a decision was made via discussion. If an article was missing important information or the information was not clear, the study was tagged, and information was requested from the

authors whenever possible. If the article did not meet eligibility for any one criterion, the study was removed from the review. I reviewed each study to ensure that samples were not repeated across multiple included studies. When duplicate samples were found, I used the earliest study to use the sample and the rest of the studies were excluded. See Figure 1 for the Prisma Flowchart breaking down the study selection process.

Figure 1

Study Selection Using the PRISMA Flow Diagram



Study Eligibility

Eligibility criteria were: 1) studies were completed in English or French; 2) samples were evidently drawn from Canadian institutions; 3) samples were evidently undergraduate students; 4) formats were presented as an empirical journal article or Masters/Doctoral thesis; 5) formats included individual data sets as opposed to theoretical papers or reviews; 6) researchers measured social anxiety symptoms with a well-validated tool (e.g., good psychometric properties, repeatedly validated); and 7) research findings included (a) a mean score of social anxiety and (b) its variance or standard deviation. There were no restrictions on the type of sample being used (e.g., convenience vs. clinical) and both published and unpublished studies were included. Unpublished studies were retrieved from the dissertations and theses database. I made this decision based on the likelihood that many theses would include samples of undergraduate students. Further, papers constituting "grey literature" are often overlooked although their findings may be relevant (Paez, 2017).

Data Extraction

All data were extracted twice, once by each of two reviewers, using the data extraction code book to enter the data. Necessary data included the social anxiety mean score, its standard deviation, sample size, and social anxiety measure used. We recorded the date of publication and of data collection when available. For most studies, the year of data collection was not reported. In those cases, we selected a date two years prior to the year of publication, based on standard procedures established in previous studies (Oliver & Hyde, 1993). We documented sample demographics (e.g., sex, age) and methodological characteristics (e.g., sample type, type of sampling, quality assessment scores), when possible. Sample type (i.e., community, analogue, clinical) was of particular interest both to possibly reduce likelihood of representation bias and to better understand if patterns of SA have changed over time based on the population. Samples that were selected based on a

diagnostic cut-off score or existing diagnosis were identified as clinical. Samples that were selected/created based on being in a top proportion of all students recruited through some type of SA evaluation (e.g., top quartile) were identified as analogue. Samples that were unselected, i.e., included participants on a voluntary basis without any sort of SA assessment, were identified as community.

Quality Assessment

Study quality was evaluated using an adapted version of the JBI Checklist for Prevalence Studies critical appraisal tool (Munn et al., 2017). This quality assessment tool is used to assess published research in systematic reviews that look at prevalence and incidence. Items included, but were not limited to, including a representative sample for the population of interest, described recruitment measures, and appropriate statistical reporting. I removed two items and made slight alterations to some of the questions to ensure they focused on essential information that could impact the quality of our study objectives (see Appendix D). Possible scores ranged from 0-7, with 7 signifying the highest quality rating. Study quality was rated independently by two reviewers on the project. Overall agreement was 71% and all disagreements were resolved by the first author. I qualitatively describe study quality for each set of analyses below.

Measures

Although my systematic review aimed to capture studies using any valid SA measure, seven measures were identified in this review as most used and therefore considered for analyses. Below, I provide a summary of retained and unretained measures for analysis, to explain our decision-making and contextualize the results. The Social Phobia Inventory (SPIN; Connor et al., 2000) is a 17-item self-report measure that was developed to screen for SAD. Items capture both individual behaviours and cognitions, and address dimensions of fear, avoidance, and physiological arousal. The SPIN has demonstrated good psychometric

properties and, although originally validated with clinical groups (Connor et al., 2000), it has since been validated with undergraduate student samples (Carleton et al., 2009; Radomsky, et al., 2006). A cut-off score of 19 has been frequently recommended to identify clinical levels of SAD (Connor et al., 2000). More recently, some researchers have suggested that a cut-off of 30 may be more appropriate, particularly for university-aged individuals to avoid over pathologizing normative social discomfort within this population (e.g., Radomsky et al., 2006; Stewart & Mandrusiak, 2007).

The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) was developed as a measure of social anxiety symptom severity. Respondents evaluate 24 social situations (interaction and performance-based) on both level of fear and level of avoidance, rather than directly addressing SA symptoms. The LSAS has demonstrated good psychometric properties in clinical samples but has not been validated in undergraduate student samples. Scores of < 30 are interpreted as no social anxiety, 30-49 as mild social anxiety, 50-64 as moderate social anxiety, 65-79 as marked social anxiety, 80-94 as severe social anxiety, and >95 as very severe social anxiety (Liebowitz, 1987).

The Social Interaction Anxiety Scale (SIAS) was developed in conjunction with the Social Phobia Scale (SPS) for use as complementary measures (Mattick & Clarke, 1998). The SIAS specifically measures symptoms of anxiety within social interactions. The SPS measures symptoms of social performance anxiety, associated with the fear of scrutiny. Although these measures were developed with the intention of being used together, they are frequently used independently. Some researchers argue that single scale use is appropriate if researchers confirm they are assessing either anxiety within social interactions (i.e., SIAS) or anxiety during social performance (i.e., SPS) rather than overall social anxiety severity (e.g., Heidenreich, 2011), whereas others note that the measures should only be used together (e.g., Thompson et al., 2019). Šipka et al. (2023) highlight the utility of using the two measures

together to assess general social anxiety, as well as reliably evaluate specific aspects of SA separately. Heimberg et al. (1992) recommend scores of 34 on the SIAS and 24 on the SPS to indicate levels of anxiety above the clinical threshold.

The Social Avoidance and Distress Scale (SADS) and the Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969) were both initially validated with samples of Canadian university students. The SADS is a 28-item measure divided into two subscales that measure social avoidance and social distress. The FNE includes 30 true or false items that address dimensions pertaining to perceived negative evaluation and apprehension (Heimberg et al., 1988). Both measures have demonstrated good psychometric properties (Watson & Friend, 1969). Researchers have cautioned against using either of these measures on its own to assess or diagnose SAD, because they do not directly address symptoms of social anxiety and do not appear to differentiate SAD from other types of anxiety (Turner et al., 1987, Heimberg et al., 1988). For example, the FNE assesses an important cognitive construct associated with social anxiety, rather than observable social anxiety symptoms (i.e., distress and avoidance). A shortened version of the FNE was also developed, the Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983a). This measure consists of 12 of the original items, which are rated on a 5-point scale. I used the systematic review findings (see Results section), to determine the most used measures of social anxiety within the undergraduate population within Canada, which further determined which studies to include in the meta-analyses and meta-regressions.

Statistical Analyses

I conducted a meta-analysis using a random effects model. A random effects model is used when estimating a mean from independent values assumed to have been sampled from a larger distribution (Borenstein, 2009). Therefore, we assume true between-study variance (Brown & Sutton, 2010). In a random effects model, study weights are balanced whereby

larger studies are assigned more weight than the smaller ones, and confidence intervals are wider. A fixed effect model assumes that every study's effect size is the same, suggesting that any variance is due to sampling error, and that we are computing data on a specific group, with no intention of generalizing to a greater population. I conducted a meta-analysis using a random-effects model because it is not plausible to assume that all participants within the studies from this analysis are identical.

A meta-analysis is often undertaken to determine a weighted average value for a particular phenomenon using several studies (Borenstein et al., 2010). Given my objectives, I undertook a meta-analysis of raw mean scores from standardized self-report symptom measures, rather than effect sizes, and explored potential changes in social anxiety experiences (i.e., questionnaire mean scores) over time.

Four measures were included in individual analyses: the SPIN, the LSAS, the SIAS, and the SPS; totalling 4 independent meta-analyses conducted. First, I entered the sample means of social anxiety scores into Comprehensive Meta-Analysis, Version 4 (CMA; Borenstein, 2022) software. An important assumption when performing a meta-analysis is the assumption of independent observations, meaning each effect size (or mean) in the analysis is independent from others (Card, 2015). Therefore, each study's sample of participants provided one score. In this analysis, I used more than one sample in a study only if the study clearly differentiated each set of scores as completely independent, unrelated samples. For studies that reported scores pre- and post-treatment/test, I took the baseline mean score as the relevant score. When studies provided individual subgroup scores within their analyses, but all used the same SA measure and reported scores at baseline, a grand mean score was calculated. One challenge with the data retrieved was that the number of studies within a given subgroup (e.g., clinical) were sometimes very low compared to other subgroups (e.g., community). I wanted to establish a numerical threshold to help determine when a subgroup

(i.e., analogue, clinical, or community) from the sample type variable should be included in the meta-regression analysis. This decision was primarily intended to avoid exceptional bias among the calculations. For each measure's dataset, a subgroup was removed from the main analysis if: 1) a subgroup (e.g., clinical) had fewer than 10 samples and 2) the remaining dataset (i.e., after removing the samples in step one) still had 10 samples or more. As a result, we removed the clinical and analogue samples from every dataset, and when appropriate analyzed them separately. The removal of scores better answers our study's objective to understand a community-based population of students, and the decision also removes possible confounds in the analyses.

Next, I inputted the year of publication among other possible moderator variables. I summarized data using a forest plot and by calculating a mean summary effect. The means from each study were weighted by the inverse of their variance per the random-effects model (Borenstein et al., 2010). The Knapp-Hartung adjustment uses a *t*-distribution instead of the *z*-distribution to capture a wider estimate of values (Borenstein, 2024). This distinction is particularly important when working with very small datasets. Because I am testing significance in the regression models, and because I have one dataset with a notably smaller number of studies, I selected the Knapp Hartung adjustment to provide more accuracy. I calculated heterogeneity using the *Q* statistic to determine the presence of variance, and Tau^2 to understand the variance of the true effect. I did not report I^2 because researchers highlight that this statistic is frequently misused and misinterpreted as representing a way to quantify the dispersion of values (Borenstein et al., 2017; Higgins et al., 2003). Rather, the statistic is a proportion that addresses the relationship between true effects and variation due to sampling error. Because I^2 is not an absolute value, it is inaccurate to use the statistic to interpret how much the effects vary (Borenstein et al., 2017; Borenstein, 2024). Borenstein (2024) recommends using prediction intervals to better understand the range within which we predict

the effect or mean to fall. This prediction interval is different from the confidence intervals we report below, as prediction intervals report how precisely we have estimated the mean (Borenstein, 2022; Borenstein, 2024). Therefore, I reported the prediction intervals when estimating the mean to report on the dispersion of effects more accurately.

I conducted a series of meta-regressions to better understand the heterogeneity observed between studies. For each data set (i.e., each analysis of a measure), I conducted a simple meta-regression to examine the impact of the year (2 years prior to the publication date) on social anxiety scores. As above, we reported the Q test, Tau^2 statistic, and prediction intervals. Additionally, we calculated R^2 analog to measure the proportion of between-study variance accounted for by the model. Finally, I calculated Cohen's d to measure the magnitude of change between the mean social anxiety values from the two studies conducted in the earliest year and the latest year out of all the studies found for each SA measure. Because the magnitude of change is particularly relevant to my objective, Cohen's d was calculated to better understand the degree of change in social anxiety between studies over time.

I did not consider publication bias because that metric is relevant primarily to null hypothesis significance testing. Statistics used to examine publication bias test whether a study that is less likely to report statistically significant effects is also less likely to be published. Because I am not reporting statistical significance, testing for publication bias is not relevant. Furthermore, because I selected studies that often reported on social anxiety scores as ancillary to their main analyses, even if publication bias existed, it would not be relevant to the social anxiety scores of interests.

I did not conduct a power analysis because this calculation requires an effect size (Borenstein et al., 2009), which I do not have for the present analysis. The current meta-analysis is calculating an overall summary mean score, and therefore effect sizes cannot be

calculated from them. Power analysis aims to estimate the sample size required to disprove the null hypothesis, if the null hypothesis is indeed incorrect; however, the goal of a meta-analysis is to identify an average effect, and determine how widely it varies (Borenstein, 2024). I expected the initial meta-analysis to yield a statistically significant value, because we know variability exists between all means reported (i.e., the social anxiety scores will be different from zero). I was also limited by the number of covariates we can include when performing a regression. I followed guidelines from the Cochrane Handbook (Higgins & Green, 2011) that suggest a minimum of 10 studies per moderator when conducting a meta-analysis procedure.

Results

I retrieved a total of 149 studies from the search. I categorized studies by measure, because possible analyses depended on having sufficient sample size for a given measure. The table below demonstrates all social anxiety measures identified and in what frequency, among this final set of studies.

Table 1

Social Anxiety Measures

SOCIAL ANXIETY MEASURES

Measures	Number of studies
Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998)	42
Social Phobia Scale (SPS; Mattick & Clarke, 1998)	28
Social Phobia Inventory (SPIN; Connor et al., 2000)	28
Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987)	13
The Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969)	23

Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969)	19
Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983a)	17
Other[a] (Identified <5 times in the review)	43

[a] Identified measures listed under 'Other' were the following: Social Phobia and Anxiety Inventory (SPAI; Turner et al., 1989), State Trait Anxiety Inventory (STAI; Spielberger et al., 1983), Social Interaction Phobia Scale (SIPS; Carleton et al., 2009); LSAS-Avoidance (Liebowitz, 1987), Interaction Anxiousness Scale (IAS; Leary, 1983b), Social Anxiety Scale (SAS; Hutama et al., 2017), Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998), State Social Anxiety Questionnaire (SSA; Kashdan & Steger, 2006), Ryerson Social Anxiety Scales (RSAS; Lenton-Brym et al., 2020), Self-Beliefs Related to Social Anxiety Scale (SBSA; Wong & Moulds, 2010), Brief Social Phobia Scale (BSPS; Davidson et al., 1991), BSPS-student (Davidson et al., 1991), IAS Short Form (Peters et al., 2012), LSAS-Self-Report (Cox et al., 1998), SPS-6 (Peters et al., 2012), Mini SPIN (Connor et al., 2001), SIAS straightforward (Rodebaugh et al., 2011), BFNE straightforward (Rodebaugh et al., 2011), Daily Social Anxiety (Battista et al., 2015).

A reference list of all these studies can be found in Appendix E. Although 149 studies were found to meet criteria, only studies with selected measures that met all criteria were maintained. The decision-making rationale is described below. I undertook four separate meta-analyses based on the systematic review results. Although the SADS was used in quite a few studies, I decided not to include it in our meta-analysis because I found only one study after 1999 in which it was used; thus, the findings of a meta-analysis would not be relevant to my research question. I also decided not to include the FNE or BFNE, given that they are not measures of social anxiety *per se*, but rather a construct associated with social anxiety. The

other commonly identified measures (SPIN, SIAS, SPS, and LSAS) were analyzed due to their ability to identify social anxiety symptoms.

Social Interaction Anxiety Scale

I identified 42 studies wherein researchers reported a social anxiety score using the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) in Canadian undergraduate students. Initially, I removed 14 studies for the following reasons: 1) duplicate data, 2) missing data (e.g., SA mean scores) where authors were either unreachable or no longer had access to the data, 3) included non-undergraduate student participants, or 4) omitted reverse items. Of the remaining 28, four studies reported social anxiety scores from two separate sets of samples/studies, bringing the number of means to include in analysis up to 32. Finally, I removed four studies that used analogue samples and two that used clinical samples to reduce heterogeneity within the analysis. This left a final dataset with 26 community-based studies and a total sample size of $n = 6224$. Three of these studies were dissertations. Publication dates for studies ranged from 1997 to 2021, though we used dates of estimated data collection for these studies which was 1995 to 2019. Of the included studies, the percentage of female participants ranged between 13.2-100%. Quality assessment scores ranged from 2-6, with a mean of 4.32. See Appendix F for the full distribution of mean scores and associated SIAS score forest plot.

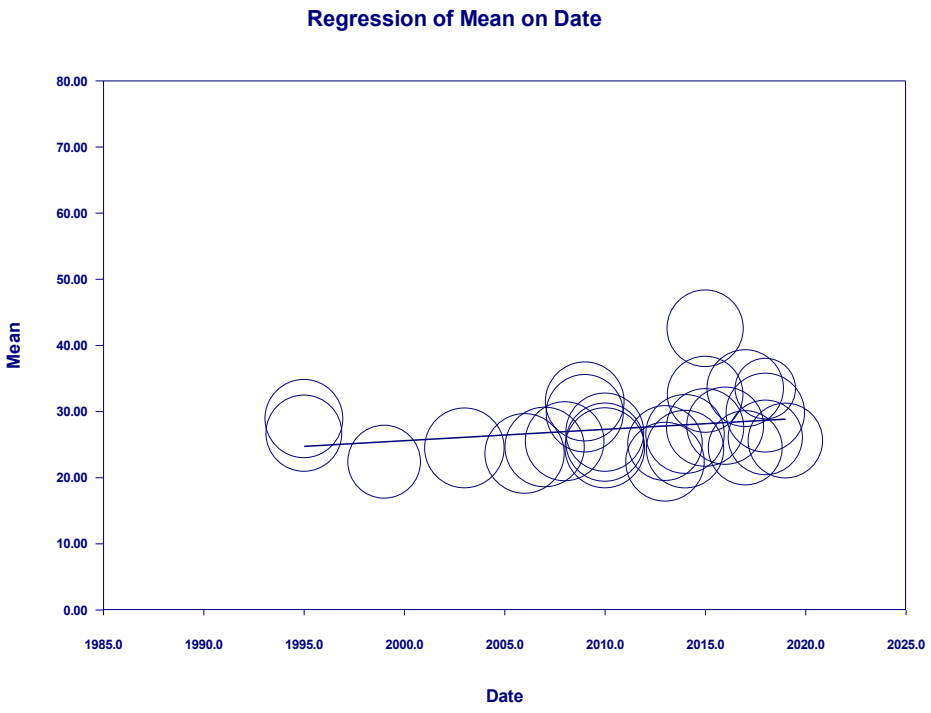
In applying the random effects model and the Knapp Hartung adjustment, the overall mean score on the SIAS was 27.44 (*95% CI* [25.68, 29.20], $t = 32.09$, $p < .001$). The dispersion of effects demonstrated by the 95% prediction interval was 19.76 - 35.12, estimating that any given population of students would have a mean SIAS score falling within this range. I conducted the Cochran's Q test (Cochran, 1950) to test whether there was true variability between SIAS scores. I rejected the null hypothesis that all studies share a

common mean ($Q = 411.32$, $df = 25$, $p < 0.001$) and calculated the variance of true effect sizes ($Tau^2 = 13.28$).

Estimating the overall mean of SIAS scores among Canadian undergraduate students, though informative, was not the primary aim of our study. To test whether social anxiety scores have increased over time, I conducted a simple random-effects meta-regression to measure the relation between social anxiety scores on the SIAS and publication date. The model did not indicate a significant relation between variables ($B = 0.17$, *95% CI* [-0.09, 0.43], $t = 1.35$, $p = 0.19$), suggesting that social anxiety scores (as measured by the SIAS) did not significantly change as a function of year in either direction. The regression line is displayed in Figure 2. The Q test indicated that variance across the means remained after accounting for date ($Q = 380.82$, $df = 24$, $p < 0.001$), with $Tau^2 = 13.28$. The R^2 analog is 0.04, indicating that the model explains about 4% of the variance in SIAS scores.

Figure 2

Regression Line Between Date and SIAS SA Score



Social Phobia Scale

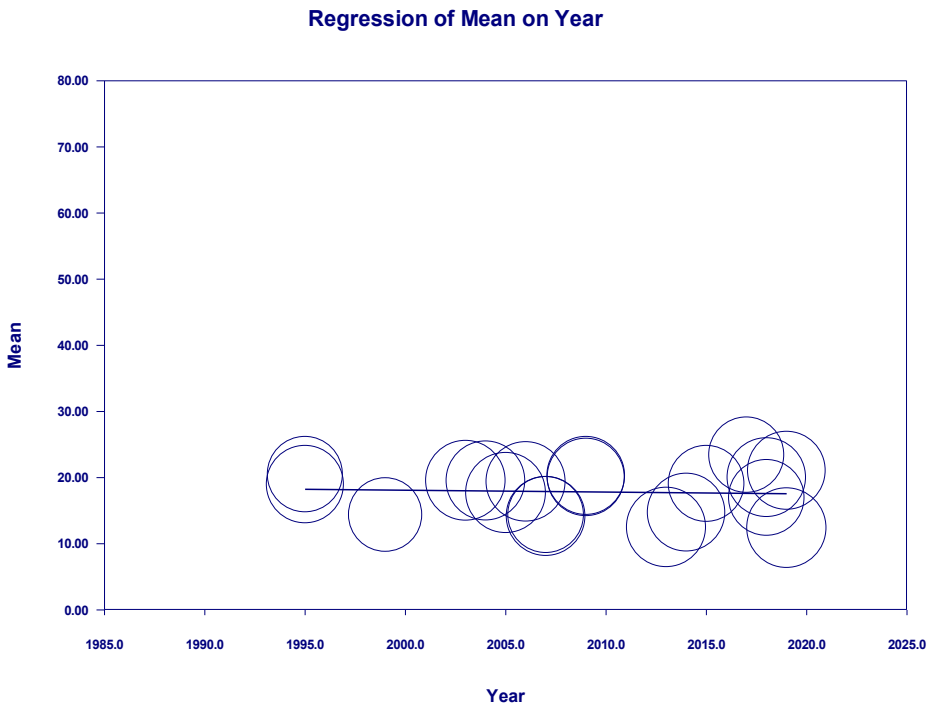
I identified 28 studies that reported a social anxiety score using the Social Phobia Scale (SPS). I removed nine studies for the following reasons 1) missing data (e.g., SA mean scores) where authors were either unreachable or no longer had access to the data, 2) SA scores were likely impacted by an experimental manipulation or other study requirement, or 3) the study used archival data over many years. Thus, I included 19 studies in the meta-analysis. Two of the studies presented two separate sets of samples or studies bringing the number of means in the analysis up to 21. To minimize the risk of confounding factors and maximize homogeneity, I removed one analogue and one clinical sample, finalizing the dataset to a total of 19 community-based studies with a total sample size of $n = 4525$. All studies were peer-reviewed. Publication dates for studies ranged from 1997 to 2021, though I used dates of estimated data collection for these studies which was 1995 to 2019. Of the included studies, the percentage of female participants ranged between 50-91%. Quality assessment scores ranged from 2-6, with a mean of 3.95. See Appendix G for the full distribution of mean scores and the associated forest plot.

The overall mean score on the SPS was 17.84 (*95% CI* [16.30, 19.38], $t = 24.30$, $p < .001$). I rejected the null hypothesis that all studies share a common mean ($Q = 258.34$, $df = 18$, $p < 0.001$) and calculated the variance of true effect sizes ($Tau^2 = 9.34$). The 95% prediction interval, which demonstrates the likely dispersion of effects for any set of samples, was 11.21-24.47. The meta-regression demonstrating the relation between social anxiety and date did not indicate a significant relation between variables ($B = -0.03$, *95% CI* [-0.24, 0.18], $t = -0.28$, $p = 0.78$). This finding suggests that social anxiety score did not significantly change based on the year in either direction. The Q test indicated that variance beyond accounting for date remained ($Q = 241.50$, $df = 17$, $p < 0.001$), with $Tau^2 = 9.29$. The R^2

analog is 0.01, indicating that the model explains about 1% of the variance. The regression line is displayed in Figure 3.

Figure 3

Regression Line Between Date and SPS SA Score



Social Phobia Inventory

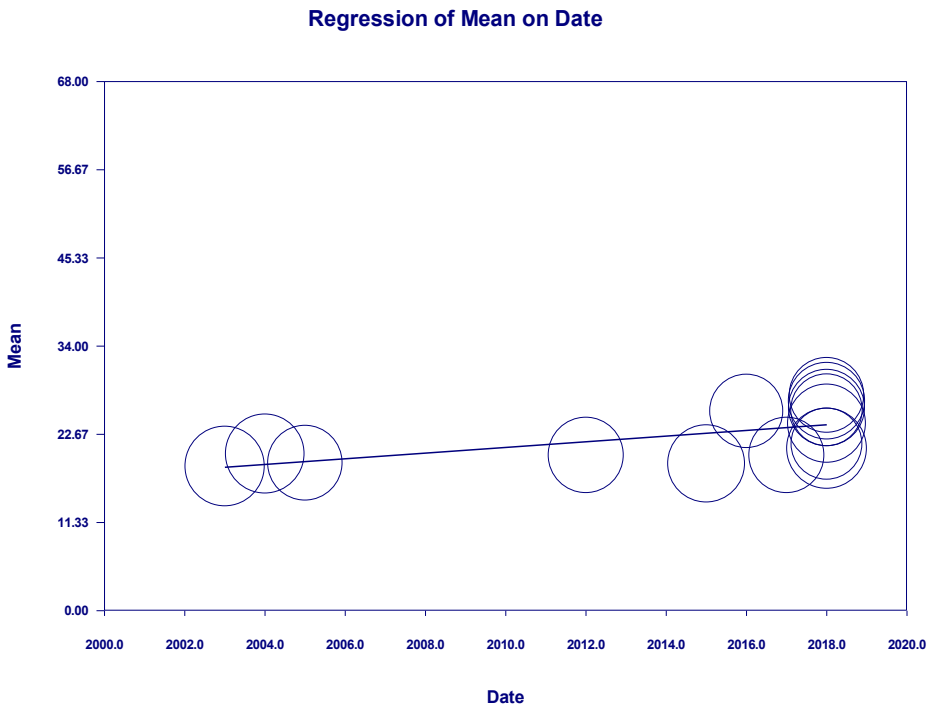
I identified 28 studies that used the Social Phobia Inventory (SPIN). First, I removed eight studies due to missing data with unreachable authors or because the study involved a manipulation or step in the procedure that could have influenced SA scores. Two of the studies presented additional sets of samples bringing the number of means to be included in the analysis up to 22. I removed two analogue and six clinical samples, finalizing the dataset to a total of 14 studies of community samples, with a total sample size of n = 3066. All studies were peer-reviewed. Publication dates for studies ranged from 2005 to 2020, though I used dates of estimated data collection from 2003 to 2018. Of the included studies, the percentage of female participants ranged between 59-90%. Quality assessment scores ranged from 1-7, with a mean of 3.77. See Appendix H for the distribution of scores and forest plot.

The overall mean score was 22.45 (*95% CI* [20.52, 24.38], $t = 25.11$, $p < .001$). Prediction intervals (95%) indicated that the possible dispersion of scores was 15.70 to 29.21. The Q value is 185.84 ($df = 13$, $p < 0.001$), $Tau^2 = 8.91$. There was a statistically significant relation between social anxiety scores as measured by the SPIN and date ($B = 0.36$, *95% CI* [0.09, 0.64], $p = 0.01$). Of note, seven of the 14 studies were published in 2020, with five of the independent samples coming from two of the same published articles. This finding indicates that when using the SPIN as a social anxiety measure, social anxiety scores increased as the years progressed. The upward sloping regression line is displayed in Figure 4. The Q test suggests that variability accounted for more than sampling error ($Q = 6.13$, $df = 12$, $p = 0.001$), and $Tau^2 = 6.13$. The R^2 analog is 0.31, indicating that the model explains about 31% of the variance.

Because a significant relation was found, I calculated the magnitude of change between the average of scores in the initial year of study ($Y_{2003} = 18.56$) and those in the final year of study ($Y_{2018} = 24.70$). I calculated a difference score of 6.14 and divided this by the average standard deviation ($SD = 12.64$) resulting in $d = 0.49$. I determined that over the course of 15 years, social anxiety scores increased by approximately 1/2 of a standard deviation.

Figure 4

Regression Line Between Date and SPIN SA Score



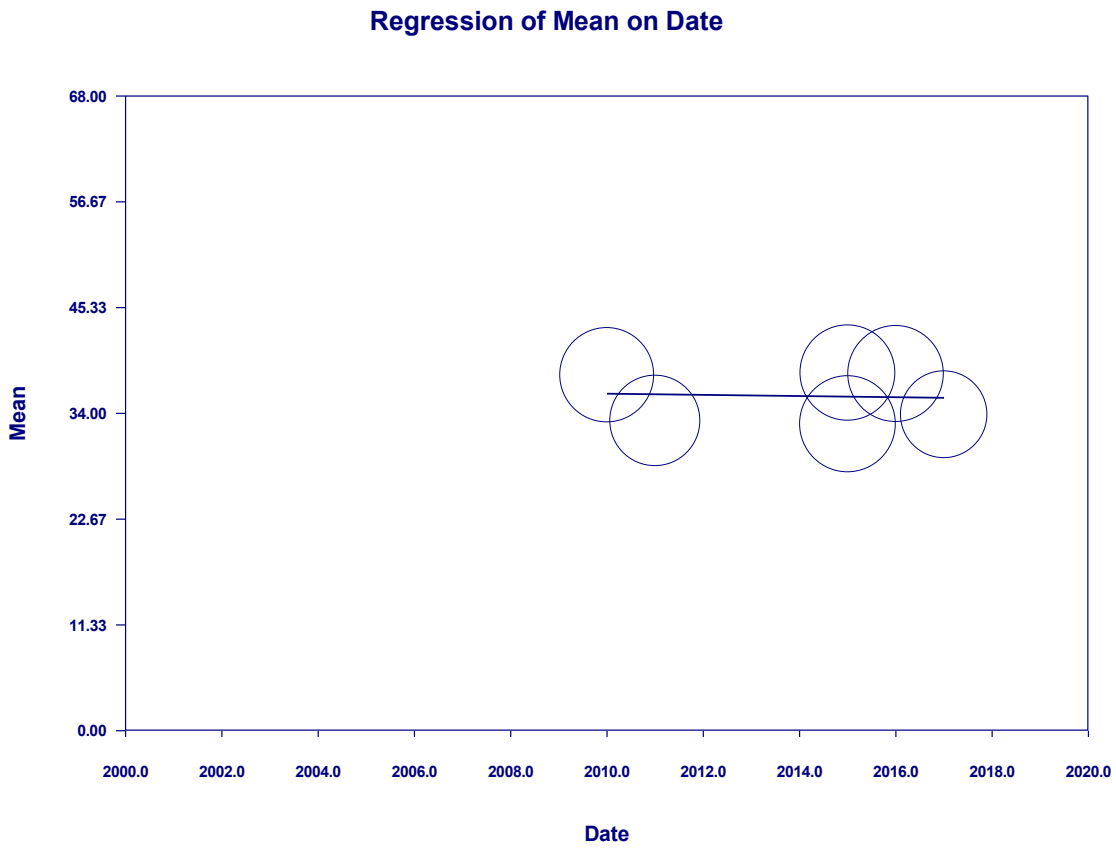
Although the aim of my study was to examine scores among the general community sample of undergraduate students, I had sufficient studies to consider a low-power analysis of undergraduate students who were categorized as a clinical sample. Although our rule of thumb was to only include subgroups with 10 or more studies to avoid bias in the data, I determined that six studies could be sufficient for its own independent analysis with the understanding that the scores would be underpowered due to low numbers. I did not include the two sample types (i.e., clinical and community) in the same analysis to avoid bias from the discrepancy in sample sizes. However, I did undertake a meta-analysis and regression of clinical samples using the six studies identified. The six clinical samples were identified with a total sample size of n = 358. All studies were peer-reviewed with publication dates from 2012 to 2019. Therefore, estimated data collection dates were reported as 2010 to 2017. The percentage of female participants ranged from 0-89.29%, with one study not reporting sex.

Quality assessment scores ranged from 3-7 with a mean of 4.33. See Appendix I for the full distribution of mean scores and forest plot.

The mean score of the samples was 35.87 (*95% CI* [32.89, 38.86], $t = 30.94$, $p < .001$). Prediction intervals (95%) indicate dispersion between 28.02-43.73. The Q test indicated variability ($Q = 32.08$, $df = 5$, $p < 0.001$), with $Tau^2 = 6.66$. Social anxiety scores from the clinical group and date did not yield a significant relation between variables ($B = -0.06$, *95% CI* [-1.47, 1.34], $p = 0.91$). When using the SPIN as a social anxiety measure to examine clinical samples of undergraduate students, social anxiety scores did not significantly change based on year. See Figure 5 for the regression line. The Q test suggests that variability did account for more than sampling error ($Q = 32.00$, $df = 4$, $p < 0.001$), with $Tau^2 = 8.55$ and $R^2 < 1\%$.

Figure 5

Regression Line Between Date and Clinical SPIN SA Score



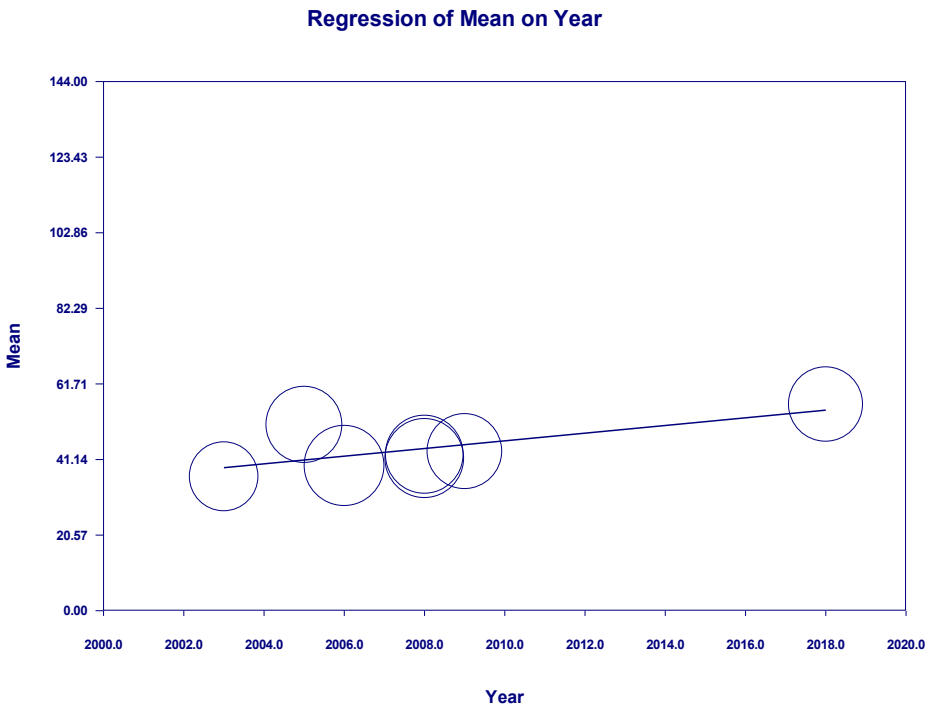
Leibowitz Social Anxiety Scale

I identified 13 studies using the Leibowitz Social Anxiety Scale (LSAS). I then removed six studies for the following reasons: 1) only reporting on Avoidance scores, 2) missing data, 3) reporting separate avoidance and fear scores, or 4) having a manipulation that could impact SA scores. A total of seven studies remained for the analysis. All studies used community-based samples with a total sample size of $n = 1364$. Two studies were dissertations, whereas the other five studies were peer-reviewed. Publication dates for studies ranged from 2005 to 2020, though we used dates of estimated data collection, which was 2003 to 2018. Of the included studies, the percentage of female participants ranged between 62.22-81.2%, with one study not reporting on sex. Quality assessment scores ranged from 4-6, with a mean of 4.86. See Appendix J for the full distribution of mean scores.

The random effects model demonstrated an overall mean score of 44.32 (*95% CI* [38.13, 50.51], $t = 17.53$, $p < .001$). The Q test was significant ($Q = 76.44$, $df = 6$, $p < 0.001$), and $Tau^2 = 30.90$. Prediction intervals (95%) indicate dispersion between 28.94-59.70. The relation between social anxiety scores and year was non-significant ($B = 1.04$, *95% CI* [-0.06, 2.15], $t = 2.42$, $p = 0.06$). See the regression line in Figure 6. The Q test suggests that variability did account for more than sampling error ($Q = 41.14$, $df = 5$, $p < 0.001$, with $Tau^2 = 18.09$ and $R^2 = 41\%$.

Figure 6

Regression Line Between Date and LSAS SA Score



Discussion

I conducted a series of meta-regressions to investigate how social anxiety symptom severity scores have changed over time among Canadian undergraduate students. Both media and researchers alike have promoted the idea that anxiety is on the rise, to the point of using the term “epidemic”. Given that the data supporting this claim are sparse, these reports may be evoking unnecessary fear within the community and directly impacting the way and extent to which resources are allocated. Four separate meta-analyses were conducted to capture the most frequently used social anxiety measures when studying Canadian undergraduate students. To our knowledge, ours is the first study to examine the pattern of severity of social anxiety experiences among undergraduate students over time in Canada.

I see two possible interpretations of our findings, given that there was no increase in social anxiety symptom severity across time when using several commonly used measures,

but I did observe an effect on one social anxiety measure. When using the SPS, the SIAS, or the LSAS, no relation was observed between date and SA score. Although there exist many claims of psychological symptom severity rising, the first possible interpretation is that this is not the case; social anxiety levels do not appear to be rising. Indeed, most of my results support the idea that there is no increase in social anxiety severity across time. However, to adopt this interpretation, we need to understand why results from the meta-regression of SPIN scores demonstrate a significant relation when meta-regressions with the other measures did not. It is important to consider the studies that were included in the SPIN meta-regression. Seven of the 14 studies were published within the same year, with many coming from the same university around the same time. The smaller date range and the similarity of contexts from which participants were recruited may have impacted the relation between date and social anxiety score, artificially inflating the increase in social anxiety scores on the SPIN over time.

A second possible interpretation is that severity scores are increasing over time, and that the SPIN demonstrates this increase more effectively. The SPIN may assess social anxiety symptoms more comprehensively in terms of symptoms compared to measures such as the SIAS or the SPS, which each measure different sets of symptoms of SA (i.e., interaction anxiety and performance anxiety). Thus, when considering all facets of social anxiety (i.e., by using the SPIN) in general samples, scores may have in fact increased over time. Indeed, the SPIN may better capture score variation and social anxiety experiences that are relevant to undergraduate students, having been validated in non-clinical student samples (Radomsky et al., 2006). Given that both the SPIN and LSAS assess for SA more comprehensively, we might have expected similar outcomes in the two meta-regressions. However, the LSAS was developed to measure symptoms in clinical populations. As such, the item content may be specific to clinical experiences of SAD and may thus not capture

heightened levels of SA in non-clinical samples. Similarly, the general undergraduate student population may not endorse the same types of items that a patient would. The LSAS items focus on a large range of daily interactions and situations that one could encounter (e.g. “resisting a high pressure salesperson”, “calling someone you don’t know very well”), whereas the SPIN items highlight situations that are more commonly seen as distressing even in those who do not have elevated levels of SA (e.g., “I am afraid of people in authority”, “I would do anything to avoid being criticized”). These SPIN items may be more normatively uncomfortable for a larger proportion of the population. It is thus possible that the items on the LSAS do not capture undergraduate elevated social anxiety symptoms if not at clinical threshold. Moreover, fewer studies identified in my systematic review reported SA scores using the LSAS. Thus, the meta-analysis and meta-regression for the LSAS were conducted with only seven studies and may have been underpowered to detect changes over time. Indeed, the p-value approached significance, and the lower confidence interval value approached zero. However, effect sizes may be inflated in small samples, reducing their reliability in meta-analysis. Indeed, in their meta-analysis of meta-analyses, Levine et al. (2009) found that effect sizes increased as meta-analysis sample sizes decreased, suggesting that we must be cautious interpreting the findings from the LSAS meta-regression. Taken together, a plausible alternative interpretation of our findings is that social anxiety severity is increasing among undergraduate students, as measured by the SPIN and LSAS, but that I did not detect this increase on the LSAS because the analysis was underpowered. However, given that the findings from the SIAS, SPS, and LSAS showed no significant relation between date and symptom severity I cautiously argue that any time-related increase in social anxiety severity among undergraduate students in Canada is limited**.**

Another alternative consideration is that individuals who attend university to complete an undergraduate degree may have changed across time. Perhaps social anxiety severity has

increased over time, but due to the social demands of university, these individuals have chosen a different path post-high school and therefore are no longer represented among the undergraduate population. If this were the case, we would expect to see fewer undergraduate students with high levels of social anxiety. There is also evidence to show that Canadian postsecondary programs have experienced a decrease in domestic student enrolments and an increase in international students (Choi & Hou, 2023). It is possible that the student body has evolved in other ways over the years, which merits further investigation. Studies assessing whether fewer socially anxious individuals attend university compared to earlier years would be helpful in this determination.[1]

Another important possibility is that the severity of some mental health challenges other than social anxiety are on the rise. When we look at various disorders or other mental health challenges (i.e., suicidality) we may see a different pattern of results over time. Indeed, Richter et al. (2019) found that reported increases in mental health problems were based on suicide rates or rates of treatment seeking behaviour as measures of overall psychopathology, with a disproportionate research focus on depression. Thus, although there may be a slight increase in depression symptoms and suicidality, our findings do not show with certainty that social anxiety severity is increasing among Canadian undergraduate students. Our findings highlight the importance of assessing symptoms for specific problems rather than generalizing from certain types of problems to mental health overall (see also Richter et al., 2019). These results are relevant to one type of anxiety within one specific population, leaving many unknowns regarding implications for the greater population. It is possible that other populations with differing characteristics (e.g., teenagers, Americans) could demonstrate different patterns of social anxiety severity over time. Yet, claims are being

[1] We are grateful to an anonymous reviewer who suggested the two alternative interpretations of our findings, which we subsequently considered and included in the manuscript.

made about increases in anxiety specific to youth and the post-secondary population in the research literature (not peer-reviewed; Scheffler, 2019) and mainstream media (e.g., Flannery 2019; Payne, 2024). However, based on the results of this study and in the context of Canadian undergraduates and social anxiety in particular, the use of "epidemic" language is unjustified.

Social Anxiety Mean Scores

Although not the primary focus of our study, I found that mean scores from both the SPIN and LSAS measures were higher than their suggested clinical cut-offs. The mean SPIN score was 22.45 with a possible dispersion of scores from 15.60-29.21. This finding indicates that most scores are above the recommended clinical cutoff score of 19, which could be interpreted in several ways. Higher social anxiety experiences among undergraduate students than the clinical cutoff may indicate that such severity is normative for this stage of development. Undergraduates most often fall into the emerging adulthood stage of development and therefore, are likely to experience major transitions that impact their developing social identity (Arnett, 2011). Some researchers have already advocated for the clinical cut-off of the SPIN to be higher in university-aged students (e.g., Stewart & Mandrusiak, 2007), suggesting that experiences measured on the SPIN are appropriate at this age, rather than clinical in nature. Alternatively, the existing cutoff scores may be lower than appropriate, and a cutoff score of 30 may be more appropriate (Radomsky et al., 2006; Stewart & Mandrusiak, 2007) or social anxiety severity may be higher than previously assumed. For the LSAS, the reported mean in our study fell above the clinical cut-off of 30, with a score of 44.32 indicating levels consistent with mild social anxiety disorder. The LSAS has not been validated in university populations, making it difficult to interpret this finding. Nonetheless, some studies continue to use the LSAS with students, a measure normed to clinical populations. When tests are used with populations that were not part of the

normative group, these results risk being invalid and should be interpreted with caution (Hunsley & Di Giulio, 2001). For instance, research findings indicate that score distributions vary among similar testing measures when the measure is not normed appropriately, such as using internet questionnaires with paper-based norms (Buchanan, 2010). Nonetheless, many SA measures have demonstrated equivalence across paper and internet administration (Hedman et al., 2010).

Strengths and Limitations

I analysed scores on standardized and well-validated measures to examine social anxiety severity to provide a clear picture of the patterns of social anxiety over time without the possible impact of using several methods at once, limiting to diagnostic categories, or changing classification criteria over time. The current study sought to answer a highly specific question within a specific population, Canadian undergraduate students. This specificity reduced the number of confounds when interpreting our data and enhanced the accuracy of our findings. A second limitation relates to sample representativeness. Because probability sampling measures were not used, the samples identified were not intended to be representative of Canadian undergraduate student populations and thus cannot speak to the greater Canadian undergraduate population. Nonetheless we did identify a pattern observed over time from samples reporting higher than expected SA symptom severity. Furthermore, to my knowledge, ours is one of few studies examining the trajectory of social anxiety symptoms rather than diagnosed social anxiety disorder. Investigating the spectrum of social anxiety symptoms and severity provides a more holistic understanding of the impact and impairment associated with social anxiety that many young people may face every day. I identified a relatively large number of studies for our meta-analysis which enabled multiple meta-regressions that not only enhanced the power of our analysis but also allowed me to compare results from different measures and consider variations in findings. Adhering to

PRISMA-P guidelines and the Cochrane Handbook and, consulting with experts in systematic review and meta-analysis to ensure quality analyses and considerations were taking place ensure the methodological rigour of the study. Nonetheless, we must note that quality assessment scores varied substantially by study, often related to minimal provision of detail about methods. Although the number of studies per analysis was generally sufficient, the total sample of studies limited our ability to analyze multiple covariates at a time. A small number of studies, particularly in the LSAS and clinical SPIN datasets meant that we may not have had enough studies to estimate our findings reliably. Lastly, although our findings did not demonstrate a general change in symptom severity, we did not test whether there was an increase in prevalence (i.e., number of people reporting symptoms). We did not measure score distribution changes or number of participants with symptoms meeting diagnostic criteria; as such, the question of increasing prevalence of SA remains open.

An important limitation of this study relates to the concept of sex and gender. Most studies identified in our systematic review described the variable of "sex," though it remained unclear how this variable was conceptualized (e.g., sex-assigned-at-birth vs gender identity) and measured (e.g., self-reported as sex vs gender). Moreover, very few studies reported on gender, either in addition to sex-assigned-at-birth or on its own. When sex/gender was reported, it was done so as the proportion of female vs male participants in a given study. As such, using sex as a moderator in the meta-regressions would be inappropriate given that it would supply information about the sex proportions at a study level, rather than sex or gender differences at an individual or population level. In the literature generally, there appears to be increased awareness of the importance of measuring sex-assigned-at-birth and gender identity separately, and including participants who identify as transgender, non-binary, and gender non-conforming. It will be important for future research to explore both sex-assigned-at-birth and gender identity as it relates to the relationship between SA and time, to enhance

generalizability.[2] Because I limited our study to examining the date and not other possible moderators or covariates, it is likely that other factors may be impacting the levels of social anxiety reported in undergraduate students.

I also comprehensively searched many databases, considered unpublished data, and conducted a second review of the data to include as many recent studies as possible (pre-pandemic). I determined data collection based on date of publication, given that most studies did not include the date of data collection. As such, I do not know the precise dates when mean scores were obtained within each sample. I intentionally included social anxiety scores that were likely to have been collected pre-pandemic, to avoid conflating the effects of time with the effects of a global health and social crisis. Indeed, the pandemic had a sizable impact on mental health worldwide (Hossain et al., 2020). Surveys and early research indicate substantial increases in anxiety because of the pandemic (Santomaura et al., 2021, Kindred & Bates, 2023). Given the various social distancing measures that were put in place, risk factors associated with SA, such as avoidance of social situations, increased (Hashim et al., 2024; Vriends et al., 2014). Consequently, several researchers investigated the impact of the pandemic on SA symptoms in the population. In their systematic review and meta-analysis, Hashim et al. (2024) found a prevalence rate of SAD of up to 34% during the pandemic, which was greater than the rates reported pre-pandemic. Similarly, Kindred and Bates (2023) found that reported levels of SA increased in the general population, particularly for women and low-income individuals. Thompson et al. (2021) also reported an increase in SA symptoms in adults during the COVID-19 pandemic, as social interactions decreased and the setting of these interactions changed (e.g., virtual).

Researchers focused on individuals who had received treatment for their SAD five years prior to the pandemic, to determine whether the treatment outcomes were maintained

[2] Please refer to Appendix K for a summary of results from sex-based analyses.

during the pandemic (Carlton et al., 2023). They found that participants' clinician-rated SAD symptomatology significantly increased from their post-treatment assessment to their COVID-19 follow-up. The researchers hypothesized that the increase in SA may be partly attributable to the social avoidance brought on by the social distancing mandates. Arad et al. (2021) made similar conclusions when investigating SA severity in socially anxious university students in Israel. They found that in a typical academic year, SA symptoms decrease over time, as students are consistently exposed to various social situations. However, during the COVID-19 pandemic, when social distancing measures were put in place, SA symptoms remained stable over the academic year.

Although the studies described above are not specific to Canadian undergraduate students, there was a general trend towards increased SA symptoms during the pandemic, suggesting that including data collected during the pandemic might have impacted my results. Specifically, we could potentially expect to see a rise in SA symptoms during the pandemic, with a gradual decrease as social distancing measures were reduced and removed, and students were once again exposed to typical social situations. As data collected during this period continues to be published, future research on the impact of the pandemic on Canadian undergraduate students' current SA symptoms post-pandemic is vital to understanding whether there are lasting impacts of the social distancing measures on this population. This increased understanding could better inform future resource allocations related to SA in undergraduate students. Future research overall should continue to explore social anxiety experiences along the spectrum in this population, which would allow for future analysis to draw more firm conclusions.

Conclusion

Despite some limitations, the results from this meta-analysis provide new and relevant information regarding social anxiety experiences among Canadian undergraduate students.

Furthermore, it is the first of its kind to demonstrate how the pattern of these rates presents over the course of time. The summary mean scores reported from each measure emphasize the presence of social anxiety symptoms in this population, and in some cases, scores surpassing clinical thresholds. This information is relevant and crucial for university settings and clinicians as subthreshold levels of social anxiety can also lead to impairment, particularly in the academic environment (Fehm et al., 2007; Stein et al., 2000).

I did not observe a relation between date and symptom severity with most measures used over time. This lack of significant increases in rates over time may be attributable to how we defined our population of interest, noted above. However, the finding begs the question – what is it about Canadian undergraduate students that leads to higher-than-expected levels of social anxiety, and how are they then coping in the socially demanding world of post-secondary education? Future research should further explore unique factors that may help explain higher scores of SA among Canadian undergraduate students. It would also be helpful to understand if these findings extend to other Canadian groups or to undergraduate students outside of Canada. Furthermore, exploring resiliency and other factors that allow for the continuation of post-secondary education despite these notable challenges should be explored.

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CHAPTER THREE:

BRIDGE

I conducted Study 1 to attempt to understand the true patterns of social anxiety symptom severity among Canadian undergraduate students. It is important to either validate or dismiss extreme claims with empirical data, given the range of important implications of a potential increase in social anxiety symptoms over time. I chose to examine symptom severity by looking at mean scores from well-validated samples as opposed to diagnostic thresholds to increase sample size and to better capture the symptom presentation of those who experience social anxiety symptoms across the continuum. Because SA symptoms can cause distress and impairment even when below threshold, understanding the pattern of symptoms over time better captures undergraduate lived experience in a quantitative way with the use of meta-analysis and meta regression. Study 1 had two important findings. First, only one measure demonstrated a significant relation between symptom severity and time, indicating little to no change in symptom severity overall. Although this study cannot determine whether SA overall is rising in terms of prevalence, it indicates that there does not appear to be a drastic increase in severity of social anxiety among Canadian undergraduate students. When carefully selecting the data through the process of systematic review, I ended data collection in 2021 to avoid any articles that would have been published with data that were collected during the pandemic. This decision was important because of the potential impact and confound that the pandemic could have had on anxiety scores. Indeed, numerous studies highlight its impact on mental health. Second, the LSAS and the SPIN identified a mean score that was higher than the recommended clinical cut-off scores for these respective measures, underscoring the need to further understand the heightened presentations being reported among this population.

Thus, for Study 2, I wanted to understand two things: 1) what is the lived experience of social anxiety among undergraduate students, given the higher than clinical threshold reported severity, and 2) how did the pandemic impact SA experiences? Although numerous studies have emerged exploring the impact of the pandemic on university students, many were quantitative in nature and/or generalized to a broader look at anxiety. A qualitative analysis and understanding of social anxiety during and post-pandemic were needed to answer the nuanced questions that emerged from Study 1 and to understand potential patterns of SA since then. This new information is necessary to inform our understanding of social anxiety, policy, and clinical implications for emerging adults.

CHAPTER FOUR: STUDY 2

ABSTRACT

The Covid-19 pandemic had significant mental health impacts worldwide. Recent research suggests increased social anxiety symptoms in adults during the pandemic. Given the intersecting social demands of undergraduate studies and stage of emerging adulthood, social anxiety symptoms are prevalent within this population. I sought to explore and better understand the lived experience of socially anxious undergraduate students who experienced university before and after the pandemic. I conducted a qualitative study to gain an in-depth understanding of how socially anxious students (Social Phobia Inventory Score>15) experienced the pandemic (including lockdowns and return to in-person learning) during their undergraduate studies. We included 14 semi-structured interviews ($\bar{x}$ = 21.28, SD = 1.13; 10 women, 2 men, 2 non-binary) in the reflexive thematic analysis. The average students' SPIN score was 42.14 (SD = 11.32), with 8 participants' scores presenting as severe or very severe social anxiety (scores > 41). Using reflexive thematic analysis, we generated 6 themes, and 18 subthemes centered around social engagement, academic success, support, identity, and pandemic-related symptoms. Our findings suggest that Canadian undergraduate students are not only experiencing high levels of social anxiety symptoms, but that the pandemic heightened these symptoms in a multitude of ways across various domains.

IN DEPTH ANALYSIS OF SOCIAL ANXIETY EXPERIENCES AMONG UNDERGRADUATE STUDENTS DURING AND AFTER THE PANDEMIC

The Covid pandemic impacted people's social engagement and well-being (Gabet et al., 2023; Montero-Marin et al., 2023), especially for those with pre-existing mental health challenges (Lewis et al., 2022). Yet much remains unknown about the varying lived experiences of different populations. Undergraduate students with social anxiety (SA) report challenges in communicating with instructors, presentations, student experiences, social skills, attention, and social-emotional functioning (e.g., Archbell & Coplan, 2022; Russell & Topham, 2012). Understanding how the pandemic impacted these pre-existing challenges is vital to ascertaining current needs. I examined how the Covid pandemic impacted socially anxious undergraduate students.

Social anxiety Disorder (SAD) is the most common anxiety disorder (Kessler et al., 2005) and is characterized by a fear of judgement from others in a social context (American Psychiatric Association, 2022). This fear can include worries about eating in public, speaking with authority figures, and other social situations. Anxiety is out of proportion to the situation and leads to social avoidance and/or intense distress (APA, 2022). However, SA exists on a spectrum of severity, regardless of whether people's symptoms meet threshold diagnostic criteria (Dell'Osso et al., 2014). SA experiences are exceedingly common. (Ruscio, 2010). Indeed, researchers argue that SA should be understood along the spectrum (Clow et al., 2025; Crome et al., 2010) with evidence that subthreshold symptoms can also cause notable distress and impairment (Lee et al., 2022).

The Cognitive-Behavioural model is the most widely used framework to understand the development and maintenance of SA (e.g., Clark & Wells, 1995; Moscovitch, 2009 Rapee & Heimberg, 1997; Wolitzky-Taylor & LeBeau, 2023), with evidence for its applicability to adolescents (Leigh & Clark, 2018; Ranta et al., 2014). The model posits that individuals with SA are invested in being positively assessed by others and perceive others as highly critical.

Symptoms of SA occur in potential social evaluative situations (e.g., class presentation, attending a party). Clark and Wells (1995) posit that negative beliefs about the self are activated in social settings, leading to perceived threats in their environment. When an interaction occurs, people generate a mental representation of how they expect others to perceive them, while also looking out for any external social threat. Moscovitch (2009) suggests that those with SA symptoms share a feared stimulus– the aspects of themselves that they perceive as flawed or socially unacceptable. Because they perceive flaws within themselves, they then fear that others judging them will confirm those flaws, leading to SA symptoms. Moreover, people with SA typically believe others' expectations are unrealistically high, inevitably leaving them to feel inadequate and to believe their desired behaviour is unattainable (Moscovitch, 2009). These beliefs are exacerbated by the physical, cognitive, and behavioural symptoms that reinforce the negative beliefs about the self (Rapee & Heimberg, 1997). For this reason, socially anxious individuals use safety behaviours (e.g., avoidance, sticking with a person who feels safe, wearing headphones in public, using a substance to cope; Hirsch et al., 2004), which are strategies to attempt to prevent a feared outcome. However, evidence shows that safety behaviours maintain or worsen SA over time (McMAnus et al., 2008; Salkovskis, 1991). These behaviours enhance vigilance towards possible social threats. Yet, they are counterproductive, as this vigilance prevents individuals from disconfirming their predictions.

Social Anxiety and Emerging Adults

SAD typically begins during adolescence or early adulthood (Kessler et al., 2005; McEvoy et al., 2011) and has a chronic course when left untreated (Keller, 2006; Wittchen & Fehm, 2003). This stage of life—emerging adulthood (Arnett, 2011)—involves many transitions and new independence. Identity development includes understanding who one is in relation to others and what they desire in relationships, while also being met with self-

doubt and worries associated with others' perceptions. Thus, SA is common in undergraduate populations with higher-than-expected levels of subthreshold SA among young people (Clow et al., 2025; Jefferies & Ungar, 2020; Kudryk et al., 2024).

Social Anxiety in University

Arnett (2004) described the high expectations of emerging adults, particularly those in higher education who view "university life" as a social, independent, and positive experience. Students' academic path can change during undergraduate studies (Arnett, 2004), due to shifting interests or potential safety behaviour use (e.g., avoidance, attempts to accommodate symptoms). It is thus vital to explore to what degree mental health challenges impact the experience of university life among emerging adults.

Researchers have long expressed concern over university student mental health (McDonald et al., 2017; Xiao et al., 2017). International and Canadian studies indicate significant levels of SAD in this population (e.g., Brook & Willloughby, 2015; Leahy et al., 2010; Stewart & Mandrusiak, 2007; Tillfors & Furmark, 2006). In our recent meta-analysis, SA mean scores were above the normed clinical cut-offs among Canadian undergraduate students prior to the pandemic, suggesting that higher SA scores are normative among emerging adults (Clow et al., 2025).

University demands often involve socially anxiety provoking situations, such as social activities, eating in large public settings, developing new relationships, public speaking, and raising hands in class. Tillfors and Furmark (2006) suggested that SA does not act as a barrier to attending university, at least in its mild form. Yet, little is known about socially anxious undergraduate students who persist in their studies, how they perceive academic demands, and what predicts withdrawal. As SA severity increases, we tend to see challenges with social skills, attention, and learning in academic settings (Bernstein et al., 2007), as well as the use of avoidant safety behaviours, such as not attending classes (Russell & Topham, 2012).

Socially Anxious Students in the Pandemic

When the pandemic began in 2020, services and courses were moved online, ensuring physical isolation across much of the world. Undergraduate students were sent home (Ministry of Colleges and Universities, 2020; Tasso et al., 2021), and later some students moved into residence with strict distancing restrictions in place (University Affairs, 2022). Consistent with cognitive-behavioural models of SA, which link reduced exposure to feared stimuli with symptom exacerbation (Clark & Wells, 1995), Covid restrictions may have increased avoidance, alleviating some symptoms related to social discomfort in the short term, but exacerbating SA symptoms and learning challenges in the long-term and when social activities resumes, after little to no opportunity to disprove maladaptive beliefs.

Findings about the pandemic's impact on mental health are mixed, with some evidence that symptoms and impairment worsened during the pandemic (e.g., Legros & Boyraz, 2023) and some reporting similar or improved mental health during the pandemic (Hamza et al., 2021; Repo et al., 2023). Hamza et al. (2021) noted a decrease in reported stressors among students during the pandemic, suggesting either that students were adapting over time, or that there was a decrease in competing demands. In a systematic review, SA among the general public increased during the pandemic (Kindred & Bates, 2023). CBT models of SA predict maintenance or worsening of symptoms; however, the mixed findings are not fully consistent with such models. Thus, it remains unclear whether the pandemic, social isolation, increase in forced avoidant behaviours, and/or return to in-person learning impacted SA among undergraduate students. Indeed, students who transitioned to university during the pandemic may represent a particularly vulnerable group considering this expansive developmental period.

Social Engagement

Peer and romantic relationships are influential in shaping emerging adulthood

(Padilla-Walker et al., 2017). The social experience associated with university including friendships, social gatherings, and involvement in campus activities, is an expected and encouraged part of the learning experience that has longstanding positive effects on one's life (Bowman, 2010). Pre-pandemic, socially anxious post-secondary students identified social discomfort and challenges forming relationships (Russell & Topham, 2012). Social distancing brought relief from social expectations, which in some cases increased academic engagement (Hendrick et al., 2023). Yet, removing social experiences also brought on loneliness, reduced belonging, poor opportunities to form relationships, isolation, and a general inability to "emerge into adulthood" (Hendrick et al., 2023; Vaterlaus et al., 2021). North American post-secondary students who experienced pre-pandemic SA symptoms also reported high loneliness during the pandemic (Ho & Moscovitch, 2021). However, higher SA also predicted less distancing, more fear of negative evaluation, and more social seeking efforts, suggesting that greater feelings of loneliness act as a motivator to affiliate (Ho & Moscovitch, 2021). This finding is surprising in the context of CBT models of SA, where we might expect relief from the reduced need to engage socially, rather than engagement seeking, even when experiencing feelings of loneliness. Thus, a more nuanced understanding of these experiences is essential to understand how the pandemic affected socially anxious undergraduate students. **Research Question 1:** *How do socially anxious students feel the pandemic impacted their social engagement in university?*

Resources and Support

Before the pandemic, people with SAD reported managing their challenges by themselves, felt embarrassed to seek help, were unaware of available accommodations, preferred informal support, and did not know where to seek treatment (Goetter et al., 2020; Salzer et al., 2008; Theurel & Witt, 2022). Post-secondary students also perceive their SA challenges as disregarded by universities (Topham, 2009; Russell & Topham, 2012; Stewart

& Mandrusiak, 2007). Positive relationships between students and university staff leads to student success, and a lack of support from faculty negatively impacts learning and socioemotional functioning, yet many students describe faculty as uncaring (Archbell & Coplan, 2022; Rapose et al., 2020; Senter, 2024). Friendships developed on campus can lead to feelings of closeness and classroom community which has shown to increase academic achievement due to more knowledge sharing behaviours (Archbell & Coplan, 2022; Brook & Willoughby, 2015). Although active participation may lead to more successful learning, socially anxious students have greater challenges in such participation.

Since the pandemic, students report disappointment with university communication and support. The reduced connection with faculty limited student engagement with material, in turn affecting their studies (Hendrick et al., 2023). Few university students sought out university or professional support during the pandemic highlighting a need to improve student mental health, and suggesting that institutional support and the campus climate play an important role (Legros & Boyraz, 2023). Undergraduate students reported a strained university-institution relationship, feelings of missing out on the "university experience", a desire for student-professor relationships and in-person learning, and disconnection from the university itself (Vaterlaus et al., 2021). Consistent with cognitive-behavioural models, students with SA may be more hesitant to seek support due to fear of judgement. Additionally, a rising demand for services and increase in mental health severity has led to staff burnout and a lack of preparedness (Watkins et al., 2011). It is imperative to better understand how SA symptoms and university resources may impact prevention and support efforts on campus. **Research Question 2:** *How supported did students feel by the university in navigating their social anxiety challenges during the pandemic?*

Academic Performance

The Covid pandemic created a unique experience whereby for the first time,

undergraduate students could not complete their post-secondary education in-person. Virtual platforms were created for courses, which led to disruptions to grades, courses and placements, impacting learning, attention, and motivation (Herold & Chen, 2021; Means & Neisler, 2020). Yet, some studies report no preference between in-person and virtual communication for those with SA (Doorley et al., 2020). A general sample of students appreciated the flexibility of online learning, whereas others noted difficulties with retaining information (Vaterlaud et al., 2021) and another study found an increase in student GPA (Tillinghast, 2023). Students with SA report higher discomfort in active learning situations, regardless of academic ability or understanding, which has been linked to lower grades (Cohen et al., 2019). Cognitive-behavioural models of SA would predict that reduced social interaction may lead to increased academic performance *via* decreased anxiety. However, given that avoidant behaviour exacerbates SA, students may experience greater challenges coping in the classroom upon social restrictions being lifted. **Research Question 3:** *How were learning and academic performance impacted by the pandemic for socially anxious undergraduates?*

Researchers have begun examining pre- and post-pandemic rates of mental health symptoms (Hamza et al., 2021; Kindred & Bates, 2023; Tefera et al., 2025). However, understanding how pandemic-related changes impacted the day-to-day social and academic functioning is crucial to inform resource allocation, university supports, and prevention and intervention efforts.

The Present Study

In this study, I explored the lived experience of socially anxious undergraduate students who experienced university before and after the pandemic, using a reflexive thematic analytical approach (Braun & Clarke, 2019). Existing research is primarily quantitative, preventing a richer understanding of undergraduate lived experience. Some of

the existing data contradicts evidence-based theoretical models of SA (e.g., increased seeking of social interaction, improved mental health). Because SA could have disrupted the university pre-pandemic experience, it is helpful to understand how the pandemic improved, maintained, or worsened SA experiences. A qualitative research approach provides nuanced information that can be missed in quantitative research (Lim, 2024), enabling us to attempt to explain surprising findings in the literature. By interviewing undergraduate students who experience both clinical and subclinical levels of SA, I increased the likelihood of capturing impairing symptoms along a spectrum of severity. I developed themes and sub-themes that provided meaning and understanding of the interview data. Following the RTA approach, I relied on the data provided and the analyst's interpretation of it to guide the results without hypotheses or being heavily based in theory.

Methodology

Study Design

I conducted virtual, one-on-one interviews between July, 2022, and August, 2023, to reduce pandemic-related risks among vulnerable populations, and reduce the anxiety-inducing impact of a potential perceived social-evaluative event for socially anxious participants.

Participant Recruitment and Data Collection

Participants were undergraduate students from two universities in a medium-sized Canadian city. Ethical approval was granted from the University of Ottawa Office of Research Ethics and Integrity (H-11-21-7578) and the Carleton University Research Ethics Board-B (Project # 117716). See Appendix K for the Certificates of Ethics Approval. The lead researcher conducted all interviews. We recruited participants via convenience sampling, social media (e.g., Instagram, Facebook), community posters, and from an existing database within our research lab that included people with subclinical and clinical levels of SAD, as

confirmed by a semi-structured interview (ADIS-5; Brown et al., 2014). Interested participants completed an online screening questionnaire package which included a sociodemographic measure and the Social Phobia Inventory (Connor et al., 2000), which has been validated with both French- and English-speaking undergraduate students (Radomsky et al., 2006). All interviews were completed in English. The consent form for the eligibility screener can be found in Appendix M. Participants with scores of 15 or higher on the SPIN were invited to participate. Given that a minimum score of 19 indicates possible mild social anxiety (Connor et al., 2000), we used a cut-off of 15 on the SPIN to increase the likelihood of accessing participants with both subthreshold and threshold symptoms. I then called participants who met this requirement to assess eligibility. Participants were eligible if they 1) were between 18-25 years old, 2) were current full-time undergraduate students at the two aforementioned universities, 3) scored higher than 15 on the SPIN, and 4) were in Canada during the interview, to ensure safety protocols (e.g., risk assessment, available resources) could be used if needed. Participants were compensated with entry into a draw for one of two cash prizes.

I conducted 27 interviews via Zoom (Zoom Video Communications, Inc., 2022). Of the 27 interviews, I decided to include only the interviews that were conducted with third- and fourth-year students (n=14), who had experienced university pre, during, and post pandemic to best address our research questions regarding how the pandemic impacted socially anxious students. The first- and second-year interviews were notably different because they had not experienced university prior to the pandemic and its social restrictions. Thus, focusing on third and fourth year students allowed me to conduct a clear and specific analysis focused directly on understanding how experiencing the pandemic impacted students' social anxiety during the pandemic and in the longer-term. The consent form for research participation can be found in Appendix N. A debriefing form (see Appendix O) was

reviewed at the end of the interview and sent to the participant via email.

Reflexive thematic analysis (RTA) was selected as the analytical approach for its flexibility and ability to establish meaningful patterns across data. The concept of saturation is not appropriate when using RTA, because it relies on the subjective experience of the researcher analyzing the data, meaning data cannot become saturated or redundant during RTA (Braun & Clarke, 2019). Instead, I focused on the quality of the data, ensuring depth of information from each interview. Braun and Clarke have put forth significant work to clarify what constitutes an RTA approach and highlight common errors. These errors include having a theme constitute a topic summary rather than a meaning-based story, separating one's experience away from their reflexive analysis, and using any quantitative data or statistical terms which shifts the analysis away from reflexivity and attempts to use data-driven understanding (Braun & Clarke, 2019). Thus, the frequency at which a code or theme was mentioned does not reflect the importance or development of a theme. Rather than seeking statistic generalizability, RTA highlights meaningful patterns of information that can inform how we understand a phenomenon or theory and consider how insights could be transferable to possible others while recognizing its value on its own (Braun & Clarke, 2021). Interviews were audio-recorded and ranged from 36-89 minutes, with a mean of 62.3 minutes. Identifying information was removed and recordings were transcribed verbatim by trained volunteers. The semi-structured guide (Appendix P) included questions focused on SA experiences, university experience, and the role of the pandemic.

Data Analysis

I uploaded transcripts to Nvivo 12 Software for analysis. The six stages of RTA used to develop themes were: 1) familiarization; 2) coding; 3) generating initial themes; 4) developing and reviewing themes; 5) refining and naming themes; and 6) writing up (Braun et al., 2023). I completed all coding and consulted with the research supervisor when

reviewing codes. I used latent and semantic analysis to code the data and then organized codes into possible subthemes and themes. In keeping with RTA, my subjective experience served as an analytical tool to shape the interpretation of data (Braun & Clarke, 2021). Codes were revisited and evolved throughout the process. The organization of codes led to the development of themes and subthemes that contributed to a comprehensive understanding of undergraduate experiences throughout the pandemic.

Identifying the researcher's role and experience within the context of their analysis is an essential part of the reflexive process (Braun & Clarke, 2019). As first author, I have professional experience working with young people up to emerging adulthood, and often students, in the context of assessment and treatment. This lens allowed me to not only build rapport with the participants but to attune to participants' emotional experience and consider the impact of their experiences within my own foundational use of the cognitive-behavioural model. My own highly cautious approach to during the pandemic (e.g., extended terms of physical distancing and mask-wearing) led to a profound curiosity regarding behaviours related to health-focused fears versus those associated with perceived social risk. My background as a longstanding post-secondary student contributed to greater attention to perceived academic needs with an interest in how the academic institution could better support their students. Throughout analysis, I was mindful of how my own critical lens shaped my interpretation of the data.

Results

Sixty-one students completed the online screener; 27 participants completed the semi-structured interviews, and 14 were third- or fourth-year students who had experienced university before, during, and after the pandemic. Student age ranged from 20 to 24 years ($\bar{x}$ = 21.28, *SD* = 1.13). Ten participants identified as women, two as men and two as non-binary. See Appendix Q for detailed sociodemographic information. Despite efforts to

capture a spectrum of severity, including subthreshold presentations, the mean SPIN score was 42.14 (*SD* = 11.32), with 8 participants' scores in the severe or very severe social anxiety range (scores > 41). See Table 2 for a summary of themes and subthemes.

Table 2

Themes and Subthemes Identified

Themes	Subthemes			
Virtual Learning was Preferred but Harmful	Virtual Learning Facilitated Safety Behaviours and Increased Avoidance	Virtual Learning Improved Grades but Not Knowledge	Positive Virtual Experience	
Although Mental Health Support is Available it is Often Inaccessible	Waitlist is too Long or Full to Meet Student Needs	Lack of Awareness and Ease of Access to University Supports	University Support Seems Superficial	University Support is Enough
Pandemic Blurred the Lines Between Normal Identity Development Versus Pandemic-Associated Challenges	Pandemic Prompted Needed Self-Discovery	Restrictions Created Barriers to Identity Exploration / Increased SA Post-Pandemic	Pandemic Led to Increased Motivation to Engage Once Restrictions Were Lifted	
Professor Support Impacts Learning in the Classroom	Professors' Approach Increased Social Distress	Professor Openness Allowed SA to Feel Manageable	Professors' Approach Changed with Pandemic	
Pandemic Impacted Skill Development	Loss of Skill Post-Pandemic	Slow Improvement with		

		Exposures Post-Pandemic		
The Development of Pandemic Specific Social Anxiety Symptoms	Unclear Pandemic-Related Social Rules	More Connection During Pandemic	Impact on Social Relationships	

Theme 1: Virtual Learning Was Preferred but Harmful

Students frequently preferred virtual learning as it led to greater achievement in school and reduced SA symptoms. However, it also reduced engagement and learning. To capture the impact of virtual learning, three subthemes were generated.

Subtheme 1: Virtual Learning Facilitated Safety Behaviours and Increased Avoidance

Students engaged in safety behaviours and relied on a safety person in social situations (eating at cafeteria, social events, time on campus). Restrictions reduced most social exposures (e.g., attending class in person), which reduced students' confidence and willingness to socialize. Some students considered dropping out or did drop to part time due to being overwhelmed. Social avoidance was common during and after restrictions, which sometimes led to reduced SA symptoms. Yet, for some the lack of exposure enhanced SA symptoms.

> *I didn't really feel too much social anxiety mainly because I didn't really have to socialize. So I like- I feel like it didn't fix a problem, I just didn't have to look at it anymore, you know what I mean? I feel like the opportunity to grow, I just didn't have and like which was kind of annoying cause I did notice that these were things that made me really anxious and nervous and I want to eventually get over these things. But then I felt like I literally could not. I just had this giant wall in front of me, the wall being my laptop. (ID11, non-binary, 21)*

The virtual platform facilitated disengagement, and it was common to have no interaction in online discussions. Students were uncomfortable with virtual interaction, yet appreciated the social disconnect, which increased safety behaviours (e.g., keeping the camera off, not speaking).

> *Um, you could just turn your camera off, if you didn't want them to see you, you could talk through mics. But also it's like I wasn't talking to a person, I was just talking to my computer screen right. So it's a lot easier. I don't have to look at their body language. I don't have to look, I don't know, notice anything about them. (ID10, male, 20).*

Some students engaged only for participation marks and some left during break-out rooms. Students avoided professors online, but others felt more at ease when interacting virtually. Post-pandemic, some students avoid any unnecessary in-person contact, with online courses acting as safety behaviours when anxious.

> *When they have office hours it's on zoom and everybody else can hear your questions, there's no like personal one-on-one. (ID62, woman, 21)*

Subtheme 2: Virtual Learning Improved Grades, But Not Knowledge

Students felt emotionally disconnected from university, noting that school did not feel real or like something to take seriously. Students did not feel like they were learning, even when passing their courses. The workload felt lighter, open-book exams made it easier to succeed (though unenjoyable), and students appreciated the ability to revisit lectures online. Students found it hard to focus on virtual lectures, describing them as less dynamic or the discomfort of engaging virtually as distracting. Fewer students reported no impact or a decrease in grades due to reduced motivation and self-discipline. Individual learning was impacted by increased discomfort when cameras had to be on, distracting from academic material. Although virtual school felt more comfortable and socially "safer", in-person school was better and less detrimental to their education and well-being.

Subtheme 3: Positive Virtual Experience

A few positive experiences were reported with the virtual platform, where students were able to gain more knowledge by learning online and revisiting lectures, to better engage in virtual discussions, and to participate more as a form of exposure.

Theme 2: Although Mental Health Support is Available it is Often Inaccessible

Many students tried seeking support for their SA or mental health during the

pandemic, but faced several barriers to accessing these services, whether perceived or experienced.

Subtheme 1: Waitlist is too Long or Full to Meet Student Needs

Students frequently describe being unable to receive services or having to search outside the university for help due to wait times. Students were often unable to book an appointment because all spots were full, with no guidance of what to do next.

Subtheme 2: Lack of Awareness and Ease of Access to University Supports

Students did not know how to seek support, often unable to schedule an appointment or reach anyone for help. Requesting services online frequently did not work and when they were successful, students found the process was too complicated and overwhelming.

> *You can like book an appointment online so I tried that and it- that didn't work so I called them multiple times um I'm referring to the wellness centre I believe it's called. Um I called them multiple times and nobody picked up and I was just like "I'll just go on a walk and get Starbucks" *laughs* and talk to myself I guess. (ID36, woman, 22)*

> *It is possible to like, kind of give more information about what services are provided and be more specific and maybe have these-these things like a little bit more accessible cause having to go through the* [UNIVERSITY] *website and find things is like the bane of my existence, it's very hard to. (ID45, non-binary, 21)*

Virtual support was more stressful for socially anxious students. The messaging from the university was described as insufficient and there was a decrease in messaging post-pandemic, feeling like the university could do more. Only short-term services, often related to learning challenges, and sometimes mild mental health needs were offered. Specific accessibility issues were also reported. One student was unable to renew their health card to access their needed service, and another was assigned a therapist on campus only to lose them after the first session due to their physical location being outside the therapist's jurisdiction.

Subtheme 3: University Support Seems Superficial

Students described messaging from the university as insincere or meaningless, viewing the university as an impersonal organization. Emails were perceived as unhelpful.

Overall, students reported feeling uncomfortable or fearful of seeking help from the university, which has been maintained post-pandemic.

> *So in terms of like universities being helpful I don't really… See the institution of university as being… I'm pretty sure it's just like an apathetic kind of like machine. I don't really think of it as like, uh, a method of like getting any sort of help. (ID42, male, 24)*

Subtheme 4: University Support is Enough

Fewer students described university support more positively where mental health supports felt more accessible at the onset of the pandemic. A few students reported successfully obtaining services and being satisfied with them, and some indicated that their Residence Assistants (RAs) were most helpful in finding services.

Theme 3: Pandemic Blurred the Lines Between Normal Identity Development Versus Pandemic-Associated Challenges

Students repeatedly expressed confusion regarding whether challenges were a result of the pandemic or whether this was a normative part of development.

Subtheme 1: Pandemic Prompted Needed Self-Discovery

Students felt that isolation allowed for internal self-discovery and enabled them to not feel forced to conform or perform according to others' perceptions.

> *It was-it was a lot easier to come to the conclusion of you know what this is actually who I want to be without anybody else, like influencing that. (ID45, non-binary, 21)*

For some, this self-awareness did not remove social discomfort but helped facilitate increasing confidence and a decrease in SA post-pandemic. This helped students make new friendships by increasing interest in in-person interactions.

Subtheme 2: Restrictions Created Barriers to Identity Exploration / Increased SA Post-Pandemic

For some, restrictions had a negative impact on identity and self-reflection by removing opportunities to seek resources and connect with peers. Many moved back home

with their parents, which inhibited anticipated self-discovery and autonomy, and increased feelings of being overwhelmed post-pandemic. Online school felt meaningless with no praise or recognition at school, leading students to question whether their SA symptoms were driven by the pandemic or the result of normative identity formation. Students questioned their pre-pandemic goals and tended to isolate when on campus, with a high tendency to compare themselves to their peers.

Subtheme 3: Pandemic Led to Increased Motivation to Engage Once Restrictions Were Lifted

Even though uncomfortable, students were more motivated to socialize once restrictions were lifted, with an enhanced desire to establish new relationships on campus. Due to more effort and confidence, students engaged with classmates and developed friendships in class despite discomfort. Students felt more connected and supported in person versus online, with reduced stigma and a newly perceived openness about mental health. One student noted that virtual interactions facilitated real life connections once in person. Overall, students felt a desire to make up for lost time, placing more value on feeling connected.

Theme 4: Professor Support Impacts Learning in the Classroom

Students often related their ability to learn and enjoy themselves on campus to their experience of their professor.

Subtheme 1: Professors' Approach Increased Social Distress

Students stated that professor behaviour increased SA symptoms whereby professors did not consider fear of being called upon in class or enforcing mandatory participation.

> *My friends have told me profs like calling out students like if no one is answering and then they're just like you what's the answer, like that is terrifying (*laughter) so I feel like just like understanding that like people may not want to. (ID39, woman, 20)*

Students expressed a need for mental health to be considered in the classroom, specifically the role SA can have on behaviours. They wish for professors to be aware of

challenges with transitions to in-person. Students felt that professors didn't care and didn't want to be bothered. Some professors made course work more challenging to make up for the new online format. Office hours were attended less frequently due to the described social discomfort associated with scheduling an individual meeting.

Subtheme 2: Professor Openness Allowed SA to Feel Manageable

Students were more at ease and competent when professors were warm and supportive, feeling relief when a professor discussed non-academic challenges or checked in. Perceived effort increased the likelihood of seeking both academic and non-academic help if needed. One student identified in-person praise as a motivating factor for participating in class.

Subtheme 3: Professors' Approach Changed with Pandemic

Although some professors seemed more receptive than before the pandemic, the level of openness from some decreased when restrictions were dropped. Others experienced a negative shift in their professors' demeanor during and post-pandemic where a lack of empathy or recognition of mental health was noted. One negative professor could impact student relationships with all professors. Other students reported positive changes post-pandemic. Some professors showed greater awareness of mental health and student-centered learning.

> *But I have noticed that they seem to be a lot more understanding an-and flexible and like you said, just-just more willing to kind of like be upfront and be like hey I know this is an issue, please see me if you have any problems versus I think first year, uhm, there might've been something, like I know they have like in the syllabus there's like a little section of like if you're struggling please seek help. (ID45, non-binary, 21)*

Professors sometimes taught more thoroughly to ensure understanding during the pandemic, whereas others just made the work easier. Other professors struggled with transitions to virtual learning, leading to more leniency with requested accommodation, and email communication was normalized during the pandemic.

Theme 5: Pandemic Impacted Skill Development

Almost all students reported a reduction in abilities during the pandemic, and a small number noticed gradual improvements once exposures resumed.

Subtheme 1: Loss of Skill Post-Pandemic

Learning online made it easier to ask questions than when in person. Students felt drained when thinking about interacting in person. One student discussed their current use of a mask:

> *It wasn't to be cautious with the pandemic, I wish it was, it was to- so that only this can be seen and no one- even if I did do something stupid no one could really identify *laughs* who I was which is very bad. But it's the truth. (ID 36, woman, 22)*

Students were scared and unsure of what to expect in-person, feeling like they had lost their coping strategies and had to relearn social scripts. Returning to campus felt more overwhelming than starting university, which students felt exacerbated SA symptoms. Students feared in-class engagement, finding their way around campus, worrying about being judged or called out in class, and of writing an in-person test. Some students were too preoccupied with the anxiety of being in class to learn. Students worried about how their emails would be interpreted post-pandemic and shared worries about what to do on campus outside of class. For others, the worry stemmed from fear of judgement if trying to join clubs, discomfort in approaching a peer, or not knowing how to make a friend. Some students feared seeing old friends and described an increase in mental gymnastics when engaging in social interaction post-pandemic. Overall, it felt like students were missing the "how-to" guide of navigating all aspects of campus. Students also perceived a decline in others' social skills and a lack of social interest by others on campus.

Subtheme 2: Slow Improvement with Post-Pandemic Exposures

A few students found their abilities and comfort improved over time post-pandemic. Students recognized a reduction in SA symptoms due to more social exposures despite them

feeling uncomfortable. One student reported a decrease in loneliness, and another was able to develop friendships after frequent small interactions.

Theme 6: The Development of Pandemic Specific Social Anxiety Symptoms

Several students identified a direct relation between the pandemic and novel SA experiences and symptoms.

Subtheme 1: Unclear Pandemic-Related Social Rules

Students were unsure of the new social rules online and post-pandemic, specifically how to interact with others while following restrictions. Students changed their behaviours (e.g., making simple food selections) to avoid possible restriction violations. The range in how people abided by the rules increased discomfort in relationships. Students were stressed trying to understand online social expectations and basic social scripts, making it hard to make social connections. Students hesitated to keep their camera on when many others were blank and feared how their on-screen actions would be interpreted. Being seen by others virtually increased SA symptoms, with fears of doing something embarrassing on camera. Online relationships felt fake, interfered with social connection, and led to avoidance with some skipping all virtual classes.

> *Tiktok, I'm not sure if you're familiar with that? Um it started coming into play as well and a lot of people I would see like on my um on my timeline would like film people in their class who had their camera on and I'm like "I don't want to be filmed and embarrassed *laughs* on not only class but on social media". (ID 36, woman, 22)*

> *I'm now sitting on a zoom, I don't know who can see me, I don't know, do I need my camera on, do I need my camera off, I'm afraid, am I going to unmute myself, everybody is going to hear what I'm saying, things like that. (ID 62, woman, 21)*

Subtheme 2: More Connection During Pandemic

A few students reported improved social connection during the pandemic as they felt that the virtual platform made it easier for them to initiate friendships and feel connected. The virtual context reduced the perceived complexity of in-person social interaction and body

language.

Subtheme 3: Impact on Social Relationships

Virtual learning took away the opportunity to make friendships, and many pre-pandemic friendships did not have time to strengthen and last, feeling like a missed opportunity. Some relationships were impacted or lost because of differing beliefs regarding restrictions. Students lacked relationships and were too fearful to initiate relationships post-pandemic. Yet many would pick the virtual option to avoid any personal interactions. Students were disappointed with their social lives because of the pandemic and their increased SA. Students questioned how to fit in and whether they would have engaged in social opportunities had there been no pandemic.

> *It was nice at first being like, okay I don't have to talk to my peers or worry about that, but then the feeling of loneliness I think it hits you and then you're like okay, it would have still been nice to have had the opportunity to talk to these people or at least have a choice. (ID11, non-binary, 21)*

Several reported past and ongoing desire to engage, take part in extra-curriculars and frosh experiences, yet also noted an inability or hesitation to work towards this goal. SA symptoms increased post-pandemic when transitioning back to in-person, like they had to start over again.

> *…but then when I grew up I kinda like got over that because I had the script and I realized that no one cared right like no one was gonna judge me for not knowing how to order a sandwich. But like, I feel like now the anxiety I have is that I'm overanalyzing every situation because like pre-Covid I used to just * *pause** what's the word, like instinctually like know how to act whereas now I'm like, I feel like I don't have the instincts anymore like what does a person do? (ID03, woman, 23)*

Discussion

The current study generated several themes that have meaningful clinical and policy-related implications and address our research questions in different ways.

How did socially anxious students feel the pandemic impacted their social engagement in university?

Students reported significant social challenges coming out of the pandemic such as a loss in social skills, difficulties and hesitations to form friendships, a discomfort around others, and a greater tendency to avoid social experiences. Increased avoidance is consistent with existing theoretical and empirical models of SA; however, research was lacking to understand the diverse impacts of the pandemic. Virtual learning facilitated the use of safety behaviours, such as avoiding social environments, sticking to one friend, isolating, turning their cameras off, and in one instance, continued use of physical masking out of social fear. The pandemic elicited a need to re-learn social skills and took the community out of campus. Overall, Covid restrictions were perceived to reinforce avoidant behaviour when using public transportation, sitting in a class, talking to peers, or being on campus, thereby maintaining and even increasing students' SA symptoms. Others were more motivated to socially engage when coming out of lockdowns. This variation in experiences provides us with additional insight to refine theoretical models. Some socially anxious students felt that isolation ignited a desire to connect and engage socially despite their discomfort. An enhanced value and need for connection and belonging was able to override their symptoms. Better understanding this drive for connection may help further our understanding of how to support socially anxious students in their social exposures.

How were learning and academic performance impacted by the pandemic for students who experience social anxiety symptoms?

Most students reported improved grades because of the format of evaluations (open book), a decrease in social distractions, and the ability to revisit recorded lectures. Yet, a few reported similar or lower grades, from discomfort with online learning, and struggling with self-discipline and attention. As such, anxiety increased for students entering in-person classes as they felt ill-prepared and like new students when entering their more senior courses. Students felt they lacked the skills to study for closed book exams and worried about

seeing people in real life. A more surprising outcome was the common desire for in-person learning even when virtual learning felt socially safer. Although students experienced discomfort and often received better grades, they were eager to get back into classrooms. Students recognized that the intricacies of in-person interaction helped their sense of belonging and deeply enhanced their learning. Although many questioned whether the pandemic would be a social setback, it appears that it served as a very useful driver in establishing one's needs – even while acting as an obstacle to knowledge attainment. Hamza et al. (2021) suggest that people who experienced much lower levels of SA before the pandemic were more likely to struggle to engage afterwards. It is possible that those with pre-pandemic SA fared better socially post-pandemic, because they returned to similar levels of avoidance and distress during the pandemic, and thus knew how to respond. Whereas those who had never previously engaged in social avoidance may have felt less capable and prepared to manage longer periods without engagement and experienced reduced confidence in social abilities. It is also possible that social avoidance imposed on those who were already socially anxious took away any sense of control they previously had and led to increased motivation to maintain their control by seeking more social environments.

How supported did students feel by the university for their social anxiety challenges?

Another major theme centered around accessibility of mental health supports. Although some students reported positive experiences whereby university messaging felt validating, most shared more negative experiences. Long waitlists and lack of ease to access supports were frequently identified as major challenges. The fear associated with trying to seek support when feeling emotionally unwell and having to learn to navigate systems independently often for the first time was a barrier to mental health support. These findings were in line with past research that report individuals with a mental health challenge, and more specifically with SAD, do not know where to seek treatment (Goetter et al., 2020).

However, unlike reports of students wanting to manage their challenges on their own or avoiding seeking support (Goetter et al., 2020; Legros & Boyraz, 2023), students in this study reported that they actively sought support but were unable to obtain it. In line with Topham (2009), socially anxious undergraduates were often unaware of what was available to meet their mental health needs. Moreover, they reported a sense of superficiality by the university, with some students feeling the university did not have an interest in meeting their students' mental health needs. This belief seemed associated with brief, seemingly generic emails and a lack of clear instruction.

Given the documented positive relation between university staff and student success (Rapose et a., 2020), hitting the right messaging tone is paramount for university settings. Additionally, identifying a point person to help students seeking support navigate and access services could be extremely useful. This service could include determining the appropriate resource, help completing online requests for services, and offering resources or options when relevant services are unavailable. Virtual chat, phone, or in-person options may be helpful when considering both physical accessibility and challenges with social interactions. This type of guidance would respond to student needs and feedback and lessen the anxiety of "not knowing" or "being stuck", while also likely reducing administrative burden across services.

Additional Contributions

An unexpected finding from the study was the mean social anxiety SPIN score across the 14 study participants (41.14). This severity score greatly surpasses both current and suggested clinical threshold cut-off scores. We would expect that the study methods—a virtual interview with a stranger—would limit our access to participants with higher levels of SA. There are a few possible reasons that may explain the observedmean score. First, we limited recruitment to participants who scored higher than 15 on the SPIN, with the goal of

accessing both clinical and subthreshold levels of social anxiety. Widening the range of the mean SPIN score for recruitment may provide more access to lower severity participants. Second, results of the qualitative study pointed to greater motivation to engage socially despite participants' social discomfort. It is possible that this semi-structured interview served as its own behavioural experiment and captured the keenness of students to engage socially even when uncomfortable. Third, we found evidence for "self-questioning" where students often wondered if the challenges being experienced were normative or a result of the pandemic. Participants in the interviews indicated that they would not typically engage in this type of research; however, they were motivated to learn more about themselves and wanted to see the results once the study was complete, demonstrating a need to better understand themselves and whether their experience was shared or normative. This desire may have encouraged people with higher SA severity to participate in our study.

Quantitative research highlights that people with SA will continue to engage in their safety behaviours even if they know it won't be helpful (Tutino, 2021; Vassilopoulos, 2009). This qualitative study delved further into this phenomenon, producing mixed results. A subset of student reports support these past findings, indicating that they choose virtual studies even when they knew it would negatively impact their learning and relationships with professors and peers. However, another subset of student reports did not support these findings. These students reported an increased motivation to engage socially and return to the classroom despite their reported discomfort. In these cases, the restrictions and isolation imposed by the pandemic served as a special type of catalyst to expose oneself to their feared environments.

There has been a recent push to increase virtual learning across educational settings, positing that this approach will not only increase student enrollment but also better meet students' needs (Ontario, 2019). Although there are certainly financial and accessibility-related motivators to online education, our findings highlight some potential risks of this

path. Students report feeling as though their mental health symptoms were exacerbated by virtual learning both in the context of social engagement and academic performance. Not only did students struggle online, but they chose to continue when given a bimodal option, despite these challenges. Despite being more comfortable and achieving better grades, their knowledge and ability to learn decreased. The impact of online learning on student experience must be at the forefront of institutional decision-making. This study highlights that at least for some, changes towards a more permanent and larger scale virtual approach could lead to some negative consequences in their learning.

The concept of identity development and the crucial stage of emerging adulthood came up in several interviews. Participants expressed confusion around how to navigate this important stage during a global pandemic. Many students identified the university context and this stage of emerging adulthood as vital to learn new skills, increase independence, and come into their own person. Yet for many, Covid interfered with that normative identity exploration and development. In a time when they were meant to be learning and making their own mistakes, many found themselves scared to leave their dorm rooms due to Covid and associated restrictions, or staying at home with their parents. Although some experienced time alone as an opportunity to discover their own interests, preferences, and sense of self, many felt like this critical stage of life was put on hold. Clinically speaking, the pandemic led some students to feel overwhelmed by not knowing if their struggles and discomfort are a normative part of becoming who they are or a negative effect from the pandemic. Is this a symptom or part of the process? Detangling this identity question will be important in years to come as young people seek to understand themselves. These are formative years within the context of identity development; the lens which young people take regarding their abilities, strengths and belongingness will impact their future choices and relationships. As such, a focus on positive self-schemas alongside challenging unhelpful thoughts are of particular

clinical value (O'Byrne et al., 2021).

Despite our thoughtful and flexible methodology, there are important limitations to consider when interpreting our findings. It can be difficult to decipher what symptoms and experiences were directly an impact of the pandemic and what would have otherwise been their SA experience. Regardless, the considerable student need identified provides us with better understanding of students' experiences with SA and also potential institutional and clinical resources that may be most supportive and effective.

We conducted semi-structured interviews, relying on students' personal accounts and perceptions to understand impacts on SA during the pandemic. Memory can be unreliable, impacted by heightened distress, and based on cognitive biases such as catastrophic interpretations. Thus, some of the experiences and causal attributions shared may not have been historically accurate. Nonetheless, our goal was to understand the lived experiences of undergraduate students with SA, rather than make firm conclusions about causal factors; this approach enables us to better identify the nuanced cognitive, behavioural, and emotional mechanisms explaining diverse experiences during the pandemic.

This interview was structured to document the experiences of undergraduate students coping with SA symptoms. Given that the core symptoms of SA include discomfort and fear in social situations (APA, 2022), these difficulties may have impacted data collection. For instance, few university students have previously been willing to engage in focus groups (Russell & Topham, 2012). As such, I used virtual one-on-one interviews to facilitate participant engagement. However, selection bias may still have limited our sample to those comfortable in virtual settings or have high insight and willingness to disclose. Indeed, some students disclosed feeling anxious online but felt the research was important or differentiated between virtual school and the interview as it was something they chose with a focused topic. As such, we must be sure not to generalize our findings to all students with SA.

Conclusions

This study provided rich and meaningful context to the lived experience of socially anxious undergraduates enrolled in university during the pandemic. Students identified a series of social, academic, and emotional challenges related to their SA that they believed were exacerbated by the pandemic. Yet, responses were not uniform. The qualitative analysis provided a more nuanced approach that showed a range of student experiences. It highlighted important information that contributes to our current knowledge of SA models, while also providing additional, unexpected outcomes specific to the pandemic experience.

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CHAPTER 5:

GENERAL DISCUSSION

The goal of these two studies was to capture an accurate picture of Canadian undergraduate students who experience social anxiety symptoms. First, I sought to determine whether the pattern of social anxiety symptom severity has substantially increased over time, as often reported but under-substantiated. Second, I wanted to understand how the pandemic impacted this symptom presentation by obtaining a more comprehensive understanding of how undergraduate students with SA were affected by the pandemic in various areas of their university life. Although many studies report on patterns over time, they typically have a limited methodology and generalize to broad mental health concerns such as the umbrella term of anxiety. Consolidating findings across time was necessary to test claims of an anxiety epidemic within the context of severity – an important aspect of mental health presentations. Focusing specifically on social anxiety enables us to better understand a common experience that causes distress or impairment in everyday life for many in this population. Cognitive-behavioural models of social anxiety provide a good understanding of how SA symptoms are developed and maintained over time, and while we can speculate and even quantify how the pandemic impacted these symptoms, qualitative research was helpful to understand the processes that may underlie these impacts. Overall, my dissertation aimed to contribute to literature exploring how social anxiety is experienced for undergraduate students during a critical stage of their lives.

Main Findings

Study 1

Not only did I develop insight into patterns of social anxiety severity over time, but I was able to obtain a clearer understanding of SA severity in this population using meta-analysis and meta-regression. Although the studies were not selected with probability

sampling and therefore cannot be declared a representative sample of Canadian undergraduates, it appears possible that SA severity among Canadian undergraduate emerging adults is higher than established thresholds for clinical diagnosis, but has not, in fact, escalated dramatically over time. Mean SA scores have remained generally stable over time, with some mild increases in reports from one measure. The SPIN was the only one of four measures to demonstrate a significant change over time, indicating an unlikely overall change in trends. Although the SPIN yielded a positive, significant relation with time, potential methodological explanations were highlighted specifically related to the samples and timeframes for most of the studies. Yet, the SPIN may more comprehensively measure SA in non-clinical undergraduate samples, potentially capturing a more accurate estimate of symptom patterns over time. I found that SA symptom severity on the SPIN increased by approximately half a standard deviation over 15 years, highlighting that if an increase in symptom severity has occurred, the change was not exponential as many have claimed. Claims about increases in mental health challenges have not been specific to SA symptom severity, and thus these claims may hold some validity when examining other symptom presentations.

Study 2

Overall, Study 2 found that some Canadian undergraduate students reported elevated social anxiety symptoms, and research findings suggest that the pandemic heightened these symptoms across various domains (Kindred & Bates, 2023). The findings of Study 2 highlight several themes in social, academic, and support-seeking areas. Socially, students report significant challenges in terms of social engagement with the onset of the pandemic; however, they also describe an enhanced motivation to connect post-pandemic. Academically, most students maintained or saw an improvement in grades, though students described reduced knowledge as well as feeling unprepared for the return to in-person

courses. In terms of seeking support, some students sought mental health services, and many relied on personal support. Those who did seek services ran into many barriers to being able to access treatment for their increased SA symptoms, in turn leaving them without sufficient help.

Cognitive-Behavioural Theory and Treatment

My first study did not align with the many claims emphasizing significant and concerning escalation in patterns of social anxiety over time among youth that could be increasing in others ways. My second study generally confirmed theoretical expectations for emerging adult undergraduate students with social anxiety in a pandemic (see below). The two studies further emphasize that some young people in our academic institutions face challenges related to SA, which were reportedly exacerbated during the COVID-19 global pandemic. Although theoretical and empirical models provide a good understanding of how social anxiety symptoms arise and are maintained, the findings from the current study carry implications for CBT models.

Our current models highlight that individuals with SA often believe others are likely to be critical and that they are unlikely to meet the expectations of others (Moscovitch, 2009). Their own perceived flaws and fear of judgement of these flaws heighten social discomfort. In my study, students reported perceiving a reduction in social skills and in their ability to form friendships due to the social isolation that arose from pandemic restrictions. Students were no longer feeling the in-person pressure to engage, and safety behaviours were inherent in the imposed restrictions (e.g., isolation, masking). It was thus very easy for students to avoid social interactions, leave their camera off, and not engage in group discussions. Although the availability and social condonement of safety behaviours provided short-term comfort for some, the lack of opportunity to gather evidence counter to their negative thoughts or possible misinterpretation of social cues may have exacerbated social avoidance,

reinforced pre-existing negative thought patterns and furthered the negative feedback loop (Clark & Wells, 1995).

Students kept their camera off out of fear of being judged on screen. Because of this fear, they continued to limit their interactions online (e.g., reducing visual interactions, typing in chats), further amplifying their sense of inability to engage in a socially appropriate way. Because more students' recent interactions were virtual in nature, and online interactions are on-going, future research should aim to understand how student interpretation of online interactions (e.g., little engagement, no cameras, no communication outside of work-related tasks) directly impacts their predictions of future in-person interactions. Thus, clinicians may also want to ensure they consider asking questions about virtual interactive experiences during clinical interviews. Important considerations around how clinicians assess and treat SA symptoms need to be addressed. For instance, exploring how virtual interactions contribute to increasing symptoms, both through virtual-related fears and with increased safety behaviour use when using the virtual platform, need to be considered within the case conceptualization and treatment plan. For example, virtual platform related behaviours may need to be included on a fear hierarchy, and virtual safety behaviours need to be clearly identified.

In my dissertation, many students also reported increased anxiety with the expectation of returning to in-person interactions following the pandemic. It will be important to assess student beliefs, feelings, and predictions about basic interactions and how those beliefs relate to the pandemic's imposed restrictions, prior to treating discomfort with in-person engagement. This information is also clinically relevant when considering how we conceptualize symptoms in our current models and to support socially anxious clients through social exposures. Indeed, post-secondary education relied on technology during the pandemic, which exposed students to a novel type of interaction (virtual), which they were

even less prepared for. In my dissertation, students frequently reported not knowing how to interact due to a whole new set of virtual social norms, with significant anxiety symptoms associated with being on the virtual platform. This information alongside the knowledge that there is and will be ongoing use of virtual platforms in school has additional clinical implications. It will be critical that researchers and clinicians ensure that behavioural experiments and exposure hierarchies include technology-related engagement and virtual-related fears.

My findings from Study 2 also have some conceptual implications for the CBT models for socially anxious young people. For instance, although respondents described experiencing more avoidant behaviours and symptoms during the pandemic, they also described a stronger desire to act to belong, socialize, and connect. For some, increased isolation was described as a motivator rather than a reinforcer of avoidant behaviour. In line with other research (Ho & Moscovitch, 2021), students took steps to seek social engagement, that they reported they would likely not have done had the pandemic not happened. Goodman and colleagues (2019) highlight a high need for belonging as a mechanism motivating some socially anxious individuals to seek interpersonal connection despite discomfort. Fear or avoidance of social interaction can co-exist with a desire to connect. Although this desire exists for most individuals with SA (Goodman et al., 2019), when one's social relationships are not satisfactory and seemingly so out of their control, this desire can overpower their social discomfort. In Study 2, students stated that they either felt an increased likelihood that they would follow through on their desires, or that they already had engaged in more social interaction than they had been open to trying before the pandemic. Clinicians can use these new social experiences to challenge the feedback loop with the integration of new exposures. It will also be important for clinicians to explore remaining barriers to connecting socially with others, and how virtual interactions and safety behaviours may influence their negative

thought patterns. With the persistent and increased use of virtual platforms post-pandemic, the findings remain of great importance.

One possible barrier to social engagement relates to identity. Study 2 highlights the significant impact of identity formation on social anxiety in this stage of life and the confusion that arose from the pandemic during this developmental phase. Although these emerging adults were experiencing heightened levels of SA and navigating new roles and demands, they were also faced with a global event that increased uncertainty and, in many cases, seemed to interfere with a crucial period for identity exploration and development. For many, the pandemic put a pause on identity exploration altogether. Others were left wondering if their challenges and "lack of skill" were a normative, typical experience of emerging adulthood, a result of the pandemic, or possibly a symptom of their SA.

Erikson's stage of intimacy versus isolation emphasizes one's need to be with others and belong, yet the pandemic led to enforced restrictions and distance from campus life. Belonging to a social group is crucial for identity and well-being and impacts students' university experience on many levels (Strayhorn, 2019). Studies have highlighted the important role of social relationships with symptom reduction and academic outcomes (Brook & Willoughby, 2015). Astin (1984) proposed a theory of student involvement that suggests student time acts as the most important resource for achieving developmental goals. Specifically, the theory posits that the extent of a student's time and effort (physical and psychological) put towards one area is what will determine success in this area. It suggests that students living in residence have greater involvement in campus community, and in turn greater attachment to the university and sense of identity. As suggested by Brook and Willoughby (2015), if being better connected to the social systems of university leads to greater academic achievement, one could also assume that someone with SA symptoms may have more academic challenges due to their social avoidance. The second study's results

cohere with this hypothesis, with participants' accounts linking a reduction in social opportunity with the campus and university, in combination with SA symptoms, leading to challenges in learning, SA symptoms, and a sense of self.

Future research should explore how identity formation is established longer-term for this unique group of undergraduates who experienced the pandemic alongside their studies. Understanding whether the clinical challenges related to identity persist beyond the short-term pandemic effects is important as these challenges may affect success into employment and further educational attainment. Furthermore, if students were provided more insight into how these difficulties in the context of a "pandemic symptom" were a shared experience, we may see positive impacts. The opportunity to reframe one's experience from exceptional to normative may decrease unhelpful thoughts and feelings of loneliness by increasing a sense of belonging, which could facilitate the separation between their symptoms and their identity. These undergraduate experiences of SA during the pandemic can be extended to the larger student population when considering that isolation and social discomfort are commonly shared experiences (Shin et al., 2024). Findings show the positive impacts of increased sense of belonging on wellbeing, personal adjustment, and academic performance (Karaman & Tarim, 2018; Pittman & Richmond, 2007), thus more awareness and education on these shared experiences could help others to better manage and overcome their symptoms. It is also essential to recognize that not all above threshold social anxiety is normative. SA symptoms can be debilitating and clinical in nature for young people, even if this is a period of increased social anxiety overall. Young people with clinical SA are known to leave school prematurely, fail a grade, experience dissatisfaction and have dysfunction in daily activities (Stein & Kean, 2000; Van Ameringen et al., 2003).

Overall, when assessing young people, it continues to be important to avoid under-pathologizing and over-pathologizing. If we know higher scores and reports of SA are

normative for some emerging adults, we should integrate this understanding in our approach to conceptualization and diagnosis. Helping young people understand the mechanisms underlying their anxiety-related experiences and symptoms may enable clients to better understand themselves and recognize the normative aspects of their development. In a recent qualitative study, a sample of older adolescents expressed the belief that mental health problems are a very common and increasing part of life (Hermann et al., 2022). Adolescents also identified a high risk of mental health problem "contagion" when their friends were struggling. Clinically, it is important to support emerging adults in the understanding that they are not necessarily "unwell" or increasingly struggling but rather facing normative challenges that need to be better understood. Indeed, differentiating normative SA experiences for their developmental phase vs those whose SA symptoms are impairing and would benefit from treatment is vital. In my dissertation, using a basic screening tool for SA identified higher mean scores that would be considered clinical in both studies. As such, a screening tool may not be sufficient to identify those with clinical need. Further tools and assessment focused on distress and impairment are needed to accurately engage in diagnostic decision making, whether for research or clinical purposes.

Re-examining Cut-Off Scores

The results of these studies have important implications for how we measure and assess social anxiety, as well as how we understand normative emerging adult experiences. The mean SA score identified in my studies needs to be interpreted with caution to avoid the risk of pathologizing what may be an expected and common phase in emerging adulthood. Mean scores from the meta-analysis indicate an elevated severity of SA among emerging adults completing their undergraduate degrees, which appears to have remained relatively stable over time. For years, young Canadians have been told their anxiety is atypical and concerning, and yet, it may be a normative and expected part of their development at this

time. This negative perception of alarming anxiety may have significant impacts on how students view themselves, their capacity, and their abilities. If students were aware that the experience of SA was shared, common, and expected, it could enhance their sense of belonging, understanding, and increase motivation to work through more challenging moments (Neff, 2003).

Studies highlight the accumulating data that question the validity of currently established cut-off scores in common SA measures (e.g., Kudryk et al., 2024). As noted above, Moscovitch et al. (2011) suggest a cut-off score of 30 on the SPIN, compared to the original 19 proposed by Connor et al. (2000). Kudryk et al. (2024) suggest using a measure of impairment alongside an SA measure when trying to distinguish SAD from other mental health challenges to allow for more valid interpretation of clinical significance. They calculated new and reliable cut-off scores to identify "analogue" samples based on measures of SA and of impairment that were better able to distinguish diagnostic levels of SAD. When selecting the use of a standalone measure to determine a clinical threshold, Kudryk et al. (2024) argue that specificity is compromised. In my dissertation, Study 1 found a mean of just over 22 in a general sample of Canadian undergraduate students on the SPIN which is over the current agreed upon clinical cut-off. Following a series of analyses with diagnosed samples and undergraduate samples, Kudryk et al., (2024) recommends using both the SPIN and the Sheehan Disability Scale (Sheehan, 1983), with combined cut-offs of 34 and 11, respectively, to obtain an analogue sample of people with high SA, while differentiating them from people with other mental health problems, but not SA. The sensitivity and specificity estimates obtained when using these two cutoff scores combined is similar to the estimates obtained when using the SPIN as a standalone measure with a cutoff score of 39 (Kudryk et al., 2024). They recommend a SPIN score of 28 when trying to distinguish SAD from those without mental health problems. Based on these findings, it makes sense to increase the SPIN

cut-off score for this population to more accurately reflect normative experience versus pathology and clinical impairment. Future studies should ensure they are using cut-off scores appropriate to the population and normative data when selecting socially anxious analogue samples of undergraduate students.

Kudryk and colleagues (2024) also observed a rising trend in self-reported SA symptom severity among undergraduate students' post-pandemic compared to pre-pandemic based on their new validated cut-off scores. In Study 2, we also found higher SA scores that go above their new recommended thresholds. What is less clear is whether these higher scores reflect a true mental health problem or normative distress related to social situations. Study 2 provides insight into many areas of distress for undergraduates during the pandemic and the way in which the pandemic amplified pre-existing challenges, which could explain the noted increase. Undergraduate students identified a surge in new or pre-existing SA symptoms that felt more unmanageable due to isolation, fear, and change in communication and academics. However, because our study did not use a measure of distress, as suggested by Kudryk et al., (2024), it is unclear whether this sample's scores would lead to categorizing them within the "clinical" category, with the exception of those whose scores were above 39. Our findings have important implications for universities in terms of their student needs. Taken together, the two studies provide further evidence that elevated symptoms of SA are common within this developmental stage. Canadian undergraduate students represent a special population that have particular needs and challenges.

The Impact of Technology

Findings from the studies also have important implications for how we implement technology moving forward. As evidenced in Study 2, students rely on a range of safety behaviours to avoid direct and uncomfortable social interaction. Indeed, students reported finding ways to socially disconnect using the virtual platform and did not always

take part in in-person opportunities when they re-emerged. Research findings also show that individuals who are socially anxious engage in socially avoidant behaviours using the internet, which may contribute to problematic internet use (Hansen et al., 2024). Numerous studies have found a positive relation between problematic internet use and social anxiety (Annoni et al., 2021; Li et al., 2025; Prizant-Passal et al., 2016), as well as a strengthening of correlation between internet use and SA as one gets older (Prizant-Passal et al., 2016).

Given the complex relation between technology use and social anxiety, it is important to consider how to incorporate technology use into both assessment and treatment. For one, with the extent to which technology has become part of everyday life, particularly for those in the emerging adult phase and as university students, technology-related items should be added to our gold standard SA measures. Some studies have begun to develop measures related to SA in the context of specific online situations (Alkis et al., 2017) or to new types of "anxiety" related to technology use (Pfaffinger et al., 2021); however our most commonly used measures of SA do not address technology use or social media more specifically, when it is arguably a significant part of an individual's life.

Although the pandemic is over, its effects remain. With the move towards greater online education and findings on the relation between technology use and social anxiety, we must consider how we are evaluating and querying technology use in assessment and intervention. In fact, it is possible that we did not observe a significant relation between time and social anxiety severity in Study 1 because these measures do not address a significant mechanism currently involved in SA for Canadian emerging adults.

As alluded to earlier, the relation between technology use and social anxiety should also be considered in intervention. Two important, evidence-based components of cognitive-behavioural treatment for SA are social exposures and behavioural experiments (Heimberg, 2022). Behavioural experiments involve collaborating with the client to design experiments

that will test and gather evidence about their anxiety-related beliefs and predictions. Using ecologically valid technology settings that represent real-world situations, such as those identified in Study 2's interview, would be of significance when treating this population and having them engage in behavioural experiments. For example, rather than engaging only in in-person experiments, therapists could work with clients to develop experiments such as making typos in texts, monitoring interaction from others in a Zoom meeting with the camera on vs off and increasing detail in online dating profiles. Exposure therapy helps individuals identify and rank anxiety-inducing situations. Then, they begin to engage in the lower ranked situations until they build a sense of mastery over them with a reduction of in symptoms. Some students in Study 2 identified distress and impairment around emailing professors, speaking in discussion groups, and keeping their camera on amongst other require virtual tasks and expectations. Establishing a fear hierarchy with these situations may be especially important to target ongoing safety behaviours that may otherwise be missed (e.g., rechecking emails, using AI to develop discussion group responses). Technology in educational and social settings is here to stay, and clinical models and treatments need to evolve to include it as a key element.

Beyond the use of technology within an assessment and intervention context, social media has begun to play an active role in how young people perceive and understand their mental health (Armstrong et al., 2025; Starvaggi et al., 2024). There are several opportunities available and often advertised for people to complete online questionnaires and checklists that allow for one to "self-diagnose". Growing evidence shows a tendency for young people to get their information about mental health from social media. Research has highlighted the common use of social media platforms as a means of self-diagnosing (Alper et al., 2023; Gilmore et al., 2022). Although online self-diagnosis may provide information when other supports are inaccessible, lead to seeking support, or provide a sense of belonging, there are

also substantial risks. Self-diagnosis carries potential risks such as increased anxiety, attempts at self-treatment, obtaining inaccurate advice, receiving unsuitable treatment, and privacy issues (Corzine & Roy, 2024; Monteith et al., 2024). Hasan et al. (2023) found that normalizing anxiety on social media –i.e., words reframing the symptom as common and normative (Buck & Hester, 2018)—led participants to rate anxiety as more common and to believe that they themselves had an anxiety disorder, compared to participants who viewed non-normalizing social media posts. Moreover, although normalization of symptoms led to more self-diagnosis, it did not appear to decrease stigma around mental health. Although it may be helpful to support students in understanding their symptoms and normative experiences for their stage of development, the studies above demonstrate the possible risks when this information in not properly assessed and determined by professionals, and misinformation is made widely available. Taken together with the high mean SA scores identified in both Study 1 and Study 2, these findings highlight the importance of differentiating between what are normative and pathological experiences, particularly if levels that are currently understood to be clinical are widespread within the population.

A Move Towards E-Learning

The integration of technology impacts our society financially, academically, and clinically. Ontario has recently been implementing more virtual learning across settings, making online courses mandatory (Ontario Ministry of Education, 2019). Arguments to increase online education include increased access to high quality education with access to a wider variety of courses through new methods of learning (Ontario Ministry of Education, 2019). Increasing virtual education has many financially driven motivations, including advantages for students. Online education could reduce the need to rely on increasingly costly transportation and limit the need to relocate or pay rent (Shah, 2024). For financial institutions, operational cost savings are substantial in terms of materials and physical space

(Shah, 2024). However, navigating and maintaining platforms, training individuals to teach online and offering technical support also comes at a cost.

Our findings also show that some students continue to struggle academically with online learning, and specifically that students reported that although their grades increased, their knowledge did not. Again, although students received a break from in-person interactions, the lack of understanding regarding appropriate social norms for virtual interaction and new expectations around online socialization added a new layer of social discomfort that requires further exploration. These challenges served as a distraction and barrier to learning, which has important implications regarding the more widespread push for virtual learning to move towards online school.

Conclusion

Social anxiety is one of the most common mental health challenges and can lead to distress and impairment even when below a clinical threshold. In my dissertation, I explored claims about rising mental health challenges and determined a more accurate picture of symptom severity patterns over time. Using meta-analysis and meta-regressions, I demonstrated that there has not been a steep rise in social anxiety symptom severity, while also highlighting that social anxiety symptoms among Canadian undergraduates are elevated compared to clinical thresholds on validated questionnaires. The findings above highlight the many ways we can adapt our existing theoretical and clinical models to better understand social anxiety among the specific population of undergraduate students. It also considers the important roles that identity and technology play in today's emerging adulthood. Undergraduate students in Canada make up a large set of emerging adults who have very particular needs and would benefit from a range of supports. More than anything, a better understanding of the self and of what is normative is essential.

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APPENDIX A: STUDY 1 SEARCH SYNTAX

Database		Search Syntax
PSYCINFO	1	social phobia/
	2	performance anxiety/ or social anxiety/ or speech anxiety/
	3	Timidity/
	4	(shyness or shy or timid*).ti,ab
	5	(fear* adj3 "negative evaluation").ti,ab
	6	phobic avoidance.ti,ab
	7	interpersonal* adj3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*).ti,ab
	8	(social* adj3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*)).ti,ab
	9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
	10	higher education/
	11	college students/
	12	("higher education" or postsecondary or "tertiary education").ti,ab
	13	((college* or universit*) adj2 (student* or youth)).ti,ab.
	14	undergrad*.ti,ab
	15	10 or 11 or 12 or 13 or 14
	16	9 and 15
MEDLINE	1	phobia, social/

	2	Shyness/
	3	(shyness or shy or timid*).ti,ab
	4	(fear* adj3 "negative evaluation").ti,ab
	5	phobic avoidance.ti,ab
	6	interpersonal* adj3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*).ti,ab
	7	social* adj3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*).ti,ab
	8	1 or 2 or 3 or 4 or 5 or 6 or 7
	9	("higher education" or postsecondary or "tertiary education").ti,ab.
	10	((college* or universit*) adj2 (student* or youth)).ti,ab.
	11	undergrad*.ti,ab.
	12	9 or 10 or 11
	13	8 and 12
COCHRANE		
	1	phobia, social/
	2	Shyness/
	3	(shyness or shy or timid*).ti,ab
	4	(fear* adj3 "negative evaluation").ti,ab
	5	phobic avoidance.ti,ab
	6	interpersonal* adj3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*).ti,ab
	7	social* adj3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*).ti,ab
	8	1 or 2 or 3 or 4 or 5 or 6 or 7
	9	("higher education" or postsecondary or "tertiary education").ti,ab.
	10	((college* or universit*) adj2 (student* or youth)).ti,ab.

	11	undergrad*.ti,ab.
	12	9 or 10 or 11
	13	8 and 12
Proquest (Dissertations and Theses)	1	TI,AB(shyness OR shy OR timid*)
	2	TI,AB(fear* NEAR/3 "negative evaluation")
	3	TI,AB("phobic avoidance")
	4	TI,AB(interpersonal* NEAR/3 (anxi* OR avoid* OR stress* OR distress* OR phob* OR inhibit*))
	5	TI,AB(social* NEAR/3 (anxi* OR avoid* OR stress* OR distress* OR phob* OR inhibit*))
	6	1 OR 2 OR 3 OR 4 OR 5
	AND 10	TI,AB("higher education" or postsecondary or "tertiary education") OR TI,AB((college* or universit*) NEAR/2 (student* or youth)) OR TI,AB (undergrad*)
Scopus	1	TITLE-ABS(shyness OR shy OR timid*)
	2	TITLE-ABS(fear* w/3 "negative evaluation")
	3	TITLE-ABS("phobic avoidance")
	4	TITLE-ABS(interpersonal* w/3 (anxi* OR avoid* OR stress* OR distress* OR phob* OR inhibit*))
	5	TITLE-ABS(social* w/3 (anxi* OR avoid* OR stress* OR distress* OR phob* OR inhibit*))
	6	1 OR 2 OR 3 OR 4 OR 5
	7	TITLE-ABS(("higher education") OR (postsecondary) OR ("tertiary education")

	8	TITLE-ABS((college* OR universit*) w/2 (student* OR youth))
	9	TITLE-ABS(undergrad*)
	10	7 OR 8 OR 9
	11	6 and 10
Web of Science		
	1	TS=(shyness or shy or timid*)
	2	TS=(fear* NEAR/3 "negative evaluation")
	3	TS=("phobic avoidance")
	4	TS=(interpersonal* NEAR/3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*))
	5	TS=(social* NEAR/3 (anxi* or avoid* or stress* or distress* or phob* or inhibit*))
	6	1 OR 2 OR 3 OR 4 OR 5
	7	TS=("higher education" or postsecondary or "tertiary education")
	8	TS=((college* or universit*) NEAR/2 (student* or youth))
	9	TS=(undergrad*)
	10	7 OR 8 OR 9

APPENDIX B: STUDY 1 CODING MANUAL

Every article reviewed must consider the following criteria, in this particular order. When a criterion is not met, you may exclude it and move on to the next article. Be sure to err on the side of caution and do not eliminate any article of which you are unsure.

The type of study (e.g., survey, experiment) or analyses (e.g., correlations, ANOVA, SEM) conducted in each article can vary. Some exceptions would include meta-analysis or other analyses performed based on review data, to avoid duplication samples. For this review, I am interested solely in the social anxiety score the authors report.

It is critical that every stage of the review is recorded, including the number of articles removed for each criterion.

___ Duplicates. This is automatically completed before screening begins.

Phase 1 – Title and Abstract Screening

___ Language

English or French articles only. Any other language must be removed.

___ University students

The study's sample must consist of **university students**. They may use other terminology such as undergraduates, college students, or postsecondary students. Other types of students, such as those from high school, applied college or community college are *not* eligible for this study. If this is unclear, additional research into the specific institution may be necessary to determine its eligibility. We would not exclude a study for having other types of samples so long as they ALSO have a sample of university students that meet the remaining criteria.

___ Canadian university

The study's sample must consist of **Canadian** University samples. Please note, It does not matter if the research was conducted by Canadian researchers or at a Canadian university. Studies conducted by Canadian researchers or at Canadian institutions do not guarantee a Canadian sample. This study will include any studies whose samples are attending a Canadian university. Exclude any study that clearly indicates that participants are not from a Canadian institution. In cases when this is unclear, include the article for the next stage of review.

___ Type of study

Journal articles and theses that used their own unique samples of undergraduates are the studies of interest. We do **NOT** want any reviews, meta-analyses, or theoretical papers.

Phase 2 – Full text Screening

Yes/No

___ Language

English or French articles only. Any other language must be removed.

___ University students

The study's sample must consist of **undergraduate students**. Other types of students, such as those from high school, college, graduate studies, community college, or the general terminology of "university student" without clarity are *not* eligible for this study. If this is unclear, additional research into the specific institution may be necessary to determine its eligibility. We would not exclude a study for having other types of sample so long as they ALSO have a sample of undergraduate students that meet the remaining criteria.

___ Canadian university

The study's sample must consist of **Canadian** University samples. Please note, It does not matter if the research was conducted by Canadian researchers or at a Canadian university. Studies conducted by Canadian researchers or at Canadian institutions do not guarantee a Canadian sample. This study will include any studies whose samples are attending a Canadian university. Exclude any study that clearly indicates that participants are not from a Canadian institution. In cases when this is unclear, include the article for the third party reviewer.

___ Type of study

Journal articles and theses that used their own unique samples of undergraduates are the studies of interest. We do **NOT** want any reviews, meta-analyses, or theoretical papers.

___ Format

We want **theses** and **journal articles** only. Posters, book chapters, conference notes, etc. should all be excluded.

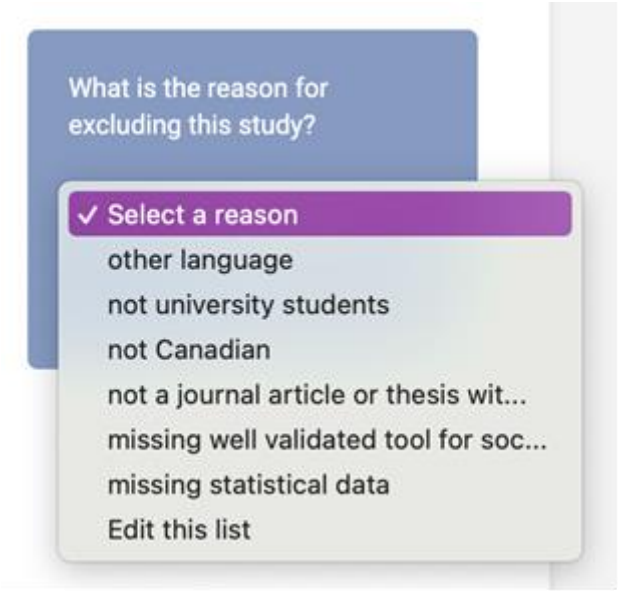
___ Measure

This research is interested in studies that **measured social anxiety symptoms** with a **well-validated tool**. This can include the Social Phobia Inventory (SPIN), the Liebowitz Social Anxiety Scale (LSAS), the Social Interaction Anxiety Scale (SIAS), or the Social Phobia Scale (SPS). *Please TAG any of these studies with a label stating the measure used for each article. For example, "SPIN", "SIAS".*

___ Statistical data

The analyses for this research require a **mean** social anxiety score AND the **variance** or **standard deviation** scores reported from the study. If a study is missing one of these two values, 1) TAG the article with the label "missing data" and 2) put the article in the "maybe" category. Authors of these articles may be contacted upon completion of this

APPENDIX C: STUDY 1 PHASE 2 DECISION TREE



APPENDIX D: STUDY 1 QUALITY ASSESSMENT TOOL

Note that we adapted the Quality Assessment Tool from JBI Checklist for Prevalence Studies critical appraisal tool (Munn et al., 2020), so that it was relevant to our study goals. Below, crossed-out text identifies what we removed, and red text identifies what we added.

1. Was the sample frame appropriate to address the target population? This question relies upon knowledge of the broader characteristics of the population of interest and the geographical area. If the study is of women with breast cancer, knowledge of at least the characteristics, demographics and medical history is needed. The term "target population" should not be taken to infer every individual from everywhere or with similar disease or exposure characteristics. Instead, give consideration to specific population characteristics in the study, including age range, gender, morbidities, medications, and other potentially influential factors. For example, a sample frame may not be appropriate to address the target population if a certain group has been used (such as those working for one organisation, or one profession) and the results then inferred to the target population (i.e. working adults). A sample frame may be appropriate when it includes almost all the members of the target population (i.e. a census, or a complete list of participants or complete registry data).	Score 1 = if all undergrads from the university Score 0 = if only a subgroup (i.e. psychology students, bio students, those in first year, etc)
2. Were study participants recruited in an appropriate way? Studies may report random sampling from a population, and the methods section should report how sampling was performed. ~~Random probabilistic sampling from a defined subset of the population (sample frame) should be employed in most cases, however, random probabilistic sampling is not needed when everyone in the sampling frame will be included/ analysed. For example, reporting on all the data from a good census is appropriate as a good census will identify everybody. When using cluster sampling, such as a random sample of villages within a region, the methods need to be clearly stated as the precision of the final prevalence estimate incorporates the clustering effect. Convenience samples, such as a street survey or interviewing lots of people at a public~~	0 = authors do not describe recruitment method 1= authors adequately describe recruitment methods.

~~gatherings are not considered to provide a representative sample of the base population.~~	
3. Was the sample size adequate? The larger the sample, the narrower will be the confidence interval around the prevalence estimate, making the results more precise. An adequate sample size is important to ensure good precision of the final estimate. Ideally we are looking for evidence that the authors conducted a sample size calculation to determine an adequate sample size. This will estimate how many subjects are needed to produce a reliable estimate of the measure(s) of interest. For conditions with a low prevalence, a larger sample size is needed. Also consider sample sizes for subgroup (or characteristics) analyses, and whether these are appropriate. Sometimes, the study will be large enough (as in large national surveys) whereby a sample size calculation is not required. In these cases, sample size can be considered adequate. When there is no sample size calculation and it is not a large national survey, the reviewers may consider conducting their own sample size analysis using the following formula: (Naing et al. 2006, Daniel 1999)	Score =1 if authors describe how they determined sample size Score = 0 if not mention of this
4. Were the study subjects and setting described in detail? Certain diseases or conditions vary in prevalence across different geographic regions and populations (e.g. Women vs. Men, sociodemographic variables between countries). The study sample should be described in sufficient detail so that other researchers can determine if it is comparable to the population of interest to them.	1 = authors describe sample as being Canadian and undergraduate 0 = Does not clearly specify this (if we can't reach them to determine)
5. Was data analysis conducted with sufficient coverage of the identified sample? Coverage bias can occur when not all subgroups of the identified sample respond at the same rate. For instance, you may have a very high response rate overall for your study, but the response rate for a certain subgroup (i.e. older adults) may be quite low. We know they will be university students but we will assess for if they are represented across the sample in terms of an important demographic: gender/sex	0 = Less than 33% of sample was a particularly gender/sex. 1= mean gender/sex was relatively proportionate (over 33%).

~~**6. Were valid methods used for the identification of the condition?**~~ ~~Here we are looking for measurement or classification bias. Many health problems are not easily diagnosed or defined and some measures may not be capable of including or excluding appropriate levels or stages of the health problem. If the outcomes were assessed based on existing definitions or diagnostic criteria, then the answer to this question is likely to be yes. If the outcomes were assessed using observer reported, or self-reported scales, the risk of over- or under-reporting is increased, and objectivity is compromised. Importantly, determine if the measurement tools used were validated instruments as this has a significant impact on outcome assessment validity.~~	DO NOT INCLUDE THIS QUESTION - We are not looking for a diagnosis - Our measures are validated.
~~**7. Was the condition measured in a standard, reliable way for all participants?**~~ ~~Considerable judgment is required to determine the presence of some health outcomes. Having established the validity of the outcome measurement instrument (see item 6 of this scale), it is important to establish how the measurement was conducted. Were those involved in collecting data trained or educated in the use of the instrument/s? If there was more than one data collector, were they similar in terms of level of education, clinical or research experience, or level of responsibility in the piece of research being appraised? When there was more than one observer or collector, was there comparison of results from across the observers? Was the condition measured in the same way for all participants?~~	DO NOT INCLUDE THIS QUESTION ▪ Same as above
8. Was there appropriate statistical analysis? Importantly, the numerator and denominator should be clearly reported, and percentages should be given with confidence intervals. The methods section should be detailed enough for reviewers to identify the analytical technique used and how specific variables were measured. Additionally, it is also important to assess the appropriateness of the analytical strategy in terms of the assumptions associated with the approach as differing methods of analysis are based on differing assumptions about the data and how it will respond.	▪ Given the purpose of our study confidence intervals aren't relevant but standard deviation or variance when reporting means is. 0 = if these are not reported 1 = if they are reported

9. Was the ~~response rate~~ the amount missing data adequate, and if not, was the ~~low response rate managed~~ way of handling missing data done appropriately? ~~A large number of dropouts, refusals or "not founds" amongst selected subjects may diminish a study's validity, as can a low response rates for survey studies. The authors should clearly discuss the response rate and any reasons for non-response and compare persons in the study to those not in the study, particularly with regards to their socio-demographic characteristics. If reasons for non-response appear to be unrelated to the outcome measured and the characteristics of non-responders are comparable to those who do respond in the study (addressed in question 5, coverage bias), the researchers may be able to justify a more modest response rate.~~	0 = they did not discuss how they managed missing data 1 = was this appropriately described

APPENDIX E: STUDY 1 SUPPLEMENTAL REFERENCE LIST

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APPENDIX F: STUDY 1 FULL DISTRIBUTION OF SIAS SCORES AND FOREST PLOT

Table G1

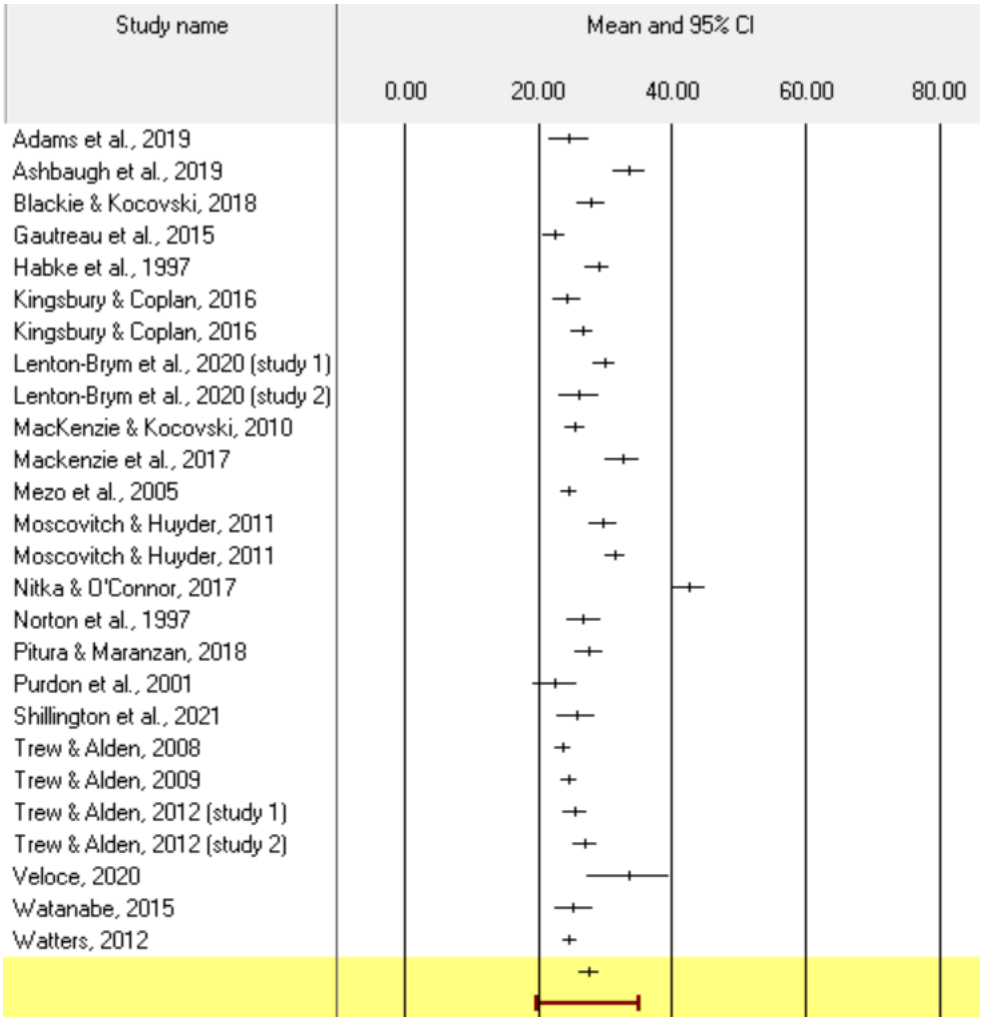
Distribution of Mean Scores and Overall Mean Summary

Study	Mean	Standard Deviation	Variance	Lower Limit	Upper Limit	Z-value	p-Value
Adams et al., 2019	24.49	1.56	2.42	21.44	27.54	15.74	0.00
Ashbaugh et al., 2019	33.51	1.19	1.41	31.18	35.84	28.20	0.00
Blackie & Kocovski, 2018	27.83	1.10	1.22	25.67	29.99	25.21	0.00
Gautreau et al., 2015	22.39	0.83	0.69	20.77	24.01	27.01	0.00
Habke et al., 1997	28.90	0.95	0.90	27.04	30.76	30.48	0.00
Kingsbury & Coplan, 2016 (sample 2)	26.58	0.83	0.69	24.95	28.21	31.89	0.00
Kingsbury & Coplan, 2016 (sample 1)	24.29	1.06	1.11	22.22	26.36	23.01	0.00
Lenton-Brym et al., 2020 (study 1)	29.80	0.82	0.68	28.19	31.41	36.23	0.00
Lenton-Brym et al., 2020 (study 2)	26.05	1.51	2.28	23.09	29.01	17.26	0.00
MacKenzie & Kocovski, 2010	25.48	0.78	0.60	23.96	27.00	32.81	0.00
Mackenzie et al., 2017	32.58	1.31	1.72	30.01	35.15	24.87	0.00
Mezo et al., 2005	24.48	0.61	0.37	23.28	25.68	40.14	0.00

Moscovitch & Huyder, 2011 (group 1)	29.71	1.08	1.16	27.60	31.82	27.59	0.00
Moscovitch & Huyder, 2011 (group 2)	31.50	0.80	0.63	29.94	33.06	39.54	0.00
Nitka & O'Connor, 2017	42.56	1.20	1.44	40.21	44.91	35.47	0.00
Norton et al., 1997	26.70	1.28	1.64	24.19	29.21	20.82	0.00
Pitura & Maranzan, 2018	27.56	1.06	1.12	25.49	29.63	26.04	0.00
Purdon et al., 2001	22.38	1.71	2.93	19.03	25.73	13.08	0.00
Shillington et al., 2021	25.59	1.47	2.16	22.71	28.47	17.43	0.00
Trew & Alden, 2008	23.64	0.63	0.39	22.41	24.87	37.65	0.00
Trew & Alden, 2009	24.61	0.64	0.41	23.35	25.87	38.21	0.00
Trew & Alden, 2012 (study 1)	25.34	0.94	0.88	23.50	27.18	27.00	0.00
Trew & Alden, 2012 (study 2)	26.85	0.95	0.89	25.00	28.70	28.40	0.00
Veloce, 2020	33.44	3.14	9.83	27.30	39.58	10.67	0.00
Watanabe, 2015	25.20	1.48	2.19	22.30	28.10	17.03	0.00
Watters, 2012	24.49	0.50	0.25	23.51	25.47	49.18	0.00

Figure G1

SIAS Scores Forest Plot



APPENDIX G: STUDY 1 FULL DISTRIBUTION OF SPS SCORES AND FOREST PLOT

Table H1

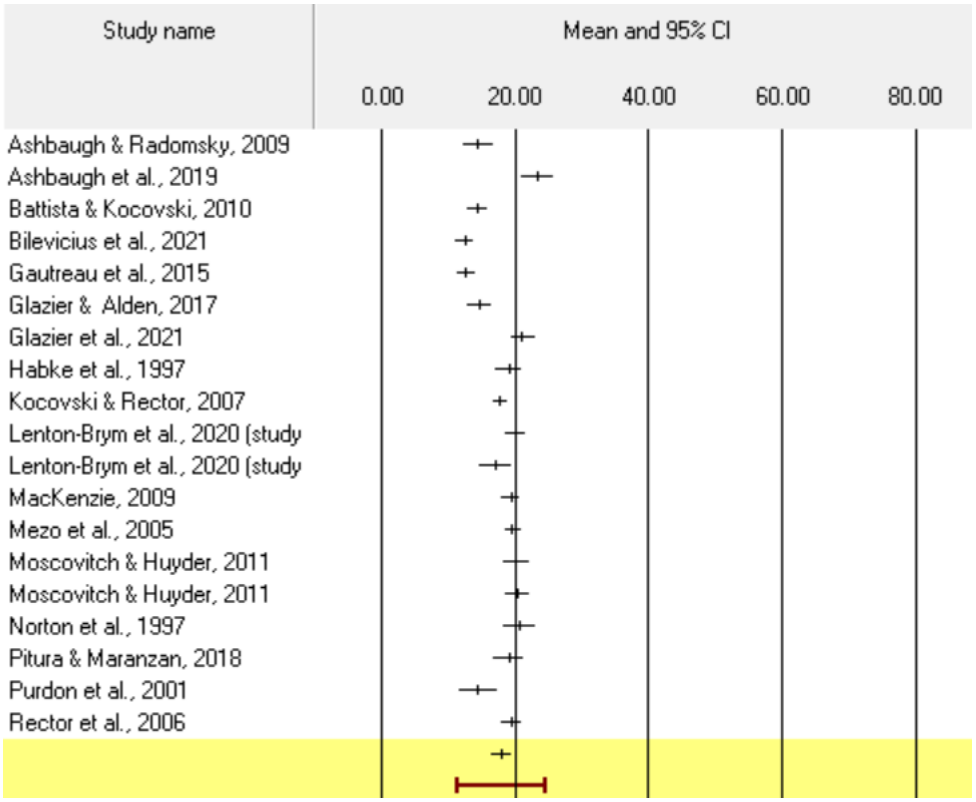
Distribution of Mean Scores and Overall Mean Summary

Study	Mean	Standard Deviation	Variance	Lower Limit	Upper Limit	Z-value	p-Value
Ashbaugh & Radomsky, 2009	14.38	1.17	1.36	12.09	16.67	12.31	0.00
Ashbaugh et al., 2019	23.44	1.25	1.56	20.99	25.89	18.78	0.00
Battista & Kocovski, 2010	14.17	0.75	0.56	12.70	15.64	18.92	0.00
Bilevicius et al., 2021	12.40	0.66	0.43	11.11	13.69	18.88	0.00
Gautreau et al., 2015	12.51	0.67	0.45	11.19	13.83	18.63	0.00
Glazier & Alden, 2017	14.75	0.94	0.89	12.90	16.60	15.62	0.00
Glazier et al., 2021	21.07	0.90	0.81	19.31	22.83	23.42	0.00
Habke et al., 1997	18.99	1.00	1.00	17.03	20.95	19.02	0.00
Kocovski & Rector, 2007	17.72	0.54	0.30	16.65	18.79	32.60	0.00
Lenton-Brym et al., 2020 (Study 1)	20.04	0.78	0.61	18.51	21.57	25.62	0.00
Lenton-Brym et al., 2020 (Study 2)	16.97	1.19	1.41	14.64	19.30	14.29	0.00
Mackenzie, 2009	19.40	0.68	0.47	18.06	20.74	28.33	0.00
Mezo et al., 2005	19.57	0.60	0.36	18.39	20.75	32.62	0.00

Moscovitch & Huyder, 2011 (group 1)	20.07	0.98	0.97	18.14	22.00	20.42	0.00
Moscovitch & Huyder, 2011 (group 2)	20.29	0.89	0.80	18.54	22.04	22.71	0.00
Norton et al., 1997	20.50	1.23	1.52	18.09	22.91	16.65	0.00
Pitura & Maranzan, 2018	19.10	1.16	1.35	16.82	21.38	16.45	0.00
Purdon et al., 2001	14.38	1.43	2.06	11.57	17.19	10.02	0.00
Rector et al., 2006	19.53	0.76	0.57	18.05	21.01	25.82	0.00

Figure H1

SPS Scores Forest Plot



APPENDIX H: STUDY 1 FULL DISTRIBUTION OF SPIN COMMUNITY SCORES AND FOREST PLOT

Table I1

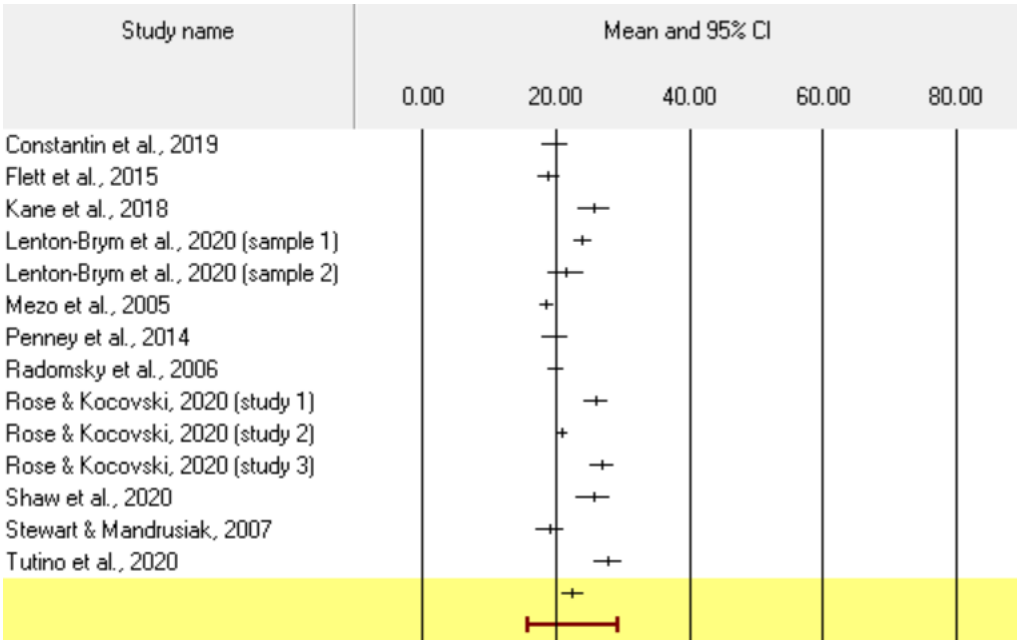
Distribution of Mean Scores and Overall Mean Summary

Study	Mean	Standard Deviation	Variance	Lower Limit	Upper Limit	Z-value	p-Value
Constantin et al., 2019	19.98	1.02	1.05	17.97	21.99	19.52	0.00
Flett et al., 2015	18.90	0.83	0.68	17.28	20.52	22.85	0.00
Kane et al., 2018	25.65	1.19	1.43	23.31	27.99	21.49	0.00
Lenton-Brym et al., 2020 (Study 1)	24.07	0.73	0.53	22.64	25.50	33.09	0.00
Lenton-Brym et al., 2020 (Study 2)	21.44	1.38	1.90	18.74	24.14	15.54	0.00
Mezo et al., 2005	18.56	0.53	.29	17.51	19.61	34.74	0.00
Penney et al., 2014	19.98	1.02	1.05	17.97	21.99	19.52	0.00
Radomsky et al., 2006	20.17	0.64	0.41	18.92	21.42	31.61	0.00
Rose & Kocovski, 2020 (Study 1)	26.07	0.92	0.85	24.26	27.88	28.29	0.00
Rose & Kocovski, 2020 (Study 2)	20.85	0.46	0.21	19.94	21.76	45.01	0.00
Rose & Kocovski, 2020 (Study 3)	26.96	0.90	0.81	25.20	28.72	30.01	0.00
Shaw et al., 2020	25.79	1.34	1.78	23.17	28.41	19.31	0.00
Stewart & Mandrusiak, 2007	18.99	1.06	1.13	16.91	21.07	17.86	0.00

Tutino et al., 2020	27.70	1.08	1.16	25.59	29.81	25.74	0.00

Figure I1

SPIN Community Scores Forest Plot



APPENDIX I: STUDY 1 FULL DISTRIBUTION OF SPIN CLINICAL SCORES AND ASSOCIATED FOREST PLOT

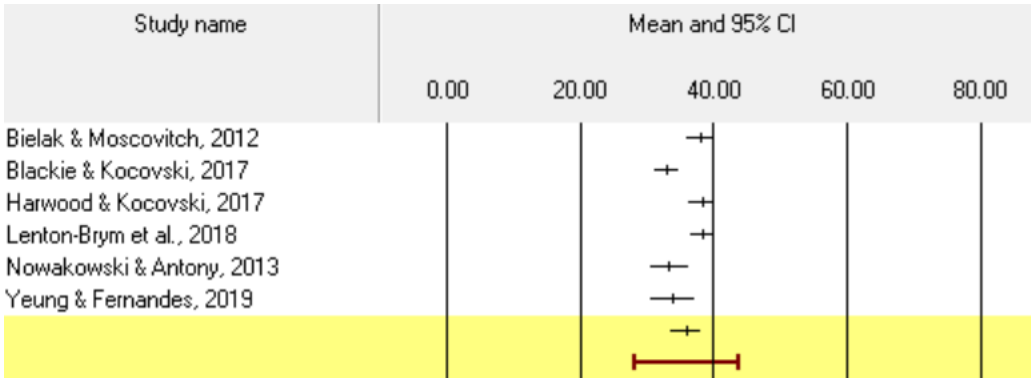
Table J1

Distribution of Mean Scores and Overall Mean Summary

Study	Mean	Standard Deviation	Variance	Lower Limit	Upper Limit	Z-value	p-Value
Bielak & Moscovitch, 2012	38.10	1.09	1.19	35.96	40.24	34.92	0.00
Blackie & Kocovski, 2017	32.86	0.91	0.83	31.07	34.65	36.06	0.00
Harwood & Kocovski, 2017	38.34	1.00	1.00	36.38	40.30	38.26	0.00
Lenton-Brym et al., 2018	38.24	0.93	0.87	36.41	40.07	40.94	0.00
Nowakowski & Antony, 2013	33.21	1.42	2.02	30.43	35.99	23.38	0.00
Yeung & Fernandes, 2019	33.87	1.71	2.91	30.53	37.21	19.86	0.00

Figure J1

SPIN Clinical Scores Forest Plot



APPENDIX J: STUDY 1 FULL DISTRIBUTION OF LSAS SCORES AND FOREST PLOT

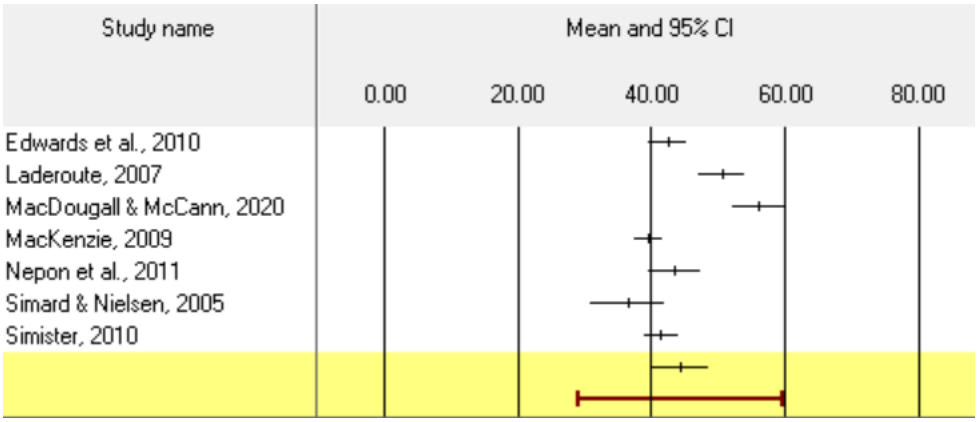
Table K1

Distribution of Mean Scores and Overall Mean Summary

Study	Mean	Standard Deviation	Variance	Lower Limit	Upper Limit	Z-value	p-Value
Edwards et al., 2010	42.51	1.49	2.21	39.59	45.43	28.58	0.00
Laderoute, 2007	50.62	1.78	3.17	47.13	54.11	28.45	0.00
MacDougall & McCann, 2020	56.16	2.06	4.23	52.13	60.19	27.30	0.00
Mackenzie, 2009	39.47	1.09	1.19	37.33	41.61	36.23	0.00
Nepon et al., 2011	43.37	1.99	3.94	39.48	47.26	21.84	0.00
Simard & Nielsen, 2005	36.50	2.81	7.91	30.99	42.01	12.98	0.00
Simister, 2010	41.47	1.31	1.71	38.90	44.04	31.67	0.00

Figure K1

LSAS Scores Forest Plot



APPENDIX K: STUDY 1 META-REGRESSIONS EXAMINING THE RELATIONSHIP BETWEEN SEX AND SOCIAL ANXIETY

Consistent with the original data analysis plan, we calculated meta-regressions examining the relationship between sex and SA score for each measure. After the first round of manuscript reviews and thoughtful consideration, we decided not to include the analyses in the manuscript because there is a high risk of misinterpretation of the data. Most studies identified in our systematic review described the variable of "sex," though it remained unclear how this variable was conceptualized (e.g., sex-assigned-at-birth vs gender identity) and measured (e.g., self-reported as sex vs gender). When sex/gender was reported, it was done so as the proportion of male vs female participants in a given study. We also labelled the variable as "sex" because there was inconsistent use across studies of male/female versus women/men, with little to no consideration of gender identity or gender diversity. This means that the data we are reporting 1) does not address whether there are differences depending on participant sex, but rather addresses whether there are differences depending on the proportion of individuals who were assigned female at birth, which likely complicates the interpretation of the analysis, and 2) lacks clarity regarding how each individual study conceptualized "sex". In the interest of producing a streamlined and clear article, we also decided to maintain the focus on the study's objectives and the important findings that address social anxiety symptoms over time. The results of the sex-based analyses are included below. Each analysis measures the relationship between the proportion of females in each study and SA scores. Sex was not included as a moderator in the relationship between SA scores and date for the aforementioned reasons, and because such analyses were likely to be underpowered given the number of studies in each analysis.

LSAS

We did not find a relationship between social anxiety and sex in the general sample of undergraduate students, (*B*=0.10, *95% CI* [-0.16, 1.36, *t* =0.22, *p* =0.834). The *Q* test indicated that variability accounted for more than sampling error (*Q*= 70.94, *df* = 4, *p* <0.001, Tau^2 = 55.57 and R^2 = <1%).

SPIN

We did not observe a relationship between social anxiety and sex when using the SPIN, (*B* = 0.16, *95% CI* [-0.05, 0.37], *t* = 1.71, *p* = 0.113). The *Q* test indicated that variability accounted for more than sampling error (*Q*= 153.27, *df* = 12, *p*<0.001, Tau^2 = 7.85 and R^2 = 0.12). We also found no relationship between social anxiety and sex in the clinical dataset using the SPIN, (*B* = 0.01, *95% CI* [-0.15-0.16], *t* = 0.16, *p* = 0.880). The *Q* test indicated that variability accounted for more than sampling error (*Q* = 26.11, *df* = 3, *p*<0.001, Tau^2 = 8.64 and R^2 = <1%).

SPS

We did not observe a relationship between social anxiety and sex (*B* = -0.02, *95% CI* [-0.19, 0.16], *t* =-0.20, *p* = 0.843). The *Q* test indicated that variability did account for more than sampling error (*Q* = 257.5, *df* = 17, *p* < 0.001), with Tau^2 = 9.85 and R^2 < 1%.

SIAS

We did not observe a relationship between social anxiety and sex (*B* = 0.01, *95% CI* [-0.12, 0.14], *t* = 0.17, *p* = 0.866). The *Q* test indicated that variability accounted for more than sampling error (*Q* = 411,32, *df* = 25, *p* < 0.001), with Tau^2 = 13.28 and R^2 < 1%.

APPENDIX L: STUDY 2 CERTIFICATES FOR ETHICS APPROVAL

17/03/2022

Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number	H-11-21-7578
Titre du projet / Project Title	In Depth Analysis of Social Anxiety Experiences among Undergraduate Students pre- and post-Pandemic
Type de projet / Project Type	Thèse de doctorat / Doctoral thesis
Statut du projet / Project Status	Approuvé / Approved
Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)	17/03/2022
Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)	16/03/2023

Équipe de recherche / Research Team

Chercheur / Researcher	Affiliation	Role
Kari-Ann CLOW	École de psychologie / School of Psychology	Chercheur Principal / Principal Investigator
Allison OUIMET	École de psychologie / School of Psychology	Superviseur / Supervisor
Jaidon MACLEAN	École de psychologie / School of Psychology	Assistant de recherche / Research Assistant

Conditions spéciales ou commentaires / Special conditions or comments

21/02/2023

Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number	H-11-21-7578
Titre du projet / Project Title	In Depth Analysis of Social Anxiety Experiences among Undergraduate Students pre- and post-Pandemic
Type de projet / Project Type	Thèse de doctorat / Doctoral thesis
Statut du projet / Project Status	Renouvelé / Renewed
Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)	17/03/2022
Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)	16/03/2024

Équipe de recherche / Research Team

Chercheur / Researcher	Affiliation	Role
Kari-Ann CLOW	École de psychologie / School of Psychology	Chercheur Principal / Principal Investigator
Allison OUIMET	École de psychologie / School of Psychology	Superviseur / Supervisor
Jaidon MACLEAN	École de psychologie / School of Psychology	Assistant de recherche / Research Assistant

Conditions spéciales ou commentaires / Special conditions or comments

550, rue Cumberland, pièce 154 550 Cumberland Street, Room 154
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada

613-562-5387 • 613-562-5338 • ethique@uOttawa.ca / ethics@uOttawa.ca
www.recherche.uottawa.ca/deontologie | www.recherche.uottawa.ca/ethics

Office of Research Ethics
4500 ARISE Building | 1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 4085
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-B (CUREB-B) has granted ethics clearance for the changes to protocol to research project described below and research may now proceed. CUREB-B is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Ethics Clearance ID: Project # 117716

Principal Investigator: Kari-Ann Clow

Co-Investigator(s) (If applicable): **Kari-Ann Clow (Primary Investigator)**
Cynthia-Maria Kanaan (Research Support)
Talia Dixon (Research Support)
Dr. Allison Ouimet (Academic Supervisor)
Phoenix Holt (Research Assistant)

Project Title: **In Depth Analysis of Social Anxiety Experiences among Undergraduate Students pre- and post-Pandemic**

Funding Source:

Effective: **September 14, 2023** Expires: **June 30, 2024**.

This certification is subject to the following conditions:

1. Clearance is granted only for the research and purposes described in the application.
2. Any modification to the approved research must be submitted to CUREB-B via a Change to Protocol Form. All changes must be cleared prior to the continuance of the research.
3. An Annual Status Report for the renewal or closure of ethics clearance must be submitted and cleared by the renewal date listed above. Failure to submit the Annual Status Report will result in the closure of the file. If funding is associated, funds will be frozen.
4. During the course of the study, if you encounter an adverse event, material incidental finding, protocol deviation or other unanticipated problem, you must complete and submit a Report of Adverse Events and Unanticipated Problems Form.
5. It is the responsibility of the student to notify their supervisor of any adverse events, changes to their application, or requests to renew/close the protocol.
6. Failure to conduct the research in accordance with the principles of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans 2nd edition* and the *Carleton University Policies and Procedures for the Ethical Conduct of Research* may result in the suspension or termination of the research project.

Upon reasonable request, it is the policy of CUREB, for cleared protocols, to release the name of the PI, the title of the project, and the date of clearance and any renewal(s).

Please email the Research Compliance Coordinators at ethics@carleton.ca if you have any questions.

CLEARED BY: **Date: September 14, 2023**

Augustine Park, PhD, Chair, CUREB-B

Eva Kartchava, PhD, Co-Chair, CUREB-B

APPENDIX M: STUDY 2 CONSENT FORM FOR PARTICIPATION ELIGIBILITY PORTION

uOttawa
Faculté des sciences sociales
Faculty of Social Sciences

École de psychologie
School of Psychology

CONSENT FORM FOR RESEARCH PARTICIPATION

Title: In Depth Analysis of Social Anxiety Experiences among Undergraduate Students pre-and post-Pandemic – Eligibility Portion

Researcher

Principal Investigator	*Supervisor*
Kari-Ann Clow	Dr. Allison J. Ouimet,
Ph.D. Candidate, Clinical Psychology	C.Psych.
School of Psychology	Associate Professor
University of Ottawa	School of Psychology
136 Jean Jacques Lussier, VNR	University of Ottawa
--- --- ----	136 Jean Jacques Lussier, VNR 4088
	(---) --- ----, --- ----

Invitation to Participate: You are invited to participate in an online screening questionnaire to determine if you are eligible to participate in the research study conducted by Kari-Ann Clow (Ph.D. Candidate) and Allison J. Ouimet, Ph.D., C.Psych. (Supervisor) at the University of Ottawa. This study is being conducted as part of Kari-Ann Clow's doctoral thesis project.

Purpose of the Study: This study will explore the unique experiences lived by undergraduate students who report experiencing social anxiety at times, and the impact of COVID-19 on these experiences.

Purpose of the Screening: To determine if you are eligible to participate in this research study. Upon completion of the online screening questionnaire, **you will only be contacted for an invitation to participate in the research study if you meet specific criteria as determined by the researcher.** If you are not eligible, all data gathered during the screening will be deleted permanently.

Voluntary Participation: You are under no obligation to participate in the screening questionnaire and if you choose to participate, you can withdraw at any time, without suffering any negative consequences. If you choose to withdraw, all data gathered until the time of withdrawal will be deleted permanently.

You can find out more information about social anxiety and other mental health problems at the following websites:

- http://www.cpa.ca/psychologyfactsheets/

Pièce 3002 / Room 3002
3e étage / 3rd floor
136 Jean Jacques Lussier
Ottawa ON K1N 6N5

- http://www.mooddisorderscanada.ca/page/resources
- http://www.bps.org.uk/psychology-public/psychology-and-public
- http://www.anxietycanada.ca/english/brochures.php
- http://www.cmha.ca/mental-health/mental-health-brochures/

Resources: COVID-19

- Living with Worry and Anxiety Amidst Global Uncertainty: https://www.psychologytools.com/assets/covid-19/guide_to_living_with_worry_and_anxiety_amidst_global_uncertainty_en-us.pdf
- "Psychology Works" Fact Sheet: Psychological Impacts of the Coronavirus (COVID-19): https://cpa.ca/psychology-works-fact-sheet-psychological-impacts-of-the-coronavirus-covid-19/
- Mental Health First Aid COVID-19 Self-Care and Resilience Guide: https://www.mhfa.ca/sites/default/files/mhfa_self-care-resilience-guide.pdf
- Self-Care, Working from home, and Tips for Parents: https://www.redcross.ca/how-we-help/current-emergency-responses/covid-19-–-novel-coronavirus/covid-19-resources-self-care-working-from-home-and-tips-for-parents
- How to Talk to Kids and Teens About the Coronavirus: https://www.psychologytoday.com/us/blog/smart-parenting-smarter-kids/202003/how-talk-kids-and-teens-about-the-coronavirus
- Secure text and online chat service for women who may be living through increased violence and abuse at home related to the COVID-19 pandemic: https://unsafeathomeottawa.ca

If you would like to seek psychological services to help manage and treat anxiety or other problems, below are some psychological clinics in the Ottawa area that you may find helpful:

Distress Centre Lines:

- Ottawa Distress Centre, (613-238-3311)
- Tel-Aide Outaouais, (613-741-6433)
- Centre d'Aide 24-7, (819-595-9999)

Treatment Resources:
Free:

- University of Ottawa Student Academic Success Service (613-562-5976; only for uOttawa students), (http://www.sass.uottawa.ca/about/mental-health-wellness.php)
- Carleton University Counselling Services (613-520-6674; only for Carleton students https://carleton.ca/health/?p=4751
- The Walk-In Counselling Clinic (613-722-2225), (https://walkincounselling.com/)
- Counselling at Catholic Family Services (613-233-8478), (https://cfsottawa.ca/programs-and-services/women/)
- Pinecrest-Queensway Community Health Centre (613-820-4922), (www.pqchc.com/mental-health-services/)
- Individual counselling at Family Services Ottawa (613-725-3601 ext. 117), (http://familyservicesottawa.org/adults/individual-counselling/)

Low-Cost:

- University of Ottawa Centre for Psychological Services and Research (CPSR): Reception (613-562-5289) or cpsr@uOttawa.ca

Private Practice (sliding scale available):

- Ottawa Institute of Cognitive Behavioural Therapy (613-820-9931), (https://www.ottawacbt.ca/)
- Ottawa Centre for Cognitive Therapy (613-729-0801), (https://ocbt.ca/)
- Centre for Interpersonal Relationships (1-855-779-2347), (https://www.cfir.ca/)

If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a series of concerns, which can be found online: http://www.abct.org/SHBooks/

Contacts: If you have any questions about the study, you may contact the researcher(s):

Kari-Ann Clow Dr. Allison J. Ouimet

This study has also been approved by the Carleton Research Ethics Board for recruitment at Carleton University. If you have any questions regarding your rights as a study participant, you may contact the:
Protocol Officer for Ethics Research at the University of Ottawa:

Tabaret Hall, 550 Cumberland Street
Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387
E-mail: ethics@uOttawa.ca
If you have any questions regarding my rights as a study participant, you may contact the:
Protocol Officer for Ethics Research at the University of Ottawa:

Tabaret Hall, 550 Cumberland Street
Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387
E-mail: ethics@uOttawa.ca

We recommend that you print a copy of the consent form to keep for your personal records by using the printing function of my computer's browser (File > Print).

By clicking on the button below, I acknowledge that I have read this document and that the screening questionnaire has been explained clearly to me.

- I agree to participate in this screening questionnaire
- I do not wish to participate in this screening questionnaire

APPENDIX N: STUDY 2 CONSENT FORM FOR RESEARCH PARTICIPATION



CONSENT FORM FOR RESEARCH PARTICIPATION

Title: In Depth Analysis of Social Anxiety Experiences among Undergraduate Students pre-and post-Pandemic

Researcher

Principal Investigator
Kari-Ann Clow
Ph.D. Candidate, Clinical Psychology
School of Psychology
University of Ottawa
136 Jean Jacques Lussier, VNR

Supervisor
Dr. Allison J. Ouimet, C.Psych.
Associate Professor
School of Psychology
University of Ottawa
136 Jean Jacques Lussier, VNR 4088
Ottawa, ON K1N 6N5

Invitation to Participate: You are being invited to participate in the above mentioned research study conducted by Kari-Ann Clow (Ph.D. Candidate) and Allison J. Ouimet, Ph.D., C.Psych. (Supervisor) at the University of Ottawa. This study is being conducted as part of Kari-Ann Clow's doctoral thesis project.

Purpose of the Study: This study will explore the unique experiences lived by undergraduate students who report experiencing social anxiety at times, and the impact of COVID-19 on these experiences.

Participation: Your participation will consist of attending one (1) online interview session (via Zoom) lasting **approximately 1-2 hours**. During this session, you will complete a semi-structured interview administered by the Principal Investigator about your thoughts, feelings and actions relating to social anxiety and the pandemic. You will be guided to 1) reflect on emotional experiences, 2) reflect on your perception of these experiences, and 3) identify how the COVID-19 pandemic has impacted these experiences. There is no right or wrong answers. You should be seated comfortably in a quiet room without distractions (i.e., phone muted, no one else in the room, etc.). You will be asked to provide your contact information (e.g., phone number, email) in case we get disconnected or in case of emergency during the study. This information will be destroyed at the end of the study.

Risks: You will be asked to provide personal information about your thoughts, feelings, and actions. It is possible that you may experience some emotional discomfort when talking about your experiences. Upon the completion of or withdrawal from this study, you will be provided with information including a list of self-help, informational, and professional resources related to mental health.

Benefits: By participating in this study, you may develop a somewhat increased awareness of your own thoughts, feelings, and actions. Additionally, this experience may contribute to your understanding of psychological research. Finally, your participation will contribute to an advanced understanding of social anxiety experiences for undergraduate students and the potential impact of the COVID-19 pandemic on these experiences.

Recording: This interview will be audio-recorded. Following the interview, the audio-recording will be downloaded onto the Principal Investigator's computer. The audio recording will then be immediately transferred to the CADRe Lab OneDrive created by Dr. Allison Ouimet and deleted from the principal investigator's computer. No one outside the research team will be allowed access to the recording. This interview will be transcribed verbatim by research assistants and the transcript will be analyzed by Kari-Ann Clow and Dr. Allison Ouimet. Extracts from the interview, which will include only your participant number, gender, and age (e.g., Participant #36, 23 years), may be used in conference presentations, reports or journal articles resulting from the research.

Confidentiality: The information you share will remain strictly confidential and will be used strictly for this research projects purposes. Only members of Dr. Allison Ouimet's research team who sign a confidentiality agreement and are working on this project will have access to the OneDrive and will have the password to relevant documents and/or datasets. Your data will be identified by a unique code that cannot be linked back to you and any other personal identifying information (other than gender and age) will always be kept separate from your data. Electronic information will be kept indefinitely. Dr. Allison Ouimet will keep a link that identifies you to your coded information for 5 years following publication, but this link will be kept secure and available only to selected members of the research team. Any information that can identify you will remain confidential.

This study is being conducted over Zoom, which is a collaborative, cloud-based videoconferencing service that allows you to communicate remotely with the Principal Investigator in real time. Zoom guarantees privacy through real-time encryption for all calls (all screen sharing content as well as the network connection to Zoom is encrypted). Zoom has access to approximate location (by city only via the IP address and OS), email address, meeting name, the date and time of the meeting, and the call data records. Zoom does not monitor or use any of this information for any reason other than to provide their services. For your privacy, the researchers will create a Zoom waiting room for your time slot that will be password-protected and locked to other participants once all parties have joined.

Open Science. In support of Open Science practices, the data analysis spreadsheets from this study might be made available to the public with all identifying information removed (including all demographic variables except for age and gender). The goal of Open Science practices is to change the culture surrounding the production and dissemination of research (i.e., more forthcoming and transparent about hypotheses and analysis of data). Any personal information that could reasonably identify you will be removed or changed before files are shared with other researchers or results are made public. Audio recordings and transcripts will NOT be shared publicly.

Exceptions: If during the interview, you disclose that 1) a child is at risk of neglect or abuse or 2) you or someone else is at imminent risk of seriously harming themselves or others, and we can't come up with a reasonable safety plan, the researchers will be required to report it to relevant authorities.

Conservation of data: Electronic data from the interview (i.e., data analysis spreadsheets) will be stored indefinitely as we may publish our de-identified datasets to be consistent with Open Science practices. Data will be stored on the CADRe Lab OneDrive created by Dr. Allison Ouimet and the Principal Investigator's password-protected personal computer. Only members of Dr. Allison Ouimet's research team will have access to the OneDrive, and only members of the research team working directly on this study will have the password to relevant documents and/or datasets. Audio Recording and transcriptions will be deleted 5 years after the publication of results.

Compensation: In return for your participation in this study, you will be offered the opportunity to enter into a draw to win one of two cash prizes (one $50.00 and one $25.00 prize) from the pool of interviewees for this study. You will still have the opportunity to enter in the draw should you choose to withdraw from the study. The person whose name is drawn will be informed by email. If the person cannot be reached within 14 days from the date of the draw, the prize will be awarded to the second name that is randomly selected, and so on, until the prize has been awarded. If you are chosen, please note that you will need to answer a simple question to receive your prize. The odds of winning a prize will depend on the number of eligible entries received. The CADRe Laboratory reserves the right to cancel the draw or cancel the awarding of the prize if the integrity of the draw or the research or the confidentiality of participants is compromised. The draw is governed by the applicable laws of Canada.

Upon completion of the interview, you can choose to provide your name and email address which will be kept in a password protected file. Once prize winners have been selected, this file will be permanently deleted.

Voluntary Participation: You are under no obligation to participate and if you choose to participate, you can withdraw from the study at any time, without suffering any negative consequences. If you choose to withdraw, all data gathered until the time of withdrawal will be deleted permanently.

Contacts: If you have any questions about the study, you may contact the researcher(s):

Kari-Ann Clow Dr. Allison J. Ouimet

This study has also been approved by the Carleton Research Ethics Board for recruitment at Carleton University. If you have any questions regarding your rights as a study participant, you may contact the:
Protocol Officer for Ethics Research at the University of Ottawa:

Tabaret Hall, 550 Cumberland Street
Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387
E-mail: ethics@uOttawa.ca

We recommend that you print a copy of the consent form to keep for your personal records by using the printing function of your computer's browser (File > Print).

By clicking on the button below, I acknowledge that I have read this document and that the study has been explained clearly to me.

- I agree to participate in this study
- I do not wish to participate in this study

APPENDIX O: STUDY 2 DEBRIEF FORM

uOttawa
Faculté des sciences sociales
Faculty of Social Sciences

École de psychologie
School of Psychology

Pièce 3002 / Room 3002
3e étage / 3rd floor
136 Jean Jacques Lussier
Ottawa ON K1N 6N5

Debriefing Form

DEBRIEFING FORM FOR RESEARCH PARTICIPATION

The Cognition and Anxiety Disorders Research (CADRe) Lab would like to thank you for participating in our research!

Title: In Depth Analysis of Social Anxiety Experiences among Undergraduate Students pre-and post-Pandemic

INVESTIGATORS AND INSTITUTION:
Thank you for participating in our research! The study you just participated in is being conducted at the University of Ottawa by Kari-Ann Clow (Ph.D. Student) and Allison J. Ouimet, Ph.D., C.Psych. (Supervisor) in the Cognition and Anxiety Disorders Research Laboratory (CADRe Lab). This study is being conducted as part of Kari-Ann Clow's doctoral thesis project.

STUDY PURPOSE AND IMPLICATIONS:
This study will explore the unique experiences of undergraduate students who report experiencing social anxiety at times, and how the COVID-19 pandemic has impacted these experiences. We used a semi-structured interview format, which provides an ideal method for exploring people's unique experiences of social anxiety within the context of COVID-19.

Among other questions, we hope to better understand whether transitions to online interactions and academic learning improved, worsened, or maintained social anxiety symptoms for undergraduate students. We formatted questions to explore your interpretation of your emotional experiences and how they have impacted you. Specifically, we focused on how people experiencing social anxiety cope in a university setting, and how the pandemic has impacted their symptoms and coping behaviours. Ultimately, this information helps us gain a clearer understanding of how the pandemic helped or hindered students' anxiety, education, and social functioning.

Throughout the study, you may have noticed some emotional discomfort, or become aware of difficulties you are experiencing with anxiety or another type of mental health issue. You can find out more information about anxiety and other mental health problems at the following websites:

- http://www.cpa.ca/psychologyfactsheets/
- http://www.mooddisorderscanada.ca/page/resources
- http://www.bps.org.uk/psychology-public/psychology-and-public
- http://www.anxietycanada.ca/english/brochures.php

- http://www.cmha.ca/mental-health/mental-health-brochures/

Resources: COVID-19

- Living with Worry and Anxiety Amidst Global Uncertainty: https://www.psychologytools.com/assets/covid-19/guide_to_living_with_worry_and_anxiety_amidst_global_uncertainty_en-us.pdf
- "Psychology Works" Fact Sheet: Psychological Impacts of the Coronavirus (COVID-19): https://cpa.ca/psychology-works-fact-sheet-psychological-impacts-of-the-coronavirus-covid-19/
- Mental Health First Aid COVID-19 Self-Care and Resilience Guide: https://www.mhfa.ca/sites/default/files/mhfa_self-care-resilience-guide.pdf
- Self-Care, Working from home, and Tips for Parents: https://www.redcross.ca/how-we-help/current-emergency-responses/covid-19-—-novel-coronavirus/covid-19-resources-self-care-working-from-home-and-tips-for-parents
- How to Talk to Kids and Teens About the Coronavirus: https://www.psychologytoday.com/us/blog/smart-parenting-smarter-kids/202003/how-talk-kids-and-teens-about-the-coronavirus
- Secure text and online chat service for women who may be living through increased violence and abuse at home related to the COVID-19 pandemic: https://unsafeathomeottawa.ca

If you would like to seek psychological services to help manage and treat your anxiety or other problems, below are some treatment resources in the Ottawa area that you may find helpful:

Distress Centre Lines:

- Ottawa Distress Centre, (613-238-3311)
- Tel-Aide Outaouais, (613-741-6433)
- Centre d'Aide 24-7, (819-595-9999)

Treatment Resources:

Free:

- University of Ottawa Student Academic Success Service (613-562-5976; only for uOttawa students), (http://www.sass.uottawa.ca/about/mental-health-wellness.php)
- Carleton University Counselling Services (613-520-6674; only for Carleton students https://carleton.ca/health/?p=4751
- The Walk-In Counselling Clinic (613-722-2225), (https://walkincounselling.com/)
- Counselling at Catholic Family Services (613-233-8478), (https://cfsottawa.ca/programs-and-services/women/)
- Pinecrest-Queensway Community Health Centre (613-820-4922), (www.pqchc.com/mental-health-services/)
- Individual counselling at Family Services Ottawa (613-725-3601 ext. 117), (http://familyservicesottawa.org/adults/individual-counselling/)

Low-Cost:

- University of Ottawa Centre for Psychological Services and Research (CPSR): Reception (613-562-5289) or cpsr@uOttawa.ca

Private Practice (sliding scale available):

- Ottawa Institute of Cognitive Behavioural Therapy (613-820-9931), (https://www.ottawacbt.ca/)
- Ottawa Centre for Cognitive Therapy (613-729-0801), (https://ocbt.ca/)
- Centre for Interpersonal Relationships (1-855-779-2347), (https://www.cfir.ca/)

If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a series of concerns, which can be found online: http://www.abct.org/SHBooks/

If you have any questions or concerns related to this study, please contact the researchers:

Kari-Ann Clow, PhD Candidate

Dr. Allison J. Ouimet, C.Psych.

This study has also been approved by the Carleton Research Ethics Board for recruitment at Carleton University. If you have any questions relating to your rights as a research participant, please contact the Protocol Officer for Ethics Research at the University of Ottawa:

Tabaret Hall, 550 Cumberland Street
Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387
E-mail: ethics@uOttawa.ca

APPENDIX P: STUDY 2 SEMI-STRUCTURED INTERVIEW

1. Tell me about the anxiety that you feel in social situations?
    - How was that experience impacted when the pandemic began? How has it been as the pandemic has evolved now?
2. How has feeling that anxiety affected your university experience? What has that been like for you?
    - *Explore whether these are positive or negative…*
    - *How has your anxiety within the university context changed or stayed the same with covid? Made things easier or harder? New challenges or the same?*

    Follow-up questions based on responses
    - What is the effect on your grades?
    - On meeting new people?
    - Have they helped you in any way?

3. How has your cultural background and identity played a role in how you experience social anxiety symptoms? Has covid impacted this differently?
4. What year of undergraduate studies are you in? What year were you in at the beginning of covid? How did this play a role into your anxiety and experiences?
5. How was your social anxiety impacted by the transition to online learning during the pandemic?
    - ❑ In what ways did it enhance your learning and university experience?
    - ❑ In what ways did it cause challenges?
    - ❑ Was it easier or more difficult to engage socially?

6. How do you feel about your level of social engagement on campus and with university members? Tell me about some positive or negative experiences that you have experienced to date related to being social at university? How has the social engagement been different pre/post pandemic? Do you have a preference to one or the other?
7. Have you ever considered dropping out of university? If so, what were your reasons? What has kept you in school? How did the pandemic influence these thoughts?
8. How supported do you feel in managing these challenges? What kind of support would you like to see from the university? How did the level of support change after the pandemic began?
9. Is there anything else you'd like to tell me about the relationship between your social anxiety experiences and your university life throughout the last couple of years?

APPENDIX Q: STUDY 2 SOCIODEMOGRAPHIC PARTICIPANT INFORMATION

Table 1

Socio-Demographic Information of the Sample

Variable	Number of Participants	%
Gender		
Female	10	71.4
Male	2	14.2
Non-binary	2	14.2
Age		
20	3	21.4
21	7	50
22	2	14.2
23	1	7.1
24	1	7.1

Sexual orientation		
Heterosexual	9	64.2
Bisexual/Bi-curious	4	28.5
Pansexual	1	7.1
Ethnic/Racial background		
White	6	42.8
White European	2	14.2
White Pacific Island	1	7.1
South Asian	1	7.1
European	1	7.1
Middle Eastern	2	14.2
North African	1	7.1
Marital status		
Single	10	71.4

Long term relationship	3	21.4
Living together/Common-Law	1	7.1
Income		
Prefer not to answer	2	14.2
> $20,000 CAD	1	7.1
$20,000-40,000 CAD	2	14.2
$40,000-60,000 CAD	1	7.1
< $80,000 CAD	8	57.1
University student status		
Part-time student	1	7.1
Full-time student	13	92.8
Occupational status		
Not current employed	8	57.1
Part-time employed	5	35.7

Full-time employed	1	7.1
Diagnosis of psychological disorder		
Yes	6	42.8
No	8	57.1
Diagnosed disorders and comorbidities		
None	8	57.1
Generalized anxiety disorder	2	14.2
Attention-deficit/hyperactivity disorder	1	7.1
Generalized anxiety disorder and major depressive disorder	1	7.1
Generalized anxiety disorder, major depressive disorder and obsessive-compulsive disorder	1	7.1

Generalized anxiety disorder, panic disorder and major depressive disorder	1	7.1
Current Psychological Treatment		
Yes	10	71.4
No	4	28.6