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The Effect of Yoga on Affect and Optimism in Adolescents

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This is to certify that the doctoral dissertation by

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Walden University
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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Due to the increase in mental health struggles among children and adolescents in the United States, there is a need for new, innovative treatments in schools to address mental health issues. Traditional forms of treatment in schools, such as group counseling and individual therapy, have fallen short in addressing the number of students who need support. The purpose of this quantitative quasi-experimental study was to examine the effect of a 45-minute session of yoga on affect and optimism compared to a group counseling session and a tutoring session control in adolescents attending a public high school in New England. The theoretical framework was based on theories of psychoneuroimmunology, mindfulness, and transpersonal psychology. Positive and negative affect were assessed using the Positive and Negative Affect Scale, while optimism was assessed using the Life Orientation Test – Revised. Assessments were administered before and after each session in the three groups. Results of multivariate analysis of covariance showed no difference in posttest Life Orientation Test – Revised and Positive Affect Scale scores, controlling for pretest scores; however, Negative Affect Scale scores were significantly lower among those in the yoga condition. Implications for positive social change include using mindfulness-based interventions such as yoga to provide holistic and cost-effective ways of improving adolescents' mental health, which may aid in improving graduation rates and guard against future mental health problems.

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Dedication

The content of this research is dedicated to my amazing wife, Caitlin Lawrnce. You inspire me so much; you are the hardest working person I know. I couldn't have done this with your support. You save me over and over again. I would also like to dedicate this research to my daughters, Zoe Allessi, Maeve Allessi, and Mariella Allessi. Zoe, you have always made me want to make myself better. I hope you can be proud of this work and the effort it took. Maeve and Mariella, thank you for making me laugh and reminding me of what is truly important in life: family. I love you all so much.

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Chapter 1: Introduction to the Study

Background

More than ever, adolescents in the United States are struggling with mental health issues. There has been a sharp increase in mental health diagnoses in adolescence over the past 20 years (Centers for Disease Control and Prevention [CDC], 2021). Due to increased mental health concerns regarding adolescents and an insufficient number of providers to care for them, much of the work done to address mental health and adolescents falls upon schools. Schools in the United States have seen a sharp increase over the past 20 years in the need to address mental health concerns among students (Ali et al., 2019).

This emerging need to support the mental health needs of students has put a strain on schools; many schools do not have sufficient staff to address the increase in the number of mental health concerns (Ali et al., 2019). Schools have been using methods such as traditional individual and group counseling to address this need; however, these methods cannot keep up with the number of students in need (Al-Harbi, 2012). Many schools rely on individual and group counseling; however, the additional counseling needs place increasing demands on school staff. Therefore, new methods of addressing student mental health needs to be explored. Schools rely on individual group counseling; however, this limits the number of students per day who can be seen. Additionally, most counseling groups are reactive as opposed to preventive in nature. A typical group in a school can service about six to eight students at one time. There is a need to develop

methods for delivering reactive and preventive mental health services that can address 20–30 or more students at a time.

In recent decades, mindfulness and mindfulness-based strategies have become a popular way of addressing mental health as prevention and intervention to address concerns when they arise (Gibson, 2019). Mindfulness-based strategies and interventions work on a physiological and psychological level to decrease the body's reaction to stress. On a physiological level, mindfulness-based activities reduce inflammation, which is the leading cause of disease in the human body (Stuad, 2015). Psychologically, mindfulness-based strategies reduce rumination on negative thinking and help a person let go of harmful thoughts and behaviors (Uebelacker et al., 2017). Yoga as a mindfulness-based strategy has been shown to reduce psychiatric symptoms measured by increased positive affect and decreased negative affect (Stephens, 2017). Many of these studies were conducted with adult participants, but recently more studies have been conducted with adolescents and have shown positive results (Deuskar, 2017; Saxena et al., 2020). Many of these studies examined multiple yoga sessions and their impact on positive and negative affect. These studies indicated that multiple sessions of yoga can decrease negative affect and increase positive affect (Parker et al., 2016; Rincón et al., 2020).

The current study examined the effectiveness of a single session of yoga in decreasing negative affect and increasing positive affect with adolescents compared to the group being counseled, the standard treatment for mental health concerns in schools. In addition, the study focused on a lesser examined but equally important component of mental health as affect: a person's experience of optimism. Optimism has been associated

with higher levels of positive affect as well as better overall well-being (Carver & Scheier, 2014). However, at the time of the present study, there was a lack of research examining the relationship between yoga and optimism, especially in the adolescent population.

Yoga as a means of addressing mental health concerns could be used as a preventive measure as well as an intervention for struggling students. It is possible that engagement in yoga could increase optimism, which has been correlated with academic success and self-reported overall higher scores of well-being. Yoga could offer a way of not only treating students suffering from mental health issues but also increasing their overall academic performance and well-being. Schools could use yoga as a prevention measure to facilitate students' optimism and emotional health.

Problem Statement

The growing number of children and adolescents suffering from mental illness is increasingly worrisome. This number has grown steadily over the past 20 years (CDC, 2021). The rate of mental illness in young adults in 2008 was 19.1%, but 10 years later mental health struggles in young adults rose to 26.3%. Diagnoses of anxiety and depression in children age 12 to 17 years also jumped from less than 8% in 2008 to 14.4% by 2018 (CDC, 2021). Suicide rates in teens increase dramatically as well. The suicide rate among children age 10 to 14 years increased by 67% between 2000 and 2017; among adolescents 15 to 18 years, it increased by 48% during the same period (Whitney & Peterson, 2019). Previous research indicated that mindfulness-based strategies can be used to increase positive affect and reduce negative affect (Stephens,

2017). Because responsibility for the mental health of children and adolescents falls a great deal on schools, mindfulness-based interventions have been adopted by many school districts to aid in the servicing of mental health needs for their students (Felver et al., 2015; Halladay et al., 2019; Malboeuf-Hurtubise et al., 2021)

Although mindfulness-based interventions can positively impact affect in adolescents, research is lacking on the relationship between mindfulness-based interventions, particularly yoga as a mindfulness activity, and optimism in adolescents (Felver et al., 2015). While much in known about the impact of multiple yoga sessions on various aspects of mental health, there was less literature on the impact of a single session on affect and optimism. There was little research on optimism and yoga, especially in adolescents. Demonstrating an impact can be an important incentive for schools to deal with the increase in mental health issues in situations of constrained resources (Ali et al., 2019).

Purpose of the Study

The purpose of this quantitative comparative study was to identify whether there a single session of Hatha yoga affects positive and negative affect and optimism in adolescence compared to a traditional group counseling and a no-yoga intervention control. The independent variable was intervention type, including one 45-minute session of Hatha yoga, one 45-minute session of group counseling, and one 45-minute session of a teacher-led independent study class. The dependent variables were positive affect, negative affect, and perceived optimism. Tests were administered before and after the interventions. A one-way multivariant analysis of variance (MANCOVA) was used to

determine the effects of intervention type on the posttest values of the dependent variables while controlling for pretest value.

Research Questions and Hypotheses

The research question was the following: Does a single 45-minute yoga session have an impact on positive and negative affect and optimism in high school students as compared to peer-group counseling and no-treatment comparison groups? The null and alternative hypotheses are as follows.

H_o1: A single 45-minute session of yoga does not significantly influence self-reported affect among high school students, as measured by the Positive and Negative Affect Scale, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_a1: A single 45-minute session of yoga does significantly influence self-reported affect among high school students, as measured by the Positive and Negative Affect Scale, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_o2: A single 45-minute session of yoga does not significantly influence optimism among high school students, as measured by the Revised Life Orientation Test for Adolescents, compared to those participating a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_a2: A single 45-minute session of yoga does significantly influence optimism among high school students, as measured by the Revised Life Orientation Test for

Adolescents, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

Theoretical Framework

The theoretical framework of this study was based on theories of psychoneuroimmunology, mindfulness, and transpersonal psychology. Psychoneuroimmunology examines the relationship between immune function and physical and psychiatric health. This theory of how immune response can affect physical and mental health became popular in the mid 1800s but was not coined until Ader and Cohen (1975) use the term *psychoneuroimmunology* in their research. They examined how immune functioning is connected to thought using classical conditioning experiments. This research focused on the role of cytokines in inflammation and relationship between physiological and mental response. Recently, during the COVID-19 pandemic, research continued to support the connect between inflammation and its relationship with psychological state (Bower et al., 2022).

The concept of mindfulness gained traction in the 1970s and has continued to guide research and interventions focused on mental health and mental illness. Kabat-Zinn et al. (1992) wrote about mindfulness and stress, and this work laid foundation for how mindfulness impacts immune functioning and mental health. This work inspired others to examine how inflammation and the body can be reduced by nonpharmaceutical interventions (Geraghty et al., 2021), and specifically those related to mindfulness-based activities (Nuesh et al., 2013) that can be used to regulate nervous system functioning. Kabat-Zinn's research also examined the role of mindfulness on stress hormones and

cytokines that influence inflammation in the body (Rengasamy et al., 2021). Much of the psychoneuroimmunology research examined the relationship between cytokines and inflammation in the body. This inflammation and rise in cytokines can lead to the expression of psychiatric symptoms (Miller, 2020). Although inflammation in the body can often be helpful in repairing the injured body, it can also lead to cell death especially in states of chronic stress. Recent studies showed that increases in cytokines have been seen in individuals with increased symptoms of depression anxiety (Zainal & Newman, 2021).

Transpersonal psychology explores human consciousness and the transformation of personal experience of the self and the inner world. Transpersonal psychology is rooted in Eastern philosophy and religion and has as a goal for individuals to experience spirituality. This experience can then be linked to a better understanding of emotional responses and how emotions affect the perception of life. Transpersonal psychology also can aid in the enhancement of experience, allowing a person to be more present and experience life with less judgment. Experiencing judgment can skew perception and influence quality of life. Transpersonal psychology also helps individuals feel a sense of connection to the whole, a common theme shared with the experience of the mindfulness associated with yoga (Hartelius, 2021). The practice of mindfulness helps the individual experience life with less preconceived notions of what is good and bad, allowing individuals to fully experience reality and connect with the present with greater awareness (Kabat-Zinn et al., 1992). In this way, transpersonal psychology views yoga as a vehicle to help the whole person reconnect, feel more content, and experience less

emotional dysregulation (Friedman, 2021). The feeling of wholeness is the experience of being present in a nonjudgmental fashion, allowing connectiveness to be experienced with less rumination on wanting things to be a certain way. Once a new level of consciousness is developed, the likelihood of developing symptoms related to psychiatric illnesses such as anxiety and depression is reduced (Hartelius, 2021).

Nature of the Study

The current study had a quantitative quasi-experimental design to analyze the effect of the treatment independent variable on the three dependent variables of positive affect, negative affect, and optimism. MANCOVA was used to test the three hypotheses. The three conditions included 40-minute sessions of Hatha yoga, counselor-led group counseling, and a study led by a history teacher. All three conditions occurred within a 50-minute block of time allowed by the high school and designed for their students to use as remediation time or to engage in extracurricular skills and interests. All participants in the study completed a pretest and posttest assessment using the Positive Affect Negative Affect Scale (PANAS) and the Life Orientation Scale Revised (LOT-R), which was used to measure optimism.

Assumptions and Limitations

There were a few assumptions guiding the study. The participants chose to participate in each activity during the 50-minute block of activity time during their school day. This 50-minute block was designed by the school to provide students with time to work on remediation in certain subjects that might be challenging to the students as well as the opportunity to engage in extracurriculars and areas of personal interest. Therefore,

there was some level of selection bias, and individuals who selected the yoga intervention may have been different from the others in terms of affect and optimism. Controlling for pretest variation was intended to statistically control for this. Data were collected from all students, but only those who had signed consent forms (both self and guardian) had their data included in the study. Those without consent forms submitted data to the teachers who used the data to complete teachers' individual annual goals. All teachers are required by the state licensing board to engage in data collection that involves the learning of all students.

Another assumption was that the instruments accurately assessed the constructs in question. The PANAS and the LOT-R are research-based instruments that have been used to assess affect and optimism (respectively) in adolescents. I also assumed that these measures were administered, and the data were collected in accordance with administration and scoring protocols to ensure maximum reliability and validity.

A final assumption was that the measures were sensitive enough to assess changes from only one session of counseling and yoga. Many studies have been conducted to assess the effectiveness of yoga over multiple sessions with adolescents; however, a single-session approach had been used less often. Single-session models exist and have been shown to be effective (Felver et al., 2015; Felver et al., 2020; Hooke et al., 2016). These studies also pointed to the need for continued research in this area and suggested that adolescents can provide meaningful and reliable information regarding their experiences related to their mental health and well-being.

Lack of diversity in the sample was a limitation. The student body consisted of mostly White students with a very small representation of African American students and those from other races and ethnicities; this sample was representative of the neighborhoods in which the school is situated. The study also had a limited sample size. Although preintervention power analyses showed the sample size to be adequate, it is likely that the study will need to be repeated on larger samples.

Significance

Addressing the mental health needs of children and adolescents has put a strain on schools; many do not have sufficient staff to address the increase in the number of mental health concerns (Ali et al., 2019). The current study was significant in its attempt to demonstrate the utility of a yoga intervention that can simply and efficiently reach many students. Implications for positive social change include providing evidence to substantiate new methods that can be used by school professionals to address mental health issues experienced by their students. Unaddressed mental health challenges through adulthood can lead to academic failure and missed opportunities for students. An even greater concerned is the correlation between untreated mental health struggles in childhood and criminal behavior in adulthood (Maynard et al., 2015). Mindfulness-based interventions such as yoga can be useful in helping children and adolescents to self-regulate affect and be more optimistic about their futures.

Summary

Adolescent mental health is becoming a greater concern in the United States. As the number of adolescents suffering mental illness increases, methods to prevent and treat

such illness have not kept up with the needs (CDC, 2021). Schools must play a central role in addressing these concerns. Standard forms of treatment of mental illness in schools include failing students due to lack of resources and inability to reach the number of students necessary (Ali et al., 2019). Recent understanding regarding inflammation and its effect on both physical and psychological symptoms of the body may offer a solution to mitigate the increased level of mental illness in adolescent students (Stuad, 2015).

Mindfulness activities have been shown to decrease inflammation and thereby reduce psychiatric symptoms such as anxiety and depression (Uebelacker et al., 2017). Yoga is a mindfulness activity that offers a way of addressing mental health issues in students. Yoga can also reach a larger number of students than traditional forms of treatment. Optimism is an under researched component of mental illness. Traditional forms of treatment for adolescent mental illness in schools have not addressed the effect they have on optimism and its relationship to the mental health of students. The focus of the current study was to determine whether yoga can be used in an educational setting to increase positive affect, decreased negative affect, and increase levels of optimism compared with traditional forms of therapy such as group counseling.

Chapter 2 provides a detailed examination of the literature. Chapter 2 begins with the literature review strategy and includes a detailed discussion of the theories providing the conceptual framework underpinning the study. Next, the literature related to key variables is examined to provide the rationale for the present study.

Chapter 2: Literature Review

Over the past 20 years, there has been a sharp increase in children and adolescents being diagnosed with mental health disorders in the United States. Currently, there are over 6 million children ages 3 to 17 years in the United States who are diagnosed with mood disorders (CDC, 2021). Students who suffer from mental health diagnoses in high school are twice as likely not to graduate and continue to higher education (Dupéré, et al., 2018). These individuals are also more likely to be involved in criminal activity later in life (Maynard et al., 2015). Mental health disorders are causing the loss of opportunities for children and adolescents that can have lifelong consequences for them and for society.

The burden of addressing mental health challenges falls to families and to school systems. Due to lack of resources, many school districts turn to traditional forms of therapy and intervention to treat mental illness. However, there are many students who do not respond to traditional forms of treatment for mental health disorders and need alternative forms of treatment (Fusar-Poli et al., 2021). Other forms of treatment must be identified. Also, there is a challenge in how alternative strategies can be delivered using limited resources to reach as many students as possible.

Yoga has been shown to be effective in helping adolescents regulate mood and decrease negative thinking. Often, this research involved frequent sessions and did not compare yoga to other forms of treatment (Kale & Kumari, 2017). Researchers had not examined the effect of yoga on optimism compared to other forms of treatment, particularly in school-age children in a school environment. The use of yoga, which could

reach a larger number of students in a single session, to impact affect and optimism could be a useful strategy for school districts constrained by limited financial resources.

Although there has been some research examining the effects of mindfulness-based activities such as yoga on decreasing symptoms of anxiety and depression in adults, fewer studies have been done on children and adolescents (Crane et al., 2016). Studies have examined the effects of yoga on mood regulation, but many of these studies examined the effects of multiple sessions of yoga rather than a single session (Janjhua et al., 2020; Kale & Kumari, 2017). Additionally, there have been studies of the impact of yoga on adolescents, but many of these have been completed in countries outside of the United States and not inside the school context. The purpose of the current study was to examine the effectiveness of a single yoga session on affect and optimism compared to a no-treatment group and a professional-led peer-support counseling group in a school-based setting.

Literature Search Strategy

Library databases and search engines assessed for the literature review included APA PsycARTICLES, APA PsycInfo, APA PsycTests, CINAHL, ERIC, and limited Google Scholar searches of articles and journals within the past 10 years. Previous published articles on yoga, psychoneuroimmunology, inflammation, and mindfulness were helpful in locating important seminal works from outside the 10-year framework. Key search terms included *yoga*, *mindfulness*, *inflammation*, *transpersonal psychology*, *mind body medicine*, *affect*, *depression*, *anxiety*, *mood*, *optimism*, and *adolescents*. Also used were combinations of search terms, including *yoga* and *mental health*, *mindfulness*

and *mental health*, *yoga* and *adolescents*, *yoga* and *affect*, *mindfulness* and *anxiety*, *inflammation* and *mindfulness*, *transpersonal psychology yoga inflammation* and *yoga*, *yoga therapy* and *mood*, *mindfulness* and *optimism*, and *yoga and optimism*.

Literature was explored to examine different types of mindfulness-based activities and their effects on mood and inflammation. Comparative articles were reviewed that examined the use of multiple interventions across different settings and modalities (Arora et al., 2019; Cramer et al., 2013). Articles were also explored to examine differing methods of delivery (i.e., single session, multiple session, individual and group sessions) of mindfulness-based activities. It was essential to examine multiple mindfulness-based interventions, such as those comparing single and multiple sessions, those offered individually versus in a group, and the effectiveness of these interventions with specific ages. Further research into the effectiveness of single-session versus multiple-session yoga with an adolescent population was necessary. Furthermore, positivity or optimism regarding a person's future also seemed to be lacking in the literature, so this was searched extensively.

Theoretical Foundation

Theories of psychoneuroimmunology and mindfulness created the theoretical foundation for this study involving the use of yoga to improve affect and optimism. Mindfulness and its applications have underpinnings in transpersonal psychology. Psychoneuroimmunology is the study of the relationship between psychiatric symptoms and immune function. Bernard (date, as cited in Ader, 2020) formulated the concept in the mid-1800s. Ader and Cohen (1975) coined the term *psychoneuroimmunology* and

explored how classical conditioning can affect a person's immune functioning; Ader and Cohen demonstrated the first connection between thought and immune functioning. Their research launched studies examining the immune brain connection (Koren et al., 2021; Schiller et al., 2020), which would later inspire research into cytokines and inflammation as well and the hypothalamic-pituitary-adrenal axis.

Mindfulness, from its introduction to the West in the 1970s, has been gaining influence and respect as an intervention strategy targeting physical and mental health concerns. Mindfulness is the quality or state of being conscious or aware of something (Kabat-Zinn et al., 1992). Mindfulness practices are activities that allow for that state of awareness to be cultivated. Mindfulness has been shown to be effective in reducing inflammation in the body and regulating the nervous system (Nuesh et al., 2013; Rengasamy et al., 2021). Mindfulness activities have also been implicated in lower stress hormones and cytokines, both of which can lead to inflammation in the body. Mindfulness practices can positively affect physical and mental health.

Transpersonal Psychology

Transpersonal psychology is the branch of psychology that explores human consciousness and the transformation of a person's experience of self in relation to the world (Friedman, 2014) Transpersonal psychology is rooted in Eastern philosophy and traditions and seeks understanding of spiritual religious experiences and how they can be used to enhance the everyday life of individuals (Cramer et al., 2013). Transpersonal psychology strives to help a person develop and realize the interconnectedness of all things (Khoury et al., 2016). In this way, much like yoga, transpersonal psychologists

attempt to orient individuals to a sense of oneness, thereby leading to clear insight and emotional stability. Yoga in transpersonal psychology is seen as a vehicle to move a person toward oneness or what is referred to as a pure conscious event. Yoga can lead to these events in realization such as moments of enlightenment from Buddhist philosophy. In these moments, a person experiences wholeness with the infinite, a sense of well-being and peace, and openness to future events (Banerjee, 2018).

Transpersonal psychology is rooted in Eastern philosophy in its conceptualization of human experience. Many Eastern philosophies attempt to transcend ego-based suffering through practices that allow a person to develop a deeper sense of connectedness to the infinite and a sense of selflessness. The work of Jung and James can be seen as some of the earliest work in transpersonal psychology (Cramer et al., 2017). Aurobindo, an Indian philosopher and yogi, explored how yoga could be used and blended with psychology to help a person develop a less egocentric consciousness. This consciousness is less affected by day-to-day events, which can cause the development of psychiatric symptoms related to affect and may cause a diagnosis of depression and anxiety (Miovic, 2004). The practice also guards against negative thoughts and perceptions, which are also usually based on egocentric thought, thereby promoting a sense of optimism. Pessimism is usually based on the thought or perception that things are going to go against the way the ego wants them to; due to the lack of ego, a person may experience the world more optimistically.

Theories of Psychoimmunology

Psychoneuroimmunology research points to a connection between increased inflammation in the body and the release of cytokines leading to illness, including psychiatric illness (Stuad, 2015). Inflammation in the body is a useful and necessary process to repair and defend the body against infection and disease, but when the body remains in a chronic state of inflammation, the body can attack itself, destroying healthy cells leading to numerous concerns. Cytokines are proteins that control the function of the immune system. Cytokines activate cells in the immune system to engage in defense, which often leads to inflammation. An increasing number of research studies have indicated that inflammation and the release of cytokines have been linked to increased symptoms of depression and anxiety. Zainal and Newman (2021) examined inflammation markers in the body and their relationship to depressive symptoms over a 9-year span. They found that increased markers of inflammation led to poorer treatment outcomes and increases in psychiatric symptoms, leading to higher reported symptoms of depression. Schrock et al. (2021) found that pretrauma systematic inflammation can lead to greater symptoms of depression after a trauma has occurred, making individuals more vulnerable to psychiatric illness. Inflammation has also been tied to anxiety, bipolar disorder, and borderline personality disorders (Milaneschi et al., 2021).

Increased levels of inflammatory biomarkers such as interleukin-6 (IL-6) and C-reactive protein have also been tied to increased psychiatric symptoms in adolescents. IL-6 and C-reactive protein are cytokines often produced when the body suffers an injury, activating an inflammatory response in the body. Arana et al. (2018) found that

adolescents who had experienced some social victimization had higher levels of depressive symptoms, somatic complaints, and markers of inflammation compared to peers with no history of victimization. Colasanto et al. (2020) conducted a meta-analysis of 22 studies and found that adolescents with higher levels of inflammation biomarkers, especially C-reactive protein, reported more depressive symptoms. Higher levels of IL-6 have also been identified in adolescents with greater symptoms of anxiety (de Baurmont et al., 2019).

More recent studies examined the role of increased cytokines in adolescents with depression. Early studies demonstrated that adolescents with depression showed an increase in cytokines such as interleukin-18 and tumor necrosis factor-alpha compared to their typically developing peers without a psychiatric illness (Mills et al., 2013). These cytokines are pro-inflammatory, suggesting the role of inflammation in psychiatric illness for adolescents. More recent studies confirmed that an increase in cytokines, notably IL-6 and tumor necrosis factor-alpha, were associated with elevated symptoms of anhedonia, a symptom of depression in which a person lacks pleasure in previous pleasurable activities. These studies also indicated that higher tumor necrosis factor-alpha levels predict higher levels of depressive symptoms over time (Rengasamy et al., 2021). Walss-Bass et al. (2018) found that female adolescents with higher levels of the cytokine transforming growth factor (TGF) alpha presented with greater symptoms of anxiety than females with lower levels. These more recent studies highlighted the relationship between cytokines, inflammation, and psychiatric illness in adolescents. This research strongly

suggests that inflammation and increased levels of particular cytokines can cause physical and mental illnesses.

Treatments focusing on mind control of the body have begun to emerge. Benson et al. (1974) showed that the mind impacts the body and vice versa when a person is under stress. Benson was one of the first pioneers to explore the mind–body connection and focus on how stress affects a person's physical body through the mind and the person's mental responsive to stress. Benson introduced the term *relaxation response* as a way of introducing Eastern meditation into Western medicine. The relaxation response is the body's counter response to the fight-or-flight response. The relaxation response occurs because the body is no longer in an environment in which it perceives a danger, and the body returns to hemeostasis (Benson et al., 1974). Benson et al. showed that using relaxation techniques or mindful meditation can help the body repair muscles and organs and cause an opposite response to the fight-or-flight response. This response reduces metabolism, breathing rate, heart rate, and brain activity. Silencing the mind and calming the body can lead to reduced inflammation and increased healing (Bagheri-Nesami et al., 2006). Research has begun to illuminate how the mind and the mental experience control physiological responses in the body.

Theories of Mindfulness

Using mindfulness to create a pure conscious event and reduce inflammation in the body and rumination over negative thoughts has become a popular intervention for physical and mental health (Gibson, 2019). Kabat-Zinn founded the mindfulness-based stress reduction program at the University of Massachusetts in 1967 to treat chronic pain.

Kabat-Zinn was a biologist interested in the mindfulness effect on the physical body (Segal et a., 2004). Kabat-Zinn's program introduced the benefits of meditation on physical and mental health. Kabat-Zinn's early work focused on the use of awareness meditation to regulate a person's response to pain (Kabat-Zinn & Burney, 1981). In the early 1990s, Kabat-Zinn's focus shifted from examining meditation as a strategy for improved physical health to mental health. Kabat-Zinn began to use mindfulness meditation and mindfulness-based stress reduction techniques to manage anxiety Miller et al., 1195). The work of Kabat-Zinn and others in mindfulness and its applications for mental health introduced the idea of Eastern practices to prevent and intervene in psychiatric illness.

Mindfulness and Yoga

Yoga began to be seen as a therapeutic practice having implications for mental health. The practice of yoga is to yoke or steer the mind and body in a direction that is harmonious and devoid of ruminating, or habitual thoughts and behaviors that cause us harm (Kest, 2007). Much of the yoga practiced in the United States today comes from the lineage of Bellur Krishnamachar Sundararaja Iyengar, whose practice of yoga became known in the West as Hatha yoga. Hatha yoga includes asanas or poses to connect the breath and the body, calming the mind and allowing for space for healing. Hatha yoga entered the United States in 1893 when Swami Vivekananda spoke in Chicago at the Parliament of Religions; Swami Vivekananda introduced the practice and benefits of Hatha yoga to the Western world (White, 2012). In the United States, research had not established yoga as a meaningful practice that could benefit a person's health until

Ornish's research in the early 1980s. Ornish et al. (1983) researched how lifestyle changes could positively change the progress of heart disease. These lifestyle changes included yoga and meditation, and Ornish et al.'s research added credibility to the practice of yoga as a medical intervention. Prior to this, the benefits of yoga were thought to be spiritual in nature.

Research regarding yoga practices has expanded. Research has demonstrated the positive effects of yoga on regulating blood glucose levels, keeping the cardiovascular system healthy, and improving mental health (Bhakti Permana et al., 2020; Kaleeswari et al., 2021). Numerous studies have shown that yoga can help increase alertness, increase positive emotions, decrease negative feelings and depression, and decrease anxious symptomatology (Stephens, 2017). Yoga can produce an inhibitory effect on the hypothalamic-pituitary-adrenal axis, causing a decrease in cortisol levels and other stress hormones that can have negative physical and mental health effects (Bershadsky et al., 2014; Nerurkar et al., 2013). The CDC (date, as cited in Nerurkar et al., 2013) reported that 80% of primary care visits are related to stress-related complaints. Research has also suggested that chronic illnesses may be correlated with greater acute stress levels of pro-inflammatory cytokines in the bloodstream, thereby linking inflammation to illness. This suggests that the practice of yoga can be a viable intervention for chronic illness as well as acute and stress-related illnesses.

The success of yoga is due to the connection of breath and movement. Hatha yoga consists of asanas, or postures, which are movements tied together with breathing and/or meditation techniques. This kind of moving meditation slows the breathing down and

causes a parasympathetic response in the body, which includes reducing respiration, decreasing blood pressure, and slowing the heart rate. Yoga also works on vagal tone, a measure of the body's response to regulating a variable heart rate. Vagal tone is an internal biological process that represents the activity of the vagal nerve. Increasing one's vagal tone activates the parasympathetic nervous system. A higher vagal tone means your body can relax faster after the stress response. The practice of yoga leads to a quicker and more efficient return of the body to homeostasis after episodes of stress; this change is reflected in the changing heart rate or higher vagal tone (Vinay et al., 2016). An increase in heart rate variability and one's ability to bring the heart rate back to homeostasis quicker and more efficiently has been tied to decreased diastolic blood pressure, release of the hormone oxytocin, and decreased levels of cortisol, all which make one healthier and better able to manage stress (Telles et al., 2014; Vinay et al., 2016). These physiological responses aid in regulating one's mental health and emotional stability.

The physiological responses indicated above that yoga elicit have neurochemical implications as well. Yoga has been shown to increase neurotransmitters, such as serotonin, dopamine, and GABA, all of which can impact mental health (Stephens, 2017). An increase in these neurotransmitters can cause a decrease in depressive and anxious symptomatology and an increase in one's overall sense of well-being (Stephens, 2017). GABA is a neurotransmitter that inhibits activity throughout the central nervous system. It plays an important role in response to stress, fear, depression, anxiety, and sleep regulation (Stephens, 2017). Low levels of GABA have been shown to be associated with schizophrenia, post-traumatic stress disorder, epilepsy, and sleep

disorders. (Stephens, 2017). Yoga also as a form of meditation increases activity in the prefrontal cortex, which stimulates the hypothalamus causing increased production of GABA through the central nervous system. These processes combined lead to more emotional regulation and sense of well-being overall from the practice of yoga (Stephens, 2017). Yoga's ability to regulate the brain's function and neurochemistry make it a valuable treatment option in the treatment of mental health disorders.

Early Yoga Research

The first studies of yoga's effect on physical and mental health were conducted in the early 1960's, during which time researchers examined the autonomic physiological responses in Indian yogis. They discovered these yogis had phenomenal control over autonomic responses of their bodies once thought unable to be controlled (Wenger & Bagchi, 1961). Datey et al. (1969) was the first to examine yoga's effect on blood pressure; results from this study indicated yoga could be used to treat hypertension. In the 1970's, Elson et al. (1977) also explored the effects of yoga on respiration and other physiological responses and showed that yogic practice can affect brain function, respiration, and basal skin resistance. They found these effects lasted even after they completed their yoga sessions, indicating yogic practice can affect physiology and one's brain function for extended periods of time. These same effects were noted in Ornish's (1983) research, opening the door to medical research involving yoga in the United States. Further research into cardiovascular and respiratory health was conducted to examine yoga's positive effects on cardiovascular and respiratory responses (Anantharaman & Kabir, 1984; Ornish, 1983). Further research indicated that yoga

produces a calming effect on both systems and enhances social bonding due to the release of oxytocin (Torner et al, 2002).

Early research into the effectiveness of yoga as a treatment for mental illness focused specifically on anxiety and depression. Sahasi et al. (1989) examined the effect of yoga on neurotic anxiety among patients in India, and those who participated in the yoga group reported a significant decrease in symptoms compared to those on medication. Mishra and Sinha (2001) found that participation in just 15 days of yoga resulted in significant positive changes in symptoms associated with anxiety and depression.

Shannahoff-Khalsa and Beckett (1996) explored yogic breathing in individuals with obsessive compulsive disorder; those who engaged in yogic breathing reported less anxiety and scored significantly lower on measures of stress and anxiety compared with a control. Yoga has also been used to reduce symptoms of specific phobias. For example, Johnson and Norton (1988) used yoga to treat snake phobias, and their results showed a decrease in somatic and cognitive complaints in those who participated in the yoga compared to a control. These early yoga studies suggested the effectiveness of yoga on physical and mental health. They paved the way for later research in the field on yoga and mental health moving into the 21st century.

Recent Yoga Research

Anxiety and Depression

Since 2005, numerous studies have shown that yoga is an effective treatment method for depression (de Manincor et al., 2016; Doria et al 2015; Prathikanti et al.,

2017; Sharma et al., 2005; Uebelacker et al., 2017). These studies indicate that consistent practice of yoga can be just as effective as medication and other forms of conventional therapy. Yoga has also been studied as an effective way to treat various forms of anxiety, including phobias and generalized anxiety (de Manincor et al., 2016; Doria et al., 2015; Katzman et al., 2012). Yoga has been used in conjunction with more conventional forms of therapy such as cognitive behavior therapy (CBT) to enhance treatment effects (Khalsa et al, 2015).

Vollbehr et al. (2022) conducted a meta-analysis of 18 studies that examined Hatha yoga as a treatment model for acute, chronic and/or treatment resistant mood and anxiety disorders. The researchers divided the 18 studies into two categories, acute presentation (10 studies) and chronic and/or treatment resistant (8 studies). Some studies examined in this meta-analysis included some types of coexisting intervention, including use of antidepressants and anxiety medication to psychotherapy; others were yoga-only interventions. Interventions ranged from three days to 12 weeks in duration. Results showed that patients with acute illness did not benefit from yoga regarding symptoms of depression compared to the treatment or control groups. However, yoga did appear to reduce depressive symptoms in follow-ups at 6 months and longer compared with controls that included other interventions. The finding that yoga is effective in reducing depressive symptomatology is consistent with previous studies on yoga's effectiveness to manage depression (Vollbehr et al., 2018). Finally, yoga was found to be a more effective treatment than control and co-intervention in reducing anxiety and depression symptomatology in patients with chronic or treatment resistant anxiety and depression.

Severe Mental Illness

Yoga has also been used to treat more severe forms of mental illness such as post-traumatic stress disorder (PTSD) and schizophrenia Military veterans, women who have suffered abuse (Clark et al., 2014), and tsunami survivors (Descilo et al., 2010) have all benefited from using yoga to reduce anxiety and emotional and physical reactiveness and symptomatology related to post traumatic stress disorder (Carter et al., 2013). Xie et al (2006) explored the benefits of yoga for individuals with schizophrenia using breathing in posture techniques to reduce physical and psychological distress and improve self-reported overall quality of life. Findings indicated yoga appeared to reduce psychological distress and improve perceived overall quality of life in the individuals diagnosed with schizophrenia. Yoga has also been examined in comparison to physical activity in treating schizophrenia; research has shown yoga to be more effective in reducing reports of positive symptomatology and overall quality of life (Duraiswamy et al., 2007; Visceglia & Lewis, 2011). These results have been replicated with larger samples examining negative symptomatology associated with schizophrenia (Sugawara & Kobayashi, 2022). Vacampfort et al. (2011) also examine the effectiveness of yoga treating individuals with schizoaffective disorder. This research indicated that a single session of yoga significantly decreased schizoaffective patient's psychological distress and had a positive impact on their overall sense of well-being. More recent meta-analyses (e.g., see Brinsely et al, 2021; Kaligal, 2022) substantiate the importance of yoga in treatment of symptoms in association with severe mental illness and as a means of

slowing cognitive decline. Thus, research demonstrates the positive effects of yoga on even the most severe psychiatric illnesses.

Yoga Research in Children and Adolescents

As yoga became a more accepted method of intervention for mental health concerns, research began to take place that included children and adolescents (McCall, 2014). Early studies explored yoga as a possible intervention strategy for children and adolescents diagnosed with attention deficit hyperactivity disorder (ADHD) (Harrison et al., 2004; Jensen & Kenny, 2004). Harison et al. (2004) found that a 6-week at-home yoga training session for children resulted in lower scores on self-report and parent-reported measures of ADHD symptoms. Jensen and Kenny (2004) found similar results; individuals participating in 20 weekly one-hour yoga sessions showed significant improvements in ADHD symptomatology compared with a control group. Yoga has also been shown to improve executive functioning challenges often seen in individuals with ADHD. More current research (Gunaseelan et al., 2021; Phan et al., 2021) provides evidence of yoga as a possible alternative to psychopharmacological intervention to manage symptoms of ADHD such as inattentiveness.

Saxena et al (2020) examined the effectiveness of 25-minute Hatha yoga on 9th grade students in a Texas high school. Findings indicated yoga reduced hyperactivity and inattention. Lastly, Anusuya et al (2020) examined yoga's effects on attention and working memory. Findings suggested yoga can be used to increase both attention control and working memory. These studies suggest that yoga is effective in directing attention and improving planning and self-monitoring skills. Luxhman et al. (2021) examined the

effect of yoga on medicated and unmedicated students with ADHD. They found yoga was effective in reducing both inattentiveness and hyperactivity in students. Long (2022) examined the effectiveness of yoga with children having behavioral disorders including ADHD and found that yoga can reduce inattentive symptoms in individuals with ADHD and can be used to manage inattentiveness as a symptom of other behavioral disorders as well.

Yoga as an intervention for adolescents has also been researched regarding its impact on self-esteem and symptoms of anxiety and depression. Mendelson et al. (2010) found that a yoga/mindfulness intervention resulted in positive outcomes in several psychological variables including self-esteem. Yoga has also been compared favorably with school-based activities such as physical education in its effectiveness in decreasing negative affect associated with depression and anxiety (Felver et al., 2015). Khalst et al. (2012) showed that yoga can be more effective than physical education in decreasing anxiety. Other studies have shown yoga to be successful working with children with more serious afflictions, such as eating disorders (Carei, 2010) and irritable bowel syndrome (Kuttner et al., 2006). Carei (2010) also found significant reductions in anxious and depressive symptomatology.

In a systematic literature review of 27 studies related to yoga interventions for children, James-Palmer (2020) found that 70% of the participants showed improvement in anxiety using a variety of yoga intervention styles such as individual sessions, group sessions, and multi week and single session models. Kinser et al (2014) researched the effectiveness of a 25-minute at-home Hatha yoga sessions compared to a control of at-

home educational activities. The yoga group experienced multiple benefits, which included boosts in confidence and a better ability to manage depression and stress throughout their day. Shonanai et al (2017) used a quasi-experimental model to assess the effectiveness of 60-to-70-minute hot yoga sessions three times a week for 4 weeks, Results indicated a significant decrease in symptoms of depression, stress, and anxiety. Frank et al (2014) examined the usefulness of a school-based yoga program for attending school in an alternative educational setting in an urban inner city. The students that participated in the yoga program reported a significant decrease in anxiety, depression, and global psychological distress. Findings also indicated a significant reduction in rumination of negative thoughts in the yoga participants. Noogle et al (2012) also found a reduction in anxiety and enhanced negative effect in the 11th and 12th graders in a rural Massachusetts school after yoga sessions 2 to 3 times a week. Yoga as an intervention for adolescences has also been shown to improve emotional regulation in general and a reduction in emotionality scores on measures of anxiety (Daly et al., 2015; Dueskar, 2007). These studies support the idea that yoga can reduce negative thinking which increase the likelihood one will experience an increase in negative affect leading to less optimistic thinking,

Yoga as an intervention for adolescents has also been used to explore health issues as well as self-concept. Saboo and Kacker (2022) explored the effect of yoga on self-concept and psychiatric symptoms in students at risk of developing Type 2 diabetes. Results indicated that yoga was beneficial in helping adolescents lose weight as well as improving symptoms of anxiety, negative self-concept, and depression. Elstad et al.

(2020) found a significant reduction in distress symptoms and improvement in sleep quality 12 and 24 weeks after participation in multiple yoga sessions. The findings above indicate yoga as a useful treatment for treating poor self-concept, which can lead to more serve psychological disorders.

More recently, trauma informed yoga therapy has become an alternative treatment for some individuals. Cook-Cottone et al. (2015) identified how the practice of yoga can reduce symptoms often related to trauma exposure such as hyperarousal, reexperiencing of traumatic events, and changes in cognition such as disconnection. Spinazzola et al. (2012) showed that yoga is an effective way to traumatized youth in residential treatment. In a more recent study, Nicotera and Viggiano (2021) examined the usefulness of an 8-week yoga program with incarcerated female youth. Participants reported a significant increase in mindful awareness and attention, validating results of the earlier study. Both studies involved examination of regulatory responses which often functioning poorly in those who suffer from diagnosed anxiety and depression therefore increasing one's self-regulation may positively affect mood and emotions.

Yoga has been studied as a preventive treatment. Yoga can impact self-regulation, resulting in better decisions regarding one behavior (Mala, 2018). Thus, yoga can use used to gain awareness and decrease one's engagement in behaviors that can serve as a preventative measure against future formal psychiatric diagnosis. Khalsa et al. (2012) also examined the effectiveness of yoga-based programs in schools as a method of reducing anxiety as well as building resiliency in hopes of preventing future struggles with anxiety. The researchers anticipated that yoga might replace current interventions in

reducing the likelihood that students would develop psychiatric illness. They found that yoga-based physical education classes reduced self-reported anxious symptomatology compared to a typical physical education class. They also discovered that yoga-based physical education classes promoted an increase in resiliency and coping skills that serve as prevention against more serious mental health struggles for secondary students. Students in their study also experienced a reduction in anxious symptomatology. These studies suggest yoga in school can aid in prevention of mental health disorders as well as a treatment for them.

Yoga can also be offered as a component of a computer-based treatment model. Henje et al. (2017) were the first researchers to compare awareness and resiliency computer-based interventions and yoga with standard forms of preventative treatment with adolescents. They found that awareness and resiliency training, which included yoga, resulted in a significant decrease in depressive symptomatology as well as increasing self-awareness and mindfulness. Ekback et al. (2021) examined the effectiveness of computer-based training in awareness and resilience that included yoga as a curriculum-based intervention. They found that this intervention was effective in decreasing distress measured by a reduction of depression symptoms. These studies indicate the usefulness of yoga as a preventative measure in reducing the likelihood adolescents suffering from depressive and anxious symptoms will develop true diagnosis.

Research on Optimism

Optimism can be viewed as a positive outlook on events that have occurred or positivity regarding one's future (Basten-Guenther et al., 2019). Research has shown that

positivity is a trait that can remain stable over one's lifetime, creating a pattern of seeing one's place in the world as positive or negative (Carver & Scheier, 2014; Saroj & Umadevi, 2022). Reed (2016) examined the characteristic of optimism and how it affects psychological and physiological recovery and how it allows one to deal with traumatic events and stress more effectively. Reed's findings indicate having a positive outlook is more optimal for success in life in general. More recently Pimple and Agrawal (2020) explored the use of yoga during the COVID-19 pandemic to impact positive affect and thus leading to more optimism thought. This research suggested that yoga can be used in a time of a crisis to promote positive affect and create a more optimism view of one's life. This becomes even more essential during adolescence where optimism appears to be a requirement for creating a successful trajectory for overall mental health and ability to manage stress and social roles. Given that most mental illness begins to appear during adolescence, the development of optimism serves as a protective factor against mental illness (Zou et al., 2016). Zou et al. (2022) also examined optimism in 2672 adolescents to assess the effects of optimism and pessimism on depression and overall life satisfaction. The research indicated that higher levels of self-reported optimism was linked to less depressive symptoms and a greater level of overall life satisfaction, than higher levels of pessimism. Their findings suggest that power of optimism is stronger than pessimism in effecting perception of affect (depression) and one's overall view of life satisfaction.

Research has been undertaken to understand optimism as a protective factor that buffers against the development of psychiatric illness in adolescents. Lai (2009) found

that high self-reported optimism was a strong protective factor of mental health in adolescence. Bagana et al. (2011) measured, lacking optimism as in the presentation of negativity in Romanian adolescents and its effect on anxious thinking. They discovered students with higher optimism scores appeared to have lower levels of anxiety compared with students reporting low levels of optimism, who had higher levels of anxiety. The study was reproduced in Romania and continued to show that that anxiety and depressive symptomatology was negatively correlated with optimism (Bogdan et al., 2018). Dooly et al. (2015) found that higher levels of optimism were associated with anxious symptomatology in Irish adolescents. Similar studies repeated in Sweden (Gustafsson et al., 2012) and Pakistan (Kaiser et al., 2015) showed similar results.

More recent studies have focused solely on depression and optimism. Studies in China (Liu et al., 2017) and another in Iran (Milam et al., 2014) indicated that high levels of optimism were associated with a significant decrease in depressive symptoms. Philips et al. (2018) examined the relationship between optimism and resiliency in adolescent female Canadians. Results indicated that lower optimism scores were associated with less resiliency. Quiroga et al. (2014) examined suicidal ideation and behaviors in Canadian adolescents and found that optimism serves as a protective factor in acute suicidal ideation and behavior. Tyler et al. (2014) examined depressive symptomatology in Native American adolescents and found that lower optimism scores predicted higher depression. Saroj and Umadevi (2022) also found that increased optimism was found to help struggling adolescent patients with chronic illness have a more positive affect as well as self-report more positive outcomes to treatment. These findings suggest the importance of

optimism across cultures in providing protection against the development of symptoms that lead to mental health disorders.

Optimism has been shown to increase the likelihood of experiencing success through childhood and into adolescence (McKusick, 2018). Childhood academic achievement and social standing have also been linked to levels of optimism (Broekhof et al., 2015), suggesting the importance of interventions that can impact optimism. Children who report higher levels of optimism are more likely to experience a positive mood, better physical health, and overall success and positive life experience than those who have reported lower optimism (Kwak & Lee, 2016). Research suggests a clear link between childhood optimism and a more positive trajectory of life.

de Oliveira (2020) conducted a meta-analysis of 24 studies examining the effects of yoga on components of emotional intelligence, including optimism. Results of this research indicated that yoga could be used to increase optimism in children. Conboy et al. (2013) found high school students participating in yoga reported a decrease in emotional reactiveness as well as having a more optimistic outlook on their future. Results of these studies suggest yoga could be used to boost mood and protect one against negative thinking, both of which can lead to depression and anxiety. Joshi and Paul (2022) conducted a systematic review of yoga's effect on adolescents as it relates to mental instability and anxious and depressive symptomatology. Results of their review indicated yoga reduces mental fluctuations and modifications and promotes mental balance, assisting an individual in becoming emotionally mature. This reduction of fluctuations

and mental maturity leads to low levels of symptomatology for both anxiety and depression.

Jothi (2019) examined the effects yoga can have on the development of optimism in college-aged students. Students engaged in 6 weeks of yoga two times a week and were compared with a control group that had formal treatment. The yoga group experienced a significant increase in optimism compared to the control. The purpose of the present study is to test the impact of a single session of yoga on optimism in adolescents compared with the traditional form of treatment in schools to manage affect (group counseling).

Research on the Effects of Yoga on Affect

The study of affect in adolescence often consists of research regarding depression. Negative effect / depression in adolescence is a predictor of suicide, poor health, and academic struggles (Rincon et al., 2020). A common method of addressing negative affect in adolescence is treatment through group counseling, which has been shown to be effective (Sanford et al., 2006). Due to lack of resources, group counseling is the preferred method of treatment in academic settings (Kose, 2019). Parker et al. (2016) found that lifestyle changes and psychoeducational instruction, including physical activity, sleep, and substance abuse education, along with problem solving therapy resulted in lower depression and anxiety scores than traditional counseling alone. Results of the study suggest that physical activity has the potential to improve mood more effectively than traditional group counseling. Cognitive behavioral therapy (CBT) approaches have also been used successfully to decrease negative affect and increase

positive mood affect. Stasiak et al. (2014) examined the effectiveness of a computer-based CBT program in school-age children and found that the CBT group reported lower depression scores than the psychoeducation control group, suggesting CBT as key effective treatment for negative affect and increasing positive affect. CBT focuses of how automatic negative thoughts can influence behavior and how one sees neutral stimuli. The idea that thought can affect mood and emotions lays the groundwork for how mindfulness can reduce negative thinking and rumination, and in doing so reduce negative affect.

Mindfulness has also been used as an effective treatment to increase positive affect and decrease negative affect in adolescences (Sibinga et al. 2013; Tumminia et al., 2020). Johnson et al. (2016) used a mindfulness-based intervention to impact anxiety, depression, and eating disorders in Australian adolescents and found that the intervention resulted in an increase in positive affect compared to the traditional psychoeducational curriculum that had been put in place to manage such psychiatric concerns. Schonert-Reichl and Lawlor (2010) also found that yoga can increase positive affect and social emotional functioning in adolescents as well as elementary students. Thus, mindfulness has been demonstrated to be an effective strategy that can increase positive affect and decrease negative affect in adolescents.

Effectiveness and Limits of Traditional Group Counseling with Adolescents

Group counseling is a staple of treatment in schools to help improve affect (Kulic et al., 2004). Group counseling has been shown to be effective in helping reduce depressive and anxious symptomatology (ASCA, 2015). Group counseling is one of the

preferred ways of treating psychiatric illness in schools due to the fact the preferable staff to student ratio. Most group counseling sessions allow anywhere from 6 to 8 students, allowing school counselors and/or psychologists to help more students with their limited resources and time. Group counseling has become an accepted form of treatment to reach many individuals in a short period of time (ASCA, 2015).

Numerous studies have shown the benefits of group counseling and reducing anxious symptomatology in children (Brown et al., 2014; Chester et al., 2018; Sween et al., 2017). Young et al. (2016) examined the effectiveness of group psychotherapy with students to reduce depressive symptoms, and their research indicated group and individual psychotherapy were equally effective. Cognitive behavioral therapy used in a group setting has also been shown to be as effective as individual therapy to reduce symptoms of depression in school age children (Bella-Awusah et al., 2016; Clarke et al., 2016). These research studies indicate that a group model can be effective in reducing anxious and depressive symptoms in children and improving their affect in general. It is of practical and theoretical interest as to whether group yoga sessions, that can have as many as 50 students, is an equally or more effective way of treating students and improving affect and optimism.

Approaches to Measuring Impact of Yoga on Affect and Optimism

Affect

Affect has been studied and researched using numerous methods and assessments. Frequently, affect is assessed by examining the increase or decrease of symptomatology associated with depression or anxiety. Researchers have used a combination of measures

which assess anxiety and depression to measure affect changes. Frequently used measures are the Multi-Dimensional Anxiety Scale for Children-Second Edition (MASC-2), three, Childhood Depression Inventory- Second Edition (CDI-2), Brief Symptom Inventory (BSI), Behavioral Assessment System for Children (3rd Ed.) (BASC-3), and the Positive Affect Negative Affect Scale (PANAS).

The BSI is often used in assessing psychological symptoms in both physical and psychiatric illnesses (Regey et al., 2022). The BSI generates nine primary symptom dimensions. The BSI is a measure that is often used to look at depressive and anxious symptomatology; however, it includes multiple other dimensions such as paranoia, somatization, and interpersonal sensitivity. Although important, these additional dimensions reduce the usefulness of the measure to solely examine affect. Much like the BSI, the BASC-3 also examines a wide range of symptoms that don't align solely with affect (Hogan & Sink, 2017). Both the CDI-2 and MASC-2 are unidimensional in their approach to how they assess affect. The CDI looks strictly at the presence of depressive symptoms, while the MASC-2 looks solely at anxious symptomatology (Kwok et al., 2021). The PANAS with its assessment of both negative and positive affect is the most efficient measure to study affect out of the above mentioned frequently used measures to examine solely affect in adolescents.

The PANAS has been used to assess affect in adolescence in other research where mindfulness interventions were explored. Deng et al. (2019) used the PANAS to explore the effect of mindfulness on adaptive responses during emotional response in adolescents. A pretest posttest model was used in this research as well to look at the effects of

mindfulness on affect. Patel and Mooventhan (2018) examined the effects of yoga-based meditation on emotional regulation, self-compassion, and mindfulness and used the PANAS; findings indicated an increase in positive affect in the yoga-based meditation group. Ganguly et al. (2021) also used the PANAS to examine the effects of yoga based rhythmic recitations on emotional personality in youths. This research also indicated an increase in positive affect in the yoga group. The PANAS was used successfully in all these studies as a pretest and posttest measures of interventions effects.

Optimism

Optimism is the belief that good things will occur to one in the future. Dispositional optimism and pessimism can affect one's life in multiple areas and can be a stable personality trait in many people (Scheier & Carver, 1985). Optimism in psychological research has been studied using a variety of assessment tools (Frost, 2021). Frost identified some of the most frequently used scales, including the Life Orientation Scale Revised (LOT-R; Scheier et al., 1994); the Resiliency Scale (RS; Wagnild & Young, 1993); and the Attributional Style Questionnaire (ASQ; Peterson et al.,1982). These measures have been used to assess levels of optimistic thinking in participants in mindfulness-based intervention studies.

D'Souza et al. (2021) used the ASQ to measure psychological stress in response to a yoga-based intervention in 14 to 16-year-olds. Although the ASQ measures components such as stress, school performance, and future uncertainty, which are related to optimistic thinking, the instrument does not specifically measure optimistic thinking due to the multiple domains assessed within the ASQ. Additionally, at 48 items, the

measure is rather long for adolescents; reliable and valid measures that are shorter are available.

Felver at el. (2021) assessed the effect of Kripalu yoga on emotional resiliency using the Resiliency Scale and compared the treatment group to a music or art class control. Results indicated an increase in emotional resiliency in the treatment group. Resiliency is often examined in relation to optimism or seen as a component of being optimistic; however, it is not a pure measure of optimism. Souri (2013) indicated that resiliency is a protective factor and can positively influence one's psychological well-being and is positively correlated with optimism. The LOT-R appears to be the most widely used and clearly defined measure of optimism used with youth (Scheier et al., 2021). The LOT-R has been successfully used to measure optimism in multiple studies using mindfulness-based interventions in pretest-posttest research designs (Dharanidharan, 2019; Lester et al., 2019; Raj et al., 2021) and with youth specifically (Ehsani et al, 2021).

Summary and Conclusions

Psychoneuroimmunology and mind-body medicine have provided evidence that our thoughts have a profound effect on our physical bodies (Colasanto et al., 2020; Stuad, 2015; Zainal et al., 2021). Thoughts can result in physical inflammation and hormone levels, such as cortisol; inflammation can have severe physical and psychological impacts (Schrock et al., 2021; Telles et al., 2014; Vinay et al., 2016). Thus, mindfulness-based activities have become one of the most recognizable ways to manage negative or unwanted thoughts and, subsequently, mental, and physical health.

Multiple studies have demonstrated the effect of yoga in improving symptoms of depression and anxiety (Felver et al., 2015; Frank et al., 2014; Khalst et al., 2012). Often, research employing yoga as an intervention has examined the effects of yoga over multiple sessions or a long period of time; research is lacking that assesses the effect of a single yoga session on affect. Optimism has also been shown to have a positive effect on one's affect and mood (D'Souza et al., 2021). However, there is little research that has examined whether yoga can positively impact optimism. Thus, the purpose of this quantitative study is to examine the effectiveness of a single yoga session on affect and optimism compared to group therapy, a more traditional form of treatment for negative affect, and to a standard control group.

Chapter 3 will provide a comprehensive description of the research methods used for the study. It will include a detailed discussion the research design and previous studies that influenced it. It will include a description of the sample and population, data collection measures, data analysis, and consideration of ethical issues. The scales used to operationalize variables in the study, the Life Orientation Test (LOT-R) and the Positive and Negative Affect Schedule (PANAS), will be described, and the data analysis strategy is explained.

Chapter 3: Research Method

The purpose of this quantitative study was to determine whether a single session of Hatha yoga can impact affect and optimism compared to a group counseling treatment and a control among adolescents. Chapter 2 provided background information and a literature review of the use of yoga as a social emotional intervention. Chapter 3 includes a description of the context, facility, target population, treatment, method, ethical considerations, and data collection and analysis methods.

Research Design and Rationale

This was a quantitative quasi-experimental study using MANCOVA as the analysis strategy. The independent variable was intervention with three levels (Hatha yoga treatment, group counseling treatment, and a control group). Students participated in one of these activities, among others, in social-emotional learning opportunities the school was offering for students after school. The yoga session was taught by a Yoga Alliance certified yoga instructor. The group counseling session was led by a state and department of education licensed school social worker who also holds an independent license as a social worker in the state and was designed to help students process emotions and develop emotional regulation and coping skills. The control was led by a state certified health teacher. In this session, students worked with this teacher on remediation of skills and reteaching of classroom materials.

The dependent variables were posttreatment affect and optimism scores. Both correlational analysis and multiple linear regression were used to assess effects. The model used in this study had been used to assess the effectiveness of yoga on affect and

optimism (Bagana et al.,2011; Chad-Friedman et al., 2019; de Manincor et al., 2016; Uebelacker et al., 2017). However, I examined the effects of a single session, which is more common in schools and more realistic for school-age children and adolescents.

The pretest-posttest design for this study had been used to assess affect. For example, Chad-Friedman et al. (2019) examined the use of yoga to influence changes in positive and negative affect in individuals during partial hospitalization and found that a single session of yoga could impact negative and positive affect. Although this study was conducted on adults, others had used the pretest-posttest design to assess affect in adolescents and children (Felver et al., 2015; S. Khalsa et al., 2012). In a more recent study, Ganguly et al. (2021) used a pretest-posttest design as part of a yoga intervention to assess affect in adolescents using the PANAS to measure changes in positive and negative affect.

Optimism had also been studied in a similar manner. D'Souza et al. (2021) used a pretest-posttest design to assess optimism in adolescents involved in yoga as compared with a no-treatment control. This study indicated yoga can be used to increase optimism by reducing life stressors and a person's sense of uncertainty of the future. Felver et al. (2021) also used this pretest-posttest design to assess resiliency, a psychological characteristic associated with optimism, demonstrating yoga as an effective intervention in schools. Ehsani et al. (2021) used the LOT-R in a pretest-posttest design to assess the impact of mindfulness-based interventions on student optimism. Results indicated a significant reduction in academic burnout and improvement in self-efficacy and optimism. Based on these findings, I concluded that a pretest-posttest design could be

used to assess the effectiveness of mindfulness-based interventions such as yoga on optimism and affect.

A quantitative approach was chosen for this research. The extent of research in the field of yoga and its impact on psychological constructs was advanced, leading to the suitability of a quantitative design. Qualitative research explores the lived experiences related to a phenomenon, or is used to generate a new theory, both of which were inappropriate for the current study in which theory had been established and the meaning participants attributed to the intervention was not of direct interest. Quantitative findings tend to be more generalizable than those from qualitative studies due to sampling considerations and sample size. A three-group design was selected to compare not only yoga's effect compared to a control, which had been done in numerous studies (Chad-Friedman et al., 2019; de Manincor et al; 2016; Elstad et al., 2020; Uebelacker et al., 2017), but also to compare yoga as an intervention against group counseling, the standard practice for how most psychological services are provided in schools.

Many studies have been conducted looking at yoga's effectiveness on changing affect compared to a nontreatment control (Chad-Friedman et al., 2019; Uebelacker et al., 2017). Numerous studies have also demonstrated the effectiveness of group counseling in impacting affect in students. The three-group model was used to assess not only yoga's effectiveness compared to no treatment but also its effectiveness against group counseling to determine whether yoga is equally or more effective than group counseling in school-based settings. Due to the larger number of students who can participate in a yoga session, this could shift how mental health services are provided to students. This is

relevant due to the mental health crisis impacting students (CDC, 2021; Dupere et al., 2018).

Methodology

Setting and Context

The study was conducted in a suburban public high school in New England. Students at the school range in age from 14 to 19 years. The sessions occurred during a Flex Block period during the school day. The Flex Block provides students with a number of academic and social-emotional activities. The social-emotional activities are designed to help students find new ways to manage stress and create an overall better sense of mental well-being. The school offers activities in addition to yoga and group counseling to help students manage their mental health, including art therapy, fitness coaching, crocheting, music therapy, tutoring, and mediation. The school offers these opportunities as an initiative to engage students in their mental hygiene, which refers to the activities and strategies students use daily to take care of their mental health.

Hatha Yoga Session

The Hatha yoga session for the current study started with students picking up the assessment forms at the beginning of the session and filling them out before they acquired their mats and moved to the floor to start their yoga session. The certified yoga instructor started the class with a lesson on how to breathe mindfully during the practice. The instructor then instructed all students on the importance of attempting to breathe through their nose throughout the practice, filling their lungs as deeply as possible because this takes attention and concentration and distracts the mind from automatic

thinking. From there students entered a 45-minute practice of Hatha yoga. Each session consisted of the same Hatha yoga flow. Participants started in child's pose and moved to downward facing dog. From there the participants engaged in three sun salutations series. Participants then transitioned from sun salutations through a vinyasa and started a series on the right side of Warrior 1, Warrior 2, triangle pose, back to Warrior 1, and pigeon pose. Vinyasa then transferred participants to the left side, conducting the same pattern of poses on the left. Participants then moved to their back for a plow pose, which transitioned into a shoulder-supported stand and moved into one-legged wind-removing pose on both sides, finally ending in corpse pose savasana. After that, the students again filled out the assessments, packed up their mats, and exited the session.

Group Counseling Session

The group counseling sessions began with students entering the social worker's office and completing assessments. From there the social worker led a group counseling session focused on developing coping skills to manage mood. The format was a standard group counseling session with some psychoeducational components to help teach the skills. At the beginning of the session, the social worker asked all students to share an emotional struggle they had during the previous week. After the group finished sharing their struggles, the group with support from the social worker brainstormed coping strategies that might be helpful for that individual to manage their situation. After that, a new coping skill was introduced. The social worker led the group in exploring how this new coping skill might help them in the upcoming weeks. With 5 minutes remaining in

the session, participants again filled out assessments as part of the postintervention data collection.

Health Session Control

In the history tutoring session, students entered the study and completed their preintervention forms. The study session was self-guided for the most part; students could at any time meet with the health teacher to ask for support with assignments related to their classes in health or spend time working on assignments in other classes not related to health. With 5 minutes left in the block, the history teacher asked students to again complete assessments as part of the postintervention data collection.

Population and Sample

The high school has a population of 1,107 students, 566 of whom are female (51%) and 536 are male (49%). White students make up 77.6% of the population, with Hispanic students representing 6.1%, African American students 5.0%, and Asian American students 7.6%. The sample for this study was students who self-selected into three 45-minute activity blocks.

Sampling and Sampling Procedures

A convenience sampling approach was used; students self-selected into the study and agreed to participate. Those who agreed to participate were part of the sample. Students could participate in the 45-minute block and choose not to participate in the study. Due to the nature of the blocks, the student numbers per session varied; therefore, data were collected in session until each condition had the required number of participants as described in the Required Sample Size section.

Eligibility and Inclusion/Exclusion Criteria

All students were eligible to participate. Eligibility depended on students agreeing to participate in the three-activity session that comprised the three groups for comparison. There were no criteria for exclusion except if a parent declined to allow their student to participate in the study. Students could participate in the activity but decline to participate in the study.

Required Sample Size

The required sample size for this study was 40 students per condition, making a total of 120 students for the study. This number was determined by reviewing multiple studies for relevant effect sizes and entering appropriate values of effect size, alpha level, and statistical power into GPower, a software program to determine the appropriate sample size. Previous research using the PANAS to assess positive affect in children and adolescents resulted in an average effect size (Cohen's d) of 0.2 (Felver et al, 2014; Felver et al., 2016; Frank et al., 2017; Laakso et al., 2021; Rawlett et al., 2019). The average for negative affect was found to be. 33 (Felver et al, 2014; Felver et al, 2016; Frank et al., 2016; Laakso et al., 2021; Carver & Scheier et al., 2015). This resulted in an average of.26, which was a medium effect size. Previous research using the LOT-R resulted in an average effect size of .52 (Brog et al., 2002; Kenne et al., 2021; Usan et al., 2022; Scheier et al., 2021; Serron et al., 2021). GPower requires f^2; therefore, using a medium effect size of $f^2 = .06$, an alpha level of 0.05, and statistical power of .80 resulted in a sample size of 118 (approximately 40 students per condition).

Procedures for Recruitment, Participation, and Data Collection

As part of a study on the effectiveness of interventions established within the school, the district conducted a study of social-emotional learning. This data were provided to me for a secondary analysis. The school district superintendent sent an email and printed letter with an informed consent to parents explaining their research, data collection process, and identifying information required for participation in the study. Parents had the option to decline their child's participation in the study at that time; in that case, their child would have participated in the condition, but no data would have been collected from them.

Consent forms were given to educators in all conditions so they would be aware that the nonparticipating student data could be used in the educators' research but that the data would be destroyed due to parents' lack of consent to participate in the current study. During each session across all three conditions, participants were required to complete pretest and posttest measures of the LOT-R to assess optimism and the PANAS to assess positive and negative affect. Data was collected before and after each 60-minute session. To assess the time required to complete the assessments, 10 students were asked to complete the two forms. The average time of completion was approximately 3 minutes.

Instrumentation

Demographic Variables

Student grade level, age, and sex were gathered as demographic variables. Demographic information was collected at the beginning of each session. Each student created a unique identification code that allowed me to match their pretest and posttest

scores. The letter corresponded to the condition: yoga = Y, counseling = C, and history = H. Following this, a number represented how many times students had participated in the intervention. For example, if this was the first time, they wrote the numeral 1; if this was the sixth time, it was 6. Next, the student indicated whether this was before (B) or after (A). Next, the participants included their father's initials and their birth month and year. For example, BS0408 would have represented a participant whose father was named Brian Smith and whose birthday was April 29, 2008. A participant who was in the first offering of the history tutoring session, taking the pretest, and whose father's name was George Stiles and whose birthday was March 1, 1980, would have been H1BGS0380. After each session, participants placed pre- and postassessments (each identified by the unique ID) in an envelope that was collected by staff. The staff member then delivered the envelopes to the administration; administration collected the envelopes and delivered them to me at the end of the data collection period.

Dependent Variables

PANAS. Affect was measured using the PANAS (see Watson et al., 1988). The PANAS is a 20-item self-report questionnaire assessing positive and negative affect. Items in the PANAS assess participants' feelings toward emotionally latent words. In the current study, each respondent was asked to report how strongly they experienced the feelings related to these words over the previous week. Each response included a 5-point Likert scale in which 0 = *very slightly or not at all*, 1 = *a little*, 2 = *moderately*, 3 = *quite a bit*, and 4 = *extremely*. Example of positive emotion words included *alert*, *intertied*, and *strong*, while examples of negative affect words were *guilty*, *ashamed*, and *upset*. Total

scores ranged from 10 to 50 for the negative and positive scales. The PANAS has a very strong internal reliability; for examine, in one study, Cronbach's alphas ranged from 0.86 to 0.90 for positive affect and 0.84 to 0.87 for negative affect (Magyar-Moe, 2009). Crawford and Henry (2004) found high internal consistency reliability for both positive affect (α = .88) and negative affect (α =.87) subscales. The PANAS continues to be a reliable and valid measure.

The PANAS has been used in multiple studies to successfully assess affect in adults and adolescents in a pre/post intervention model (Chad-Friedman et al., 2019; Patel et al., 2018). Alan et al (2015) examined the factor structure and structural invariance of the PANAS across children, adolescents, and young adults. Results demonstrated the PANSAS to be a reliable measure in assessing affect across all three age groups (Crawford & Henry, 2002). More recently, Shen et al. (2021) used the PANAS to assess affect in adolescents dealing with sleep issues. Heubeck and Boulter (2000) examined the effectiveness of the PANAS in adolescence in Australia. They found the PANAS to correlate highly with other measures of affect and emotions in adolescence, supporting the concurrent validity of PANAS.

Life Orientation Test-Revised. The LOT-R (Scheier et al., 1994) was used to assess optimism. Studies in the United States have reported alpha values ranging from .78 to .83 (Carver & Scheier, 2002). Additionally, test-retest correlations ranged between .56 and .79; thus, the data apparently support the temporal stability of the scale (Cadena et al., 2021). Convergent and discriminant validity were assessed using multiple measures. Self-mastery was assessed using the Self-Mastery Scale (SMS; Pearlin & Schooler,

1978); trait anxiety was assessed using the State–Trait Anxiety Inventory (STAI; Spielberger et al., 1974); neuroticism was assessed using the Guilford–Zimmerman Temperament Survey (GZTS; Guilford et al., 1976); and self-esteem was measured using the Self-Esteem Scale (SES; Rosenberg, 1965). A subset also completed a 10-item version of the Neuroticism Scale of the Eysenck Personality Questionnaire (EPQ; Eysenck, 1958; Goh, King, & King, 1982). All measures correlated modestly with the LOT-R. The LOT-R has been found effective in reliably and validly measuring optimism in adolescents. Kaur and Shourie (2019) successfully used the LOT-R to assess optimistic traits in adolescence and how they impacted overall perceived wellbeing. Kennes et al. (2021) also used the LOT-R in assessing level of optimism in Dutch adolescents.

Data Analysis Plan

Data Screening and Cleaning

Educators collected data in all three conditions and delivered it to designated district officials. The administration then delivered the data to the researcher. The researcher reviewed the data to ascertain data integrity. To ensure the integrity of data entry, the researcher inputted the data and then had a second party review the entries for mistakes ensuring it is valid and correct. Data was entered into a SPSS V28 data sheet.

Missing Data

In the case of missing data, if the missing data was less than 5%, the mean was imputed. All missing data was marked as missing. Regression estimates were used to replace missing data if the level of missingness was more than 5% but not extensive.

Testing Statistical Assumptions

Outliers. The Mahalanobis distance ($p < .001$) was computed to assess any outliers in the data. If outliers are present, they were reviewed and retained or deleted depending on results of inspection of the cases.

Normality. To assess normality, a probability plot was created, and skewness and kurtosis coefficients was inspected. Skewness and kurtosis should be within plus or minus 2.0 (kurtosis up to 5.0). Bivariate scatter plots were created to check for normality. If the data are not normally distributed, appropriate transformation was performed and reevaluated for normality.

Linearity. Residual plots were created and examined to assess linearity among independent (condition) and the dependent variables (positive affect, negative affect, and optimism). If linearity does not exist, the data was transformed and reevaluated.

Homogeneity of Variance. Testing for homogeneity of covariant matrices occurred to ensure equal variances among conditions for each of the dependent variables. Box' s test were be conducted; a p-value of greater than .05 was confirm the homogeneity. If the p-value is less than .05, data was transformed and reevaluated.

Data Analysis

Data was analyzed using SPSS V28. Multivariate analysis of covariance (MANCOVA) was used to assess the effects the three conditions have on levels positive affect, negative affect, and optimism. All variables were measured before and after sessions in each of the three conditions. Demographic variables of sex, age, and grade level were included as covariates. In MANCOVA, the pretest was used as a covariate; the

posttest scores was used as the outcome variables. MANCOVA is particularly suitable as the analysis technique, as it allows for a parsimonious test in which all the effects of group on affect and optimism can be tested in a single analysis. Accounting for the potential correlation between dependent variables allows for increase statistical power (Tabachnick & Fidell, 2019).

H_o1: A single 45-minute session of yoga does not significantly influence self-reported affect among high school students, as measured by the Positive and Negative Affect Scale, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_a1: A single 45-minute session of yoga does significantly influence self-reported affect among high school students, as measured by the Positive and Negative Affect Scale, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_o2: A single 45-minute session of yoga does not significantly influence optimism among high school students, as measured by the Revised Life Orientation Test for Adolescents, compared to those participating a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_a2: A single 45-minute session of yoga does significantly influence optimism among high school students, as measured by the Revised Life Orientation Test for Adolescents, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

Threats to Validity

There were several potential participant biases that could possibly threaten the internal validity of this study. Selection bias could impact the validity of this study since individuals will self-select into the different conditions. Individuals who opt to be in the yoga group might by nature be more optimistic. To manage this threat, the researcher statistically controlled for variations in initial scores by including baseline assessment scores as covariates. A halo effect could also cause some threat to validity. People in the yoga group might see themselves as needing to reflect more optimism than those in a counseling group who are there probably due to some struggle there having in their life. Acquiescence was also a threat to validity because individuals will be explained the nature of the study and might feel that participating in a one condition rather than the other may cause more optimism or even positive affect (Knowles & Condon, 1999). For example, participants may feel that being in the yoga condition one should report greater feels of optimism and positive affect because of the connotations of spirituality and calm associated with yoga.

Ethical Procedures

This research proposal was submitted to the university's institutional review board (IRB) for approval before participants are recruited. Several precautions were followed to ensure the ethical protection of the participants of this study. A web page was created on the school district's homepage to discuss the study purpose, and this site included informed consents and a statement of the voluntary nature of the study and contact information for the researcher if questions arise. There are no foreseeable

complications or distress anticipated for the participants who engage in the research because they are already engaged in these activities prior to the research being conducted. All participants were informed of the nature of the study being completely voluntary as well as the intended value of the research. Participants were recruited based on their willing participation to join the block of time in their school day. Data from the research will be collected and protected on the researchers password protected site for 5 years at which time all the data will be destroyed, access to the site is limited to the researcher and the dissertation committee member.

Summary

Chapter 3 includes a detailed description of the research methodology for this quantitative, quasi-experimental design using multivariate analysis of variance as the analysis strategy. The independent variable was intervention with three levels (Hatha yoga treatment, group counseling treatment, and a control group). The dependent variables were posttest values of positive affect, negative affect, and optimism. The research study involved 132 adolescent high school students of ages 14 to 18 years of age. Rationale for use of the PANAS and LOT-R was given along with validity and reliability criteria. Chapter 4 includes a detailed presentation of the results of statistical analyses.

Chapter 4: Results

As adolescents in the United States continue to struggle with mental health concerns at a rapidly increasing rate over the past decade and in the face of the aftermath of the COVID-19 pandemic (CDC, 2021: Raccanello et al., 2023), new methods of treatment and prevention need to be explored. Schools are becoming the most common place for students to receive mental health support (Ali et al., 2019). The increase in supports for mental health services in schools has created a strain on resources and indicates the need for creativity in finding new methods to reach more students. Traditional one-on-one counseling and group counseling have become insufficient due to decreasing staff-to-student ratios.

Recently, mindfulness interventions have become increasingly popular in addressing mental health concerns for adolescents (Gibson, 2019). Yoga as a mindfulness activity has been shown to increase positive affect and reduce negative affect in adolescents (Dueskar, 2017; Saxena et al., 2020). Although much of this research was conducted with adolescents participating in multiple sessions of yoga, there were studies showing that a single session of yoga can also affect positive and negative affect (Chad-Friedman et al., 2019).

The purpose of the current study was to examine the effectiveness of a single session of yoga in decreasing negative affect and increasing positive affect with adolescents compared to a group counseling session, the standard treatment for mental health concerns in schools, and to a history tutoring session control. Optimism was included as a variable that had been examined less frequently. Optimism has been

associated with higher levels of positive affect and positive effects on perceived well-being (Carver & Scheier, 2014; Sarojo & Umadevi, 2022). Chapter 4 includes a detailed description of the sample and results of the statistical analyses.

Data Collection

Data collection followed the plan described in Chapter 3. Participants self-selected into three groups representing Hatha yoga, group counseling, and the tutoring comparison group. A science teacher led the Hatha yoga session. The sessions consisted of a brief explanation of yoga and provided guidelines as to how to conceptualize the practice. Participants were then led in a warm-up section of the practice followed by a vinyasa flow session and ending with a brief cool-down session (savasana). Participants during savasana were guided to reflect on feelings of openness and peace. The second intervention was led by a licensed mental health counselor at the school. The counselor facilitated students in a coping skills group. Students were able to express stressors and anxieties they experienced over the previous few weeks. Students commented on how they managed these experiences. Staff and group members then offered suggestions and encouragement in hopes of helping others manage these things more effectively. The tutoring session was led by a science classroom teacher; during this session, students entered the class and worked with a science teacher on topics presented in their classes or worked quietly on materials from other subjects. All sessions took place during the mid-morning Flex Block period; this time had been set aside for students to engage in remedial and extracurricular activities.

Individuals in charge of the session presented students with the data collection sheets at the beginning of the session and reviewed with the students the identifying information portion. Teachers then instructed the students to complete the Test 1 section. After the completion of the session, the teacher instructed students to complete the Test 2 section. Teachers were instructed by the school to collect the assessments and place them in a manila folder. I collected these folders at the end of the day, removed the assessments, and placed them in three separate folders labeled yoga, counseling, and control. Data from the yoga condition were collected over a 2-week time span involving three different sessions. The counseling data were collected over 3 weeks and included four sessions. Control group data were collected over two sessions during a single week.

I entered data weekly into an Excel spreadsheet. A second person reviewed the data entry to ensure validity. Any data collection sheets that were not completed were put aside and not entered. The yoga condition had a total of 48 data sheets that were collected and inputted; the counseling condition included 43, and the control condition had 41. I imported data into SPSS Version 28.

Results

The purpose of this quantitative quasiexperimental study was to determine whether a single session of Hatha yoga impacted affect and optimism compared to a group counseling treatment and control group. The independent variable was an intervention with three levels (Hatha yoga treatment, group counseling treatment, and control group). Students participated in one of these activities and in social-emotional learning opportunities the school offered for students after school. The dependent

variables included posttreatment affect and optimism scores as measured by the PANAS and LOT-R. Pretest scores, as well as the demographics of age and grade, were addressed in the analysis.

MANCOVA was used to assess the effect the three conditions on levels of positive affect, negative affect, and optimism. All variables were measured before and after each session of the three conditions. Pretest scores, as well as demographic variables of age and grade level, were included as covariates. Gender was not controlled for in the MANCOVA because the requirement for MANCOVA is that the covariates be measured on the interval level of measurement.

The following hypotheses were tested using statistical analyses performed in SPSS:

H_o1: A single 45-minute session of yoga does not significantly influence self-reported affect among high school students, as measured by the Positive and Negative Affect Scale, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_a1: A single 45-minute session of yoga does significantly influence self-reported affect among high school students, as measured by the Positive and Negative Affect Scale, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_o2: A single 45-minute session of yoga does not significantly influence optimism among high school students, as measured by the Revised Life Orientation Test

for Adolescents, compared to those participating a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

H_a2: A single 45-minute session of yoga does significantly influence optimism among high school students, as measured by the Revised Life Orientation Test for Adolescents, compared to those participating in a single peer support session group led by a licensed mental health counselor and a no-treatment comparison group.

Participant Demographics

There were 132 participants in the study, which included mostly females (n = 94, 71.2%). This was followed by males (n = 34, 25.8%), and four (3.0%) students who identified as some other gender (see Table 1 and Figure 1).

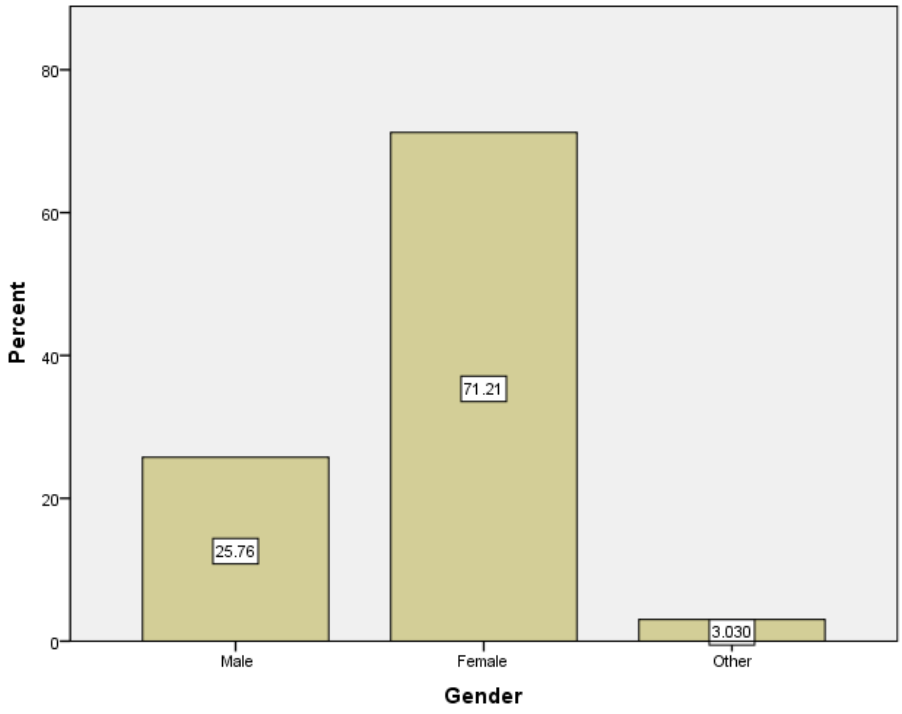
Table 1

Gender

Category	Number	%
Male	34	25.8
Female	94	71.2
Other	4	3.0
Total	132	100.0

Figure 1

Bar Chart of Gender



The ages of participants ranged from 12 to 18 years with a mean of 15.14 (*SD* = 1.08). Regarding grade level, most were in the ninth grade (*n* = 56, 42.4%). This was followed by 11th graders (*n* = 39, 29.5%; see Table 2 and Figure 2).

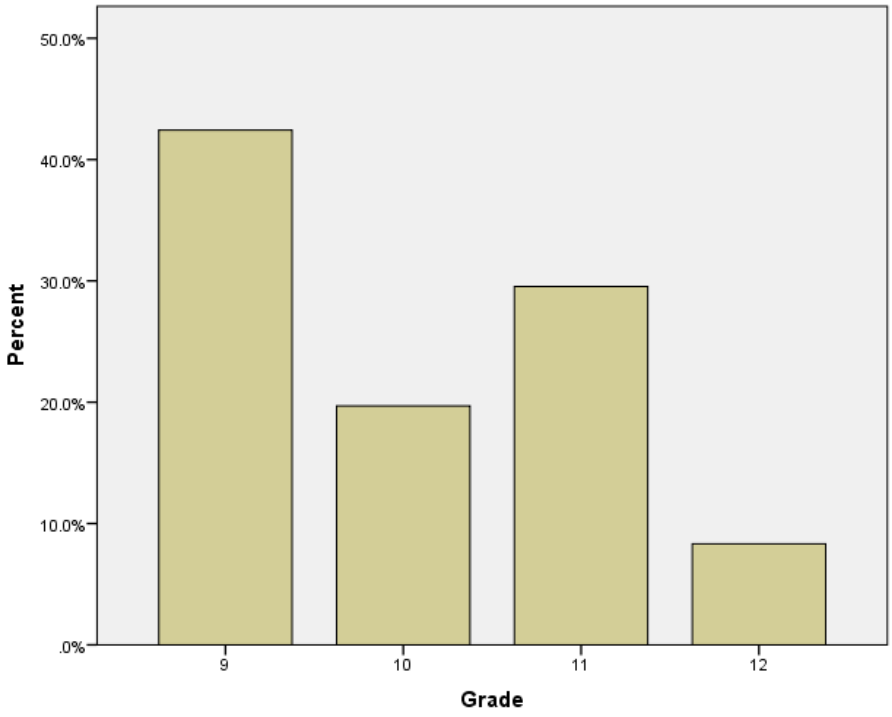
Table 2

Grade Level

Category	Number	%
9	56	42.4
10	26	19.7
11	39	29.5
12	11	8.3
Total	132	100.0

Figure 2

Bar Chart of Grade Level



Study Measures

The independent variable was an intervention with three levels (Hatha yoga treatment, group counseling treatment, and control group). There were 41 (31.1%) participants in the control group, 43 (32.6%) in the counseling group, and 48 (36.4%) in the yoga group (see Table 3 and Figure 3).

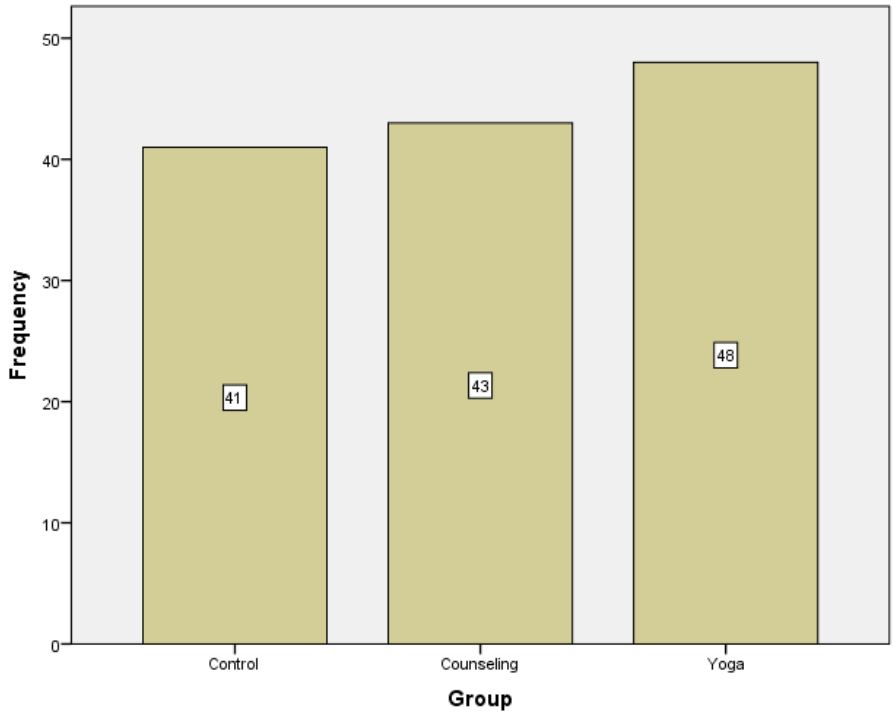
Table 3

Group Type

Category	Number	%
Control	41	31.1
Counseling	43	32.6
Yoga	48	36.4
Total	132	100.0

Figure 3

Bar Chart of Group Type



Pre- and postscores of affect and optimism measures are depicted in Table 4. Mean optimism increased from preintervention (M = 13.44, SD = 3.36) to postintervention (M = 13.96, SD = 3.49). Regarding positive affect, there was a slight decrease from preintervention (M = 29.81, SD = 6.63) to postintervention (M = 29.20, SD = 8.12). Mean negative affect decreased from preintervention (M = 18.92, SD = 6.27) to postintervention (M = 17.89, SD = 6.40).

Table 4

Descriptive Measures of Optimism and Affect

Measure	Min	Max	*M*	*SD*
Optimism (pretest)	4.00	22.00	13.44	3.36
Optimism (posttest)	4.00	23.00	13.96	3.49
Positive (pretest)	15.00	46.00	29.81	6.63
Positive (posttest)	11.00	48.00	29.20	8.12
Negative (pretest)	10.00	38.00	18.92	6.27
Negative (posttest)	10.00	37.00	17.89	6.40

Descriptive statistics by group are detailed in Table 5. In the yoga group, optimism increased from preintervention (M = 13.27, SD = 3.11) to postintervention (M = 14.10, SD = 3.40), positive affect increased from preintervention (M = 32.19, SD = 7.28) to postintervention (M = 32.65, SD = 8.75), and negative affect decreased from preintervention (M = 18.79, SD = 6.27) to postintervention (M = 16.04, SD = 6.09). Other groups did not demonstrate much change. The significance of these differences was assessed with MANCOVA.

Table 5

Pre- and Postintervention Measures by Group

Group		*N*	Min	Max	*M*	*SD*
Control	Optimism (pretest)	41	4.00	19.00	13.29	3.29
	Optimism (posttest)	41	4.00	23.00	13.10	3.53
	Positive (pretest)	41	18.00	39.00	28.44	5.21
	Positive (posttest)	41	18.00	44.00	27.29	5.72
	Negative (pretest)	41	10.00	36.00	19.46	5.42
	Negative (posttest)	41	10.00	37.00	18.83	6.02
Counseling	Optimism (pretest)	43	6.00	22.00	13.77	3.74
	Optimism (posttest)	43	4.00	22.00	14.63	3.45
	Positive (pretest)	43	15.00	42.00	28.47	6.49
	Positive (posttest)	43	11.00	46.00	27.19	8.20
	Negative (pretest)	43	10.00	38.00	18.56	7.09
	Negative (posttest)	43	10.00	37.00	19.07	6.76
Yoga	Optimism (pretest)	48	6.00	19.00	13.27	3.11
	Optimism (posttest)	48	5.00	21.00	14.10	3.40
	Positive (pretest)	48	16.00	46.00	32.19	7.28
	Positive (posttest)	48	15.00	48.00	32.65	8.75
	Negative (pretest)	48	10.00	32.00	18.79	6.27
	Negative (posttest)	48	10.00	33.00	16.04	6.09

Testing of Parametric Assumptions

Prior to conducting MANCOVA, I assessed the assumptions of linearity, homogeneity of regression slopes, homogeneity of covariances, no univariate or multivariate outliers, and normality of residuals. There was a linear relationship between positive affect, negative affect, and optimism for each group, as assessed by visual inspection of scatterplots (see Figures 4, 5, and 6).

Figure 4

Matrix Scatterplot of Study Variables (Control Group)

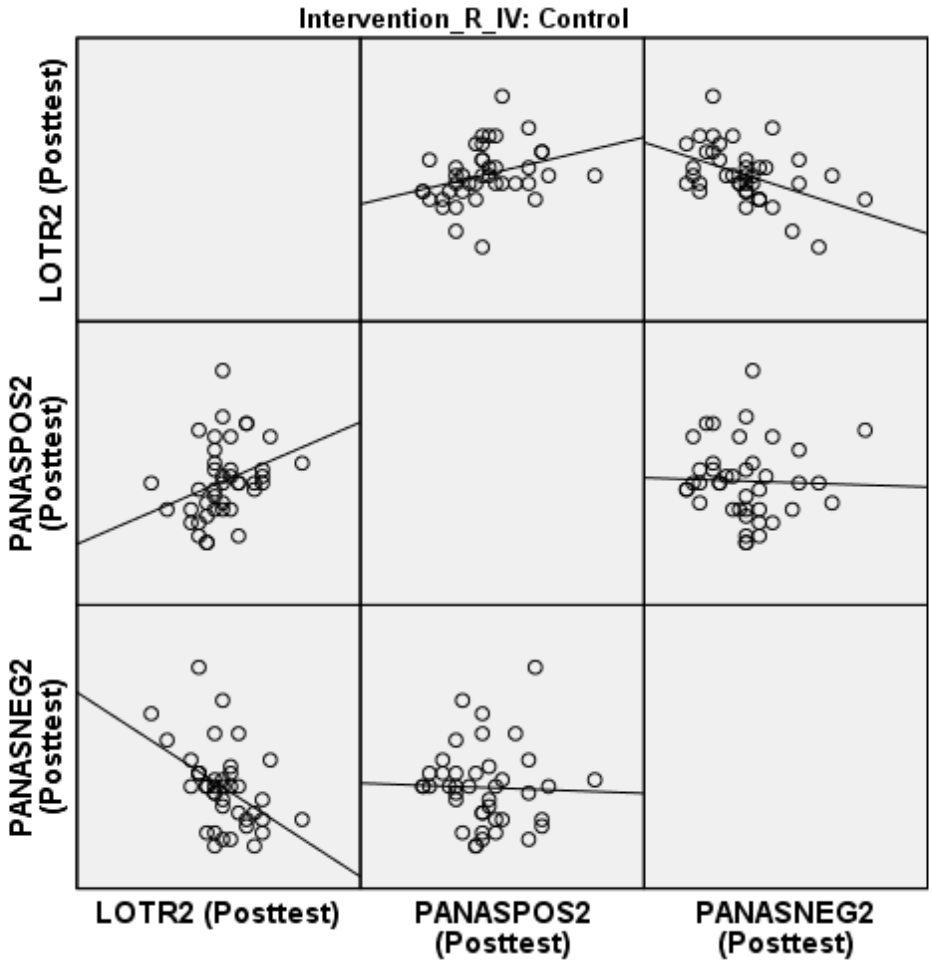


Figure 5

Matrix Scatterplot of Study Variables (Counseling Group)

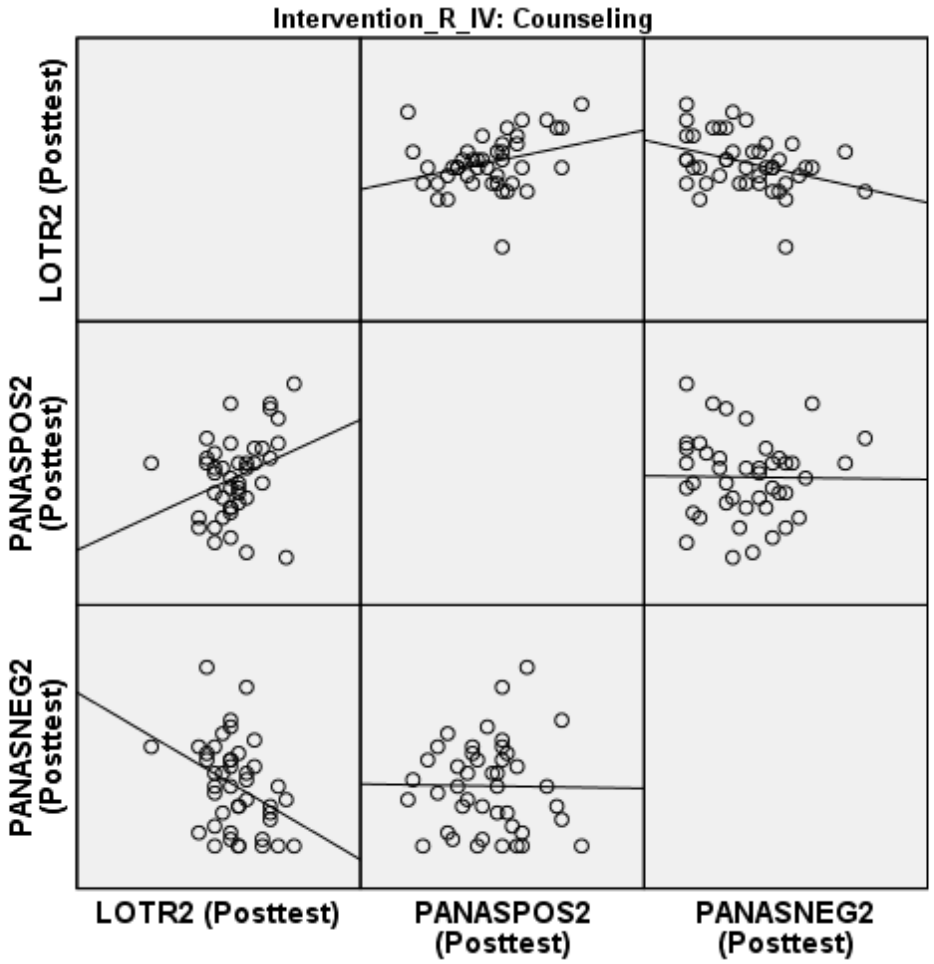
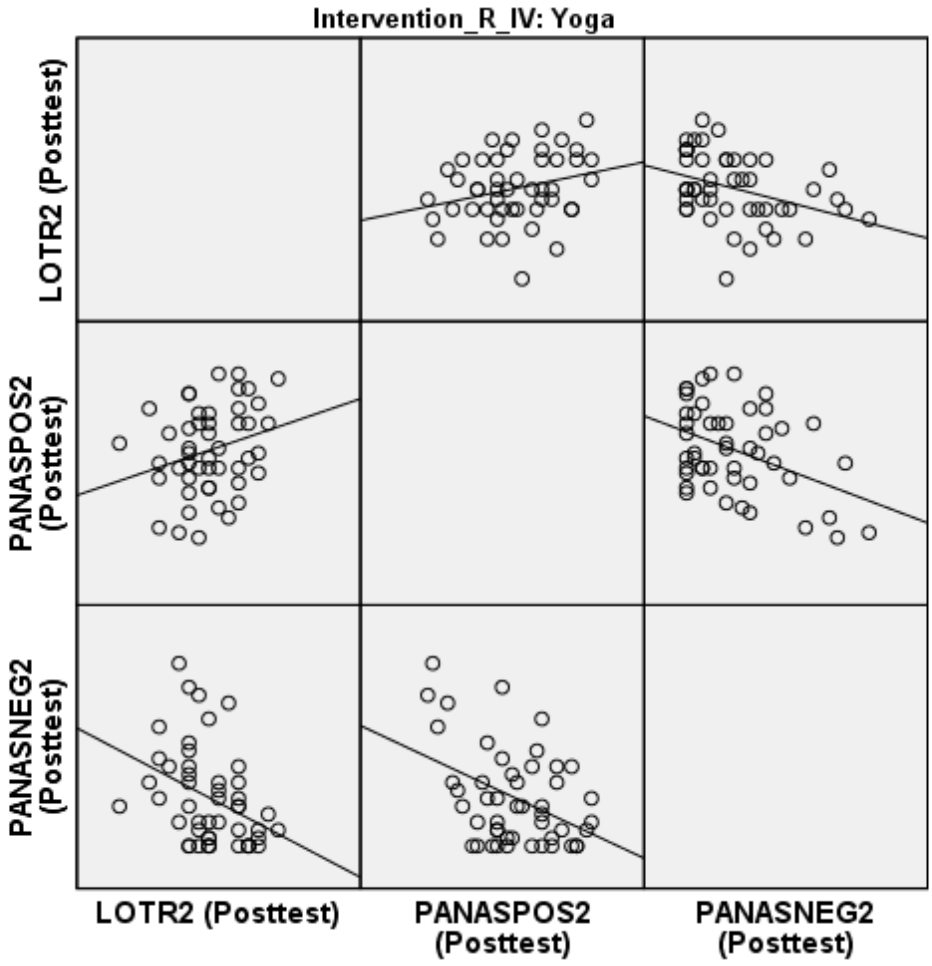


Figure 6

Matrix Scatterplot of Study Variables (Yoga Group)



There was homogeneity of regression slopes, as assessed by non-significant interaction terms between grade and group, age and group, pre-optimism score and group, pre-positive affect and group, and pre-negative affect and group. There was homogeneity of covariances, as assessed by Box's M test, $p = .175$. There were no univariate or multivariate outliers, as assessed by no standardized residuals greater than ± 3 or Mahalanobis distance values greater than a specific cut-off point ($p > .001$),

respectively. Residuals were normally distributed, as assessed by skewness and kurtosis statistics. Hair et al. (2010) and Bryne (2010) stated that data are normal if skewness is between -2 to +2 and kurtosis is between -7 to +7 (see Table 6).

Table 6

Skewness and Skewness Statistics of Residuals

Category	Skewness		Kurtosis	
	Statistic	*SE*	Statistic	*SE*
Residual for optimism	-.503	.211	4.343	.419
	-.160	.211	.550	.419
Residual for positive affect				
Residual for negative affect	.303	.211	.535	.419

Additionally, histograms of the residuals for each group suggest an approximate normal distribution (see Figures 7, 8, and 9).

Figure 7

Histogram of Residuals (Control Group)

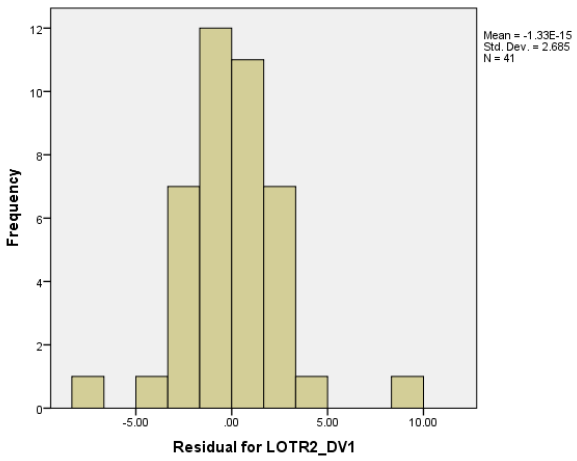


Figure 8

Histogram of Residuals (Counseling Group)

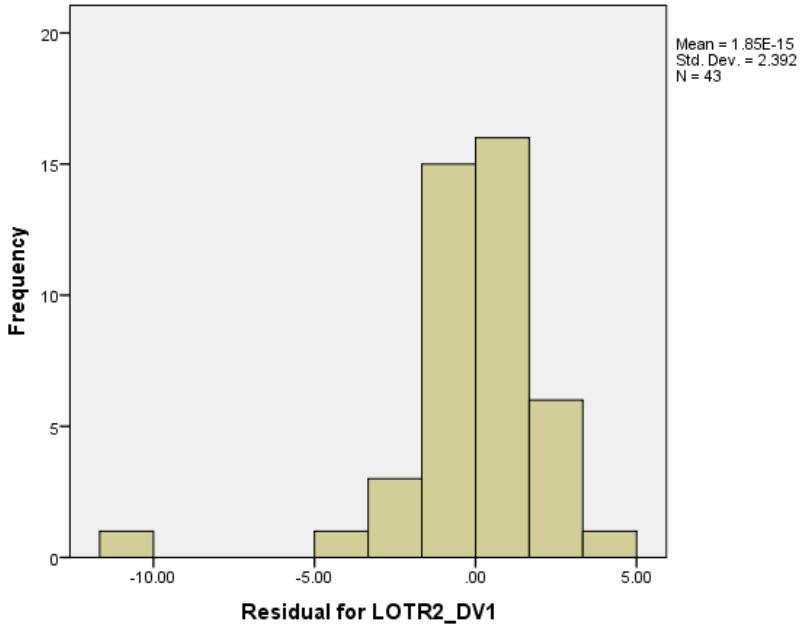
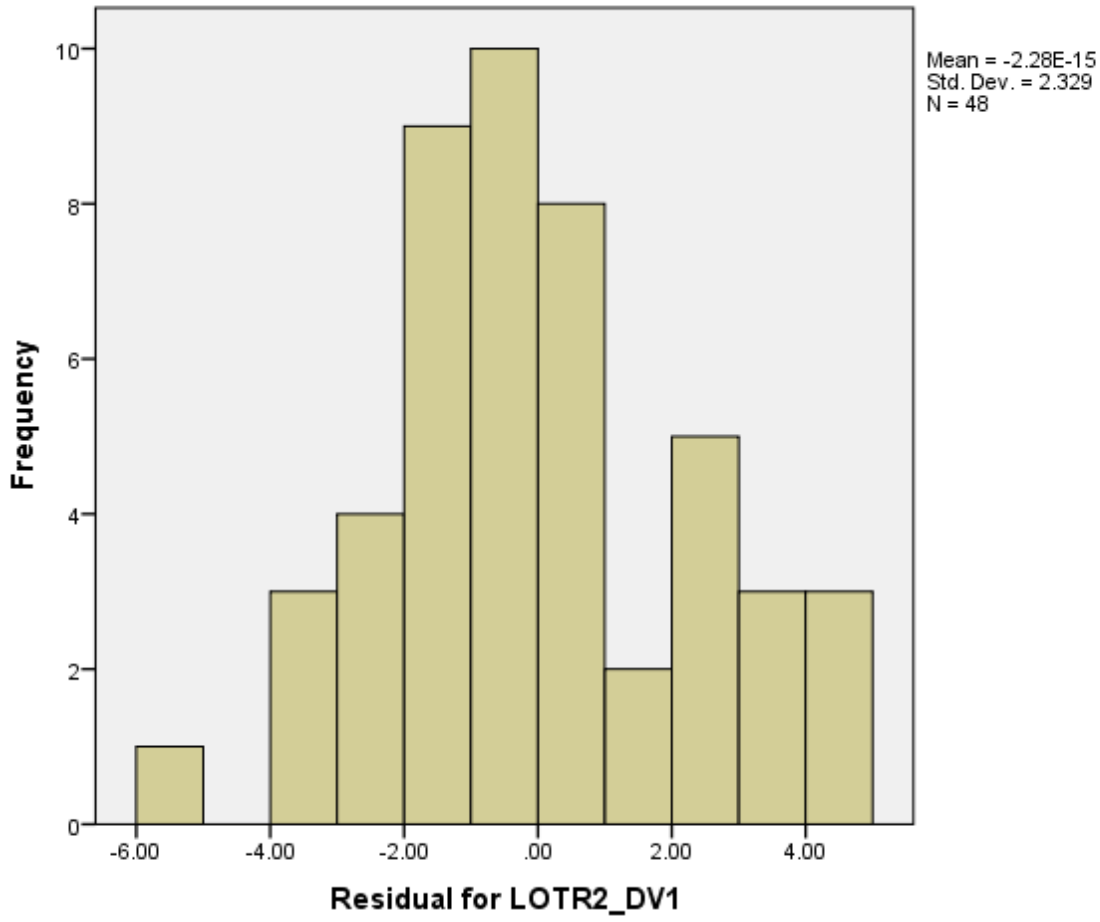


Figure 9

Histogram of Residuals (Yoga Group)



Results of MANCOVA

The adjusted means for optimism, positive and negative affect by group appear in Table 7. The adjusted means are the means of the dependent variables for each group of the independent variable group after they have been adjusted for the covariates. The yoga group had the greatest optimism, and positive affect score, as well as the lowest negative affect measure compared to either the control or counseling groups.

Table 7

Adjusted Means

Dependent variable	Group	*M*	*SE*	95% *CI*	
				Lower bound	Upper bound
Optimism (posttest)	Control	13.19	.43	12.33	14.05
	Counseling	14.51	.46	13.61	15.41
	Yoga	14.13	.39	13.35	14.91
Positive affect (posttest)	Control	28.69	.81	27.10	30.29
	Counseling	28.27	.85	26.59	29.96
	Yoga	30.48	.73	29.03	31.92
Negative affect (posttest)	Control	18.19	.82	16.57	19.80
	Counseling	19.85	.86	18.14	21.55
	Yoga	15.90	.74	14.43	17.37

Note. Covariates appearing in the model are evaluated at the following values: Grade_control = 10.04, Age_control = 15.14, LOTR1 (Pretest) = 13.4394, PANASPOS1 (Pretest) = 29.8106, PANASNEG1 (Pretest) = 18.9242.

There was a statistically significant difference between the groups on the combined dependent variables after controlling for grade, age, and pre-intervention scores, $F(6, 244) = 2.857$, $p = .001$, Wilks' $\Lambda = .873$, partial $\eta^2 = .066$. Since the MANCOVA was statistically significant, the default action of SPSS statistics followed up with univariate statistical tests (Pituch & Stevens, 2016). Specifically, ANCOVAs were conducted to determine the statistically significant mean differences of each dependent

variable separately. Results of the univariate tests provided in Table 8 indicate that there were statistically significant mean differences in negative affect amongst the three groups, F (2, 124) = 5.798, p = .004. The differences were not statistically significant for positive affect or optimism (p > .05).

Table 8

Univariate Follow-Up Tests for MANCOVA

Dependent variable		Sum of squares	*df*	*MS*	*F*	*p*	Partial eta squared
Optimism (posttest)	Contrast	29.801	2	14.901	2.229	.112	.035
	Error	829.041	124	6.686			
Positive affect	Contrast	103.763	2	51.881	2.237	.111	.035
(posttest)	Error	2875.958	124	23.193			
Negative affect	Contrast	275.700	2	137.850	5.798	.004	.086
(posttest)	Error	2947.953	124	23.774			

Note. The F tests the effect of intervention. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Specifically, the yoga group had the least negative affect score compared with the counseling group. This was a statistically significant mean difference of M_{diif}= -3.95 (SE = 1.203); 95% *CI*, -6.87 to -1.03. There were no other significant mean differences found (see Table 9).

Table 9

Pairwise Comparisons

	Group i	Group j	Mean difference (I-J)	*SE*	*p*	95% *CI* for difference[b]	
						Lower bound	Upper bound
LOTR2 (posttest)	Control	Counseling	-1.32	.674	.156	-2.96	.31
		Yoga	-.94	.576	.311	-2.34	.45
	Counseling	Control	1.32	.674	.156	-.31	2.96
		Yoga	.38	.638	1.000	-1.17	1.93
	Yoga	Control	.94	.576	.311	-.45	2.34
		Counseling	-.38	.638	1.000	-1.93	1.17
PANASPOS2 (posttest)	Control	Counseling	.42	1.255	1.000	-2.63	3.47
		Yoga	-1.78	1.073	.299	-4.39	.82
	Counseling	Control	-.42	1.255	1.000	-3.47	2.63
		Yoga	-2.20	1.188	.199	-5.08	.68
	Yoga	Control	1.78	1.073	.299	-.82	4.39
		Counseling	2.20	1.188	.199	-.68	5.08
PANASNEG2 (posttest)	Control	Counseling	-1.66	1.271	.580	-4.75	1.42
		Yoga	2.29	1.086	.112	-.35	4.92
	Counseling	Control	1.66	1.271	.580	-1.42	4.75
		Yoga	3.95*	1.203	.004	1.03	6.87
	Yoga	Control	-2.29	1.086	.112	-4.92	.35
		Counseling	-3.95*	1.203	.004	-6.87	-1.03

Note: Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Summary

Results of MANCOVA indicated that the yoga group had the least negative affect score compared with the counseling group. This was a significant mean difference of M_{diif}= -3.95 (SE = 1.203); 95% *CI*, -6.87 to -1.03. There were no other significant mean differences found. Thus, the first null hypothesis is rejected, and the alternative hypothesis is partially supported; a single 45-minute session of yoga for high school students does significantly influence self-reported negative affect, as measured by the Positive and Negative Affect Scale (PANAS)The second null hypothesis, there were no significant mean differences found in optimism between the different groups. Thus, the second hypothesis was not rejected and it is concluded that a single 45-minute session of yoga for high school students does not significantly influence future optimism, as measured by the Revised Life Orientation Test for Adolescents (LOT-R-A), compared to a single session of yoga to those participating a single peer support session group led by a licensed mental health counselor and no treatment comparison groups.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative quasi-experimental study was to determine whether a single session of hatha yoga can impact affect and optimism compared to a group counseling treatment and control. MANCOVA was used to assess the effects of three conditions on levels of positive affect, negative affect, and optimism. All variables were measured before and after sessions in each of the three conditions. Demographic variables of age and grade level were included as covariates. Chapter 5 includes a summary of results presented in Chapter 4. Interpretation of the results is included, as well as limitations of the study and implications for theory, practice, and research.

Interpretation of the Findings

Results of MANCOVA indicated that the yoga group had the lowest negative affect score compared with the counseling group and control group. There were no other significant mean differences found. No statistically significant mean differences were found in optimism. Results of the PANAS comparisons are consistent with research that showed yoga's effectiveness in reducing symptoms of depression and anxiety such as negative affect (see Uebelacker et al., 2017; Vollbehr et al., 2018). Results also align with Felver et al. (2017) who showed that physical education activities in schools can reduce negative affect. Chad-Friedman et al. (2019) also found that a single session of Hatha yoga can be effective in reducing negative affect and increasing positive affect in a single session.

The findings of the present study showed no effect on positive affect. This is contradictory to other studies. For example, Vollbehr et al. (2018) found yoga to be an

effective means of increasing positive affect. Visceglia and Lewis (2011) also found an increase in positive affect and decrease in depressive symptoms when treating individuals suffering from schizoaffective disorder. However, Frank et al. (2017) found positive affect was not impacted by yoga (although they did find reduced absences and detention among students participating in yoga). Studies are mixed in this regard, and the potential impact on positive affect should be further explored.

Little research had examined the effect of one session of yoga on optimism. Although de Oliveira (2020) performed a meta-analysis of 24 studies that examined optimism and yoga, all included studies that examined yoga over multiple sessions. Some studies indicated that yoga could increase components of emotional intelligence that could be related to optimism. For example, Jothi (2019) examined whether 6 weeks of yoga sessions could increase optimism in college age students and found an effect. In the present study, no effect was found. More studies need to be conducted to better understand the impact of yoga on optimism in youths.

Limitations of the Study

There were several limitations that should be addressed. The study had limited diversity in its participants, who were from a high school whose population was 72% White, 6% African American, 9% Asian American, and 7% Hispanic. This raises questions about whether similar results would be found in a more diverse population. Therefore, the study should be replicated in more diverse school settings. There was also no follow-up after the initial intervention that would have answered questions about persistence of the effect. In addition, the sample size was small. Although the study

technically had sufficient power, a larger sample size may have improved chances of finding a significant effect in other variables. Self-report was another limitation; it is possible that some students, particularly when considering the age group, responded inaccurately or may not have been motivated to respond accurately throughout the entire assessment. The average completion time in a pilot test was 5–10 minutes, so the brevity of the assessment should have helped.

Recommendations and Implications

Recommendations for Future Research

Future research should include samples that are larger and more diverse in terms of race and socioeconomic status. It would also be beneficial to include examination of students who have diagnosed mental health disorders such as anxiety and depression to understand whether the single session had the same effect on them as their peers. Another area of study would be to look at ethnicity and race. Given the positive findings of reduction in negative affect, more research is warranted in this area to understand how to maximally impact student mental health with yoga practice. Another area of potential research is examination of effect by gender. There were no significant differences by gender in the present study, but sample sizes were small, and it might be of interest to examine this further.

Implications for Theory

The study furthers the research showing that yoga can influence mental health. Mindfulness-based practices such as yoga have been demonstrated to reduce negative affect. Such practices can reduce inflammation in the body, which reduces negative

thinking (Rengasamy et al., 2021). Numerous studies have indicated how yoga reduces inflammation in the body and how reduced inflammation in the body is correlated with less depressive and anxious symptomatology (Zainal & Newman, 2021). The current study adds to the body of evidence that indicates mindfulness-based activities such as yoga reduce inflammation in the body, leading to better physical and mental health (see Bower et al., 2022).

Implications for Practice

This study supports the use of yoga as a viable option to reduce negative affect associated with psychiatric/mental health problems in adolescence. A single session of yoga was found to be more effective than standard treatment (counseling) for mental-health-related matters. Although group counseling can be effective, it often takes multiple sessions to be effective and cannot reach as many people at one time as can yoga; group counseling sessions usually reach 8–10 students per session (Al-Harbi, 2012). That one session of yoga with over 20 people in attendance was found to be effective, at least in terms of negative affect, is a finding that has important implications for practice in the schools. This study also is consistent with other research showing that mindfulness-based strategies can be useful in schools to reduce mental health struggles in adolescents (Sibinga et al., 2013, 2016; Tumminia et al., 2020).

Implications for Positive Social Change

The present study confirms that mindfulness-based interventions such as yoga can improve adolescents' mental health by reducing negative affect. The results suggest that schools could use a holistic method to reduce negative affect; such interventions could

reduce the likelihood that students' mental health concerns will persist into early and later adulthood. Managing these struggles in students could have an impact on academic success. In the long run, such interventions could reduce the number of adults who engage in criminal behaviors resulting in incarceration and stress on society (see Maynard et al., 2015). Yoga as an intervention in schools may be a useful strategy to address mental health concerns and may be a more cost-effective approach to addressing these concerns. The current study also suggests that yoga and mindfulness-based activities could be used to reduce inflammation in adolescents and thereby reduce the effect that inflammatory diseases have on children and adolescents in terms of mental health and financial costs. Inflammatory diseases in the United States accounted for over $119 billion dollars in 2018, and yoga could be used as a cost-effective way to reduce this expenditure on treatment (Peery et al., 2021). Finally, the goal of yoga is to connect a person's mind and body and allow insight into the interconnectedness of all, perhaps resulting in a more peaceful and harmonious society.

Conclusion

Results suggest that yoga could be used as an intervention to address mental health struggles of youths in schools. Sufficient staff numbers and time are becoming increasingly scarce, and yoga may offer a method of intervention/prevention that allows a single practitioner to reach more students in less time. Providing mental health services to children can become more efficient in terms of time and financial resources.

References

Ader, R. (2020). Historical perspectives on psychoneuroimmunology. In H. Friedman et al. (Eds), *Psychoneuroimmunology, stress, and infection* (pp. 1–24). CRC Press. https://doi.org/10.1201/9780367812522-1

Ader, R., & Cohen, N. (1975). Behaviorally conditioned immunosuppression. *Psychosomatic Medicine, 37*(4), 333–340. https://doi.org/10.1097/00006842-197507000-00007

Al-Harbi, K. S. (2012). Treatment-resistant depression: therapeutic trends, challenges, and future directions. *Patient preference and adherence*, 369-388. https://doi.org10.2147/PPA.S29716

Ali, M. M., Sherman, L. J., Lynch, S., Teich, J., & Mutter, R. (2019). Differences in utilization of mental health treatment among children and adolescents with Medicaid or private insurance. *Psychiatric Services, 70*(4), 329–332. https://doi.org/10.1176/appi.ps.201800428

Allan, N. P., Lonigan, C. J., & Phillips, B. M. (2015). Examining the factor structure and structural invariance of the PANAS across children, adolescents, and young adults. *Journal of Personality Assessment, 97*(6), 616–625. https://doi.org/10.1080/00223891.2015.1038388

Anantharaman, R. N., & Kabir, R. (1984). A study of yoga. *Journal of Psychological Researches, 28(*2), 97–101. https://doi.org/10.1080/15377903.2013.863259

Anusuya, U., Mohanty, S., & Saoji, A. (2020). Effect of mind sound resonance technique (MSRT– A yoga-based relaxation technique) on psychological variables and

cognition in school children: A randomized controlled trial. *Complementary Therapies in Medicine, 56*, 1–5. https://doi.org/10.1016/j.ctim.2020.102606

Arana, A. A., Boyd, E. Q., Guarneri-White, M., Iyer-Eimerbrink, P., Dougall, A. L., & Jensen-Campbell, L. (2018). The impact of social and physical peer victimization on systemic inflammation in adolescents. *Journal of Developmental Psychology, 64*(1), 12–40. https://doi.org/10.13110/merrpalmquar1982.64.1.0012

Arora, P. G., Baker, C. N., Marchette, L. K., & Stark, K. D. (2019). Components analyses of a school-based cognitive-behavioral treatment for youth depression. *Journal of Clinical Child & Adolescent Psychology, 48*(sup11), S180–S193. https://doi.org/10.1080/15374416.2017.1280800

Bagana, E., Raciu, A., & Lupu, L. (2011). Self-esteem, optimism and exam anxiety among high school students. *Procedia - Social and Behavioral Sciences, 30*, 1331–1338. https://doi.org/10.1016/j.sbspro.2011.10.258

Bagheri-Nesami, M., Mohseni-Bandpei, M. A., & Shayesteh-Azar, M. (2006). The effect of Benson relaxation technique on rheumatoid arthritis patients. *International Journal of Nursing Practice, 12*(4), 214–219. https://doi.org/10.1111/j.1440-172X.2006.00568.x

Banerji, D. (2018). Introduction to the special topic section on integral yoga psychology: The challenge of multiple integrities. *International Journal of Transpersonal Studies, 37*(1). https://doi.org/10.24972/ijts.2018.37.1.27

Basten-Guenther, J., Peters, M., & Lautenbacher, S. (2019). Optimism and the experience of pain: A systematic review. *Behavioral Medicine*, *45*(4), 323–339. https://doi.org/10.1080/08964289.2018.1517242

Beets, M. W., & Mitchell, E. (2010). Effects of yoga on stress, depression, and health-related quality of life in a nonclinical, bi-ethnic sample of adolescents: A pilot study. *Hispanic Health Care International*, *8*(1), 47. https://doi.org/10.1891/1540-4153.8.1.47

Benson, H., Beary, J. F. & Carol, M. P. (1974). The relaxation response. *Psychiatry*, *37*(1), 37–46. http://doi.org/10.1080/00332747.1974.11023785

Benson, H., & Klipper, M. Z. (1975). *The relaxation response*. Avon.

Bershadsky, S., Trumpfheller, L., Kimble, H, Pipaloff, D., & Yim, I. (2014). The effect of prenatal Hatha yoga on affect, cortisol, and depressive symptoms. *Complementary Therapies in Clinical Practice*, *20*(2), 106–113. https://doi.org/10.1016/j.ctcp.2014.01.002

Bhakti Permana, B., Lindayani, L., Hendra, A., & Juniarni, L. (2020). The effect of yoga exercise on reducing blood pressure among elderly with hypertension: A systematic review. *Jurnal Pendidikan Keperawatan Indonesia*, *6*(2),163–170. https://doi.org/10.17509/jpki.v6i2.25083

Bogdan, M., Hărăguș, P., & Roth, M. (2018). Constructing future expectations in adolescence: Relation to individual characteristics and ecological assets in family and friends. *International Journal of Adolescence and Youth*, *23*(1), 1–10. https://doi.org/10.1080/02673843.2016.12470 07

Brinsley, J., Schuch, F., Lederman, O., Girard, D., Smout, M., Immink, M. A., ... & Rosenbaum, S. (2021). Effects of yoga on depressive symptoms in people with mental disorders: A systematic review and meta-analysis. *British Journal of Sports Medicine, 55*(17), 992-1000. https://doi.org/10.1136/bjsports-2019-101242

Broekhof, R., Rius-Ottenheim, N., Spinhoven, P., van der Mast, R. C., Penninx, B. W. J. H., Zitman, F. G., & Giltay, E. J. (2015). Long-lasting effects of affective disorders and childhood trauma on dispositional optimism. *Journal of Affective Disorders, 175*, 351-358. https://doi.org/10.1016/j.jad.2015.01.022

Brog, N. A., Hegy, J. K., Berger, T., & Znoj, H. (2022). Effects of an internet-based self-help intervention for psychological distress due to COVID-19: results of a randomized controlled trial. *Internet Interventions, 27*, 100492. https://doi.org/10.1186/s13063-021-05089-9

Brown, H., Pearson, N., Braithwaite, R., Brown, W, & Biddle, J. (2013). Physical activity interventions and depression in children and adolescents. *Sports Medicine, 43*(3), 195-206. https://doi.org/10.1007/s40279-012-0015-8

Bower, J. E., Radin, A., & Kuhlman, K. R. (2022). Psychoneuroimmunology in the time of COVID-19: Why neuro-immune interactions matter for mental and physical health. *Behaviour Research and Therapy*, *154*, 104104. https://doi.org/10.1016/j.brat.2022.104104

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Routledge.

Cadena, C. H. G., Diaz, H. L., & Caycho-Rodríguez, T. (2021). The construct, convergent and divergent validity, and reliability of three optimism scales among North American university students. *Psychological Reports, 124*(3), 1412–1430. https://doi.org/10.1177/0033294120933144

Carei, T., Fyfe-Johnson, A., Breuner, C., & Brown, M. (2010). Randomized controlled clinical trial of yoga in the treatment of eating disorders. *Journal of Adolescent Health, 46*, 346–351. http://dx.doi.org/10.1016/j.jadohealth.2009.08.007

Carter, J., Gerbarg, P., & Brown, R. (2013). Multi-component yoga breath program for Vietnam veteran post-traumatic stress disorder: Randomized controlled trial. *Journal of Traumatic Stress Disorders & Treatment, 2*,1–10. http://dx.doi.org/10.4172/2324-8947.1000108

Carver, C., & Scheier, M. (2014). Dispositional optimism. *Trends in Cognitive Sciences, 18*(5), 293–299. https://doi.org/10.1016/j.tics.2014.02.003

Carver, C. S., & Scheier, M. F. (2015). A control-process perspective on anxiety. In *Anxiety and self-focused attention* (pp. 3-8). Routledge.

Centers for Disease Control and Prevention. (2021, June 16). *Data and Statistics on Children's Mental Health***.** https://www.cdc.gov/childrensmentalhealth/data.html

Chad-Friedman, S., Forgeard, M., McHugh, K., Beard, C., Kopeski, L., & Björgvinsson, T. (2019). Effectiveness of a brief adjunctive yoga intervention for short-term mood and psychiatric symptom change during partial hospitalization. *Psychiatric Rehabilitation Journal, 42*(1), 48–56. https://doi.org/10.1037/prj0000329

Chiesi, F., Galli, S., Primi, C., Innocenti Borgi, P., & Bonacchi, A. (2013). The accuracy of the Life Orientation Test-Revised (LOT-R) in measuring dispositional optimism: evidence from item response theory analyses. *Journal of personality assessment*, *95*(5), 523–529. https://doi.org/10.1080/00223891.2013.781029

Clark, C. J., Lewis-Dmello, A., Anders, D., Parsons, A., Nguyen-Feng, V., Henn, L., & Emerson, D. (2014). Trauma-sensitive yoga as an adjunct mental health treatment in group therapy for survivors of domestic violence: a feasibility study. *Complementary Therapies in Clinical Practice*, *20*(3), 152–158. https://doi.org/10.1016/j.ctcp.2014.04.003

Colasanto, M., Madigan, S., & Korczak, D. J. (2020). Depression and inflammation among children and adolescents: A meta-analysis. *Journal of affective disorders*, *277*, 940–948. https://doi.org/10.1016/j.jad.2020.09.025

Conboy, L. A., Noggle, J. J., Frey, J. L., Kudesia, R. S., & Khalsa, S. B. S. (2013). Qualitative evaluation of a high school yoga program: feasibility and perceived benefits. *Explore*, *9*(3), 171-180.

Cramer, H., Lauche, R., Langhorst, J., & Dobos, G. (2013). Yoga for depression: A systematic review and meta-analysis. *Depression and Anxiety*, *30*(11), 1068-1083. https://doi.org/10.1002/da.22166

Crane, R., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J., & Kuyken, W. (2016). What defines mindfulness-based programs? The warp and the weft. *Psychological Medicine*, *47*(6), 990-999. https://doi.org/10.1017/S0033291716003317

Crawford, J.R. and Henry, J.D. (2004), The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *43*, 245-265. https://doi.org/10.1348/0144665031752934

Crystal L. Park, & Jeanne M. Slattery. (2021). Yoga as an integrative therapy for mental health concerns: An overview of current research evidence. *Psychiatry International, 2*(30), 386–401. https://doi.org/10.3390/psychiatryint2040030

de Baumont, A., Bortoluzzi, A., Wollenhaupt de Aguiar, B., Scotton, E., Pinto Guimarães, L. S., Kapczinski, F., Belem da Silva, C., & Manfro, G. (2019). Anxiety disorders in childhood are associated with youth IL-6 levels: A mediation study including metabolic stress and childhood traumatic events. *Journal of Psychiatric Research*, *115*, 43–50. https://doi.org/10.1016/j.jpsychires.2019.05.011

De Oliveira, N. (2020). *A scoping review of yoga and emotional-social intelligence in children and youth* (Doctoral dissertation, North-West University (South-Africa)).

Daly, L. A., Haden, S. C., Hagins, M., Papouchis, N., & Ramirez, P. M. (2015). Yoga and emotion regulation in high school students: A randomized controlled trial. *Evidence-Based Complementary and Alternative Medicine*, Article 794928. https://doi.org/10.1155/2015/794928

Datey, K., Deshmukh, S., Dalvi, C., & Vinekar, S. (1969). "Shavasan": A yogic exercise in the management of hypertension. Angiology, 20(6), 325–333. https://doi.org/10.1177/000331976902000602

de Baumont, A., Bortoluzzi, A., Wollenhaupt de Aguiar, B., Scotton, E., Pinto Guimarães, L. S., Kapczinski, F., Belem da Silva, C. T., & Manfro, G. G. (2019). Anxiety disorders in childhood are associated with youth IL-6 levels: A mediation study including metabolic stress and childhood traumatic events. *Journal of psychiatric research*, *115*, 43–50. https://doi.org/10.1016/j.jpsychires.2019.05.011

de Manincor, M., Bensoussan, A., Smith, C., Barr, K., Schweickle, M., Donoghoe, L. L., Bourchier, S., & Fahey, P. (2016). Individualized yoga for reducing depression and improving well-being: A randomized controlled trail. *Depression and anxiety*, *33*(9), 816–828. https://doi.org/10.1002/da.22502

Deng, X., Zhang, J., Hu, L., & Zeng, H. (2019). Neurophysiological evidence of the transient effects of mindfulness induction on emotional processing in children: An ERP study. *International Journal of Psychophysiology, 143,* 36 43. https://doi.org/10.1016/j.ijpsycho.2019.06.014

Descilo, T., Vedamurtachar, A., Gerbarg, P., Nagaraja, D., Gangadhar, B., Damodaran, B., Adelson, B., Braslow, L., Marcus, S., & Brown, P. (2010). Effects of a yoga breath intervention alone and in combination with an exposure therapy for post-traumatic stress disorder and depression in survivors of the 2004 South-East Asia tsunami. *Acta Psychiatrica Scandinavica*, *121*(4), 289–300. https://doi.org/10.1111/j.1600-0447.2009.01466.x

Deuskar, M. (2007). The effectiveness of Yogic relaxation technique in the reduction of examination anxiety among high school students. *Journal of Psychosocial Research, 3*(1), 119–129. https://psycnet.apa.org/record/2010-26205-010

DeVellis, R. F. (2017). *Scale development: Theory and applications (4th ed.).* Sage.

Dharranidharan, M. (2019). A study on the effect of mindfulness intervention on optimism self-efficacy mindfulness among adults. Unpublished doctoral dissertation, University of Madras.

Dooly, B., Fitzgerald, A., & Giollabhui, N. (2015). The risk and protective factors associated with depression and anxiety in a national sample of Irish adolescents. *Irish Journal of Psychological Medicine, 31*(1), 93–105. https://doi.org/10.1017/ipm.2014.83

Doria, S., de Vuono, A., Sanlorenzo, R., Irtelli, F., & Mencacci, C. (2015). Anti-anxiety efficacy of Sudarshan kriya yoga in general anxiety disorder: A multicomponent, yoga based, breath intervention program for patients suffering from generalized anxiety disorder with or without comorbidities. *Journal of Affective Disorders*, *184*, 310–317. https://doi.org/10.1016/j.jad.2015.06.011

Dupéré, V., Dion, E., Nault-Brière, F., Archambault, I., Leventhal, T., & Lesage, A. (2018). Revisiting the link between depression symptoms and high school dropout: Timing of exposure matters. *Journal of Adolescent Health*, *62*(2), 205-211.

Duraiswamy, G., Thirthalli, J., Nagendra, H., & Gangadhar, B. (2007). Yoga therapy as an add-on treatment in the management of patients with schizophrenia--a randomized controlled trial. *ActaPsychiatrica Scandinavica*, *116*(3), 226–232. https://doi.org/10.1111/j.1600-0447.2007.01032.x

Duruturk, N, Tuzaun, H & Cullhaolgu, B. (2015) Is balance exercise training as effective as aerobic exercise in treating fibromyalgia syndrome? *Rheumatology International, 35*, 845–854. http://doi.org/10.1007/s00296-014-3159

D'souza, O. L., Jose, A. E., Suresh, S., & Baliga, M. S. (2021). Effectiveness of Yoga Nidra in reducing stress in school going adolescents: An experimental study. *Complementary Therapies in Clinical Practice, 45*, 101462. https://doi.org/10.1016/j.ctcp.2021.101462

Eggleston, B. (2015). The benefits of yoga for children in schools. *International Journal of Health, Wellness & Society, 5*(3), 1-7. https://doi.org/10.18848/2156-8960/CGP/V05I03/41125

Elson, B. D., Hauri, P., & Cunis, D. (1977). Physiological changes in yoga meditation. *Psychophysiology, 14*(1), 52–57. https://doi.org/10.1111/j.1469-8986.1977.tb01155

Elstad, T., Ulleberg, P., Klonteig, S., Hisdal, J., Dyrdal, G. M., & Bjorndal, A. (2020). The effects of yoga on student mental health: A randomized controlled trial. *Health Psychology and Behavioral Medicine, 8*(1), 573–586. https://doi.org/10.1080/21642850.2020.1843466

Ehsani, A., Sohrabi Esmrood, F., & Ghorban Jahromi, R. (2021). The effect of mindfulness-based stress management intervention on students' self-efficacy and optimism. *Razi Journal of Medical Sciences, 28*(8), 90 – 98.

Falsafi, N. (2016). A randomized controlled trial of mindfulness versus yoga: Effects on depression and/or anxiety in college students. *Journal of the American*

Psychiatric Nurses Association, 22(6), 483–497. https://doi.org/10.1177/1078390316663307

Felver, J., Butzer, B., Olson, K., Smith, I., & Khalsa, S. (2015). Yoga in public school improves adolescent mood and affect. *Contemporary School Psychology, 19*(3), 184–192. https://doi.org/10.1007/s40688-014-0031-9

Felver, J., Razza, R., Morton, M., Clawson, A., & Mannion, R. (2020). School-based yoga intervention increases adolescent resilience: a pilot trial. *Journal of Child and Adolescent Mental Health, 32*(1), 1–10. https://doi.org/10.2989/17280583.2019.1698429

Frank, J., Bose, B., & Schrobenhauser-Clonan, A. (2014). Effectiveness of a school-based yoga program on adolescent mental health, stress coping strategies, and attitudes toward violence: Findings from a high-risk sample. *Journal of Applied School Psychology, 30*(1), 29–49. https://doi.org/10.1080/15377903.2013.863259

Frank, J. L., Kohler, K., Peal, A., & Bose, B. (2017). Effectiveness of a school-based yoga program on adolescent mental health and school performance: Findings from a randomized controlled trial. *Mindfulness, 8*, 544-553.

Friedman, H. (2014). Finding meaning through transpersonal approaches in clinical psychology: Assessments and psychotherapies. *Journal of Existential Psychology and Psychotherapy, 45*, 49.

Friedman, H. (2021). An approach to transpersonal psychology as a science. *International Journal of Transpersonal Studies, 40*(1), 3. https://doi.org/10.24972/ijts.2021.40.2.50

Frost, S. (2021). *Optimism at work: Developing and validating scales to measure workplace optimism*. Unpublished doctoral dissertation, Antioch University.

Fusar-Poli, P., Correll, C. U., Arango, C., Berk, M., Patel, V., & Ioannidis, J. P. (2021). Preventive psychiatry: a blueprint for improving the mental health of young people. *World Psychiatry*, *20*(2), 200-221. https://doi.org/10.1002/wps.20869

Ganguly, M., Mohanty, S., Mishra, S., & Patra, S. (2021). Effect of Prosody of Rhythmic Yoga-Based Recitation on Positive and Negative Affect among Adolescents: A Four-Armed Comparative Study. *Dev Sanskriti Interdisciplinary International Journal*, *17*, 13-19.

Geraghty, A. W., Maund, E., Newell, D., Santer, M., Everitt, H., Price, C., ... & Stuart, B. (2021). Self-management for chronic widespread pain including fibromyalgia: A systematic review and meta-analysis. *Plos One*, *16*(7), e0254642. https://doi.org/10.1371/journal.pone.0254642

Gibson J. (2019). Mindfulness, interoception, and the body: A contemporary perspective. *Frontiers in Psychology*, *10*, 2012. https://doi.org/10.3389/fpsyg.2019.02012

Gunaseelan, L., Vanama, M. S., Abdi, F., Qureshi, A., Siddiqua, A., & Hamid, M. A. (2021). Yoga for the management of attention-deficit/hyperactivity disorder. *Cureus*, *13*(12).

Gustafsson, H., & Skoog, T. (2012). The mediational role of perceived stress in the relation between optimism and burnout in competitive athletes. *Anxiety, Stress & Coping*, *25*(2), 183–199. https://doi.org/10.108010615806.201.594045

Groves, R. M., Fowler, F. J. Jr., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). *Survey methodology* (2nd ed.). John Wiley & Sons

Hair, J., Black, W. C., Babin, B. J. & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson Educational International.

Halladay, J.E., Dawdy, J.L., McNamara, I.F., Chen, A. J., Vitoroulis, I., NcInnes, N., & unn, C. (2019). Mindfulness for the mental health and well-being of post-secondary students: A systematic review and meta-analysis. *Mindfulness 10*, 397–414 (2019). https://doi.org/10.1007/s12671-018-0979-z

Harrison, L, Manocha, R., & Rubia, K. (2004). Sahaja yoga meditation as a family treatment programme for children with attention deficit-hyperactivity disorder. *Clinical Child Psychology and Psychiatry*, *9*(4), 479-497. https://doi.org/10.1177/1359104504046155

Hartelius, G. (2021). The origin (and future) of transpersonal psychology in an open scientific naturalism: Introduction to the special topic section. *International Journal of Transpersonal Studies*, *40*(2). https://doi.org/10.24972/ijts.2021.40.2.50

Henje Blom, E., Tymofiyeva, O., Chesney, M., Ho, T., Moran, P., Connolly, C., Duncan, L., Baldini, L., Weng, H., Acree, M., Goldman, V., Hecht, F., & Yang, T. (2017). Feasibility and preliminary efficacy of a novel RDoC-based treatment program for adolescent depression: "Training for Awareness Resilience and Action" (TARA)-A pilot study. *Frontiers in Psychiatry*, *7*(208) 1-13. https://doi.org/10.3389/fpsyt.2016.00208

Heubeck, B. G., & Boulter, E. (2021). PANAS models of positive and negative affectivity for adolescent boys. *Psychological Reports*, *124*(1), 240–247. https://doi.org/10.1177/0033294120905512

Hogan, T., & Sink, C. (2017). *BASC-3 Behavioral and Emotional Screening System*. The Twentieth Mental Measurements Yearbook.

Hooke, M. C., Gilchrist, L., Foster, L., Langevin, M., & Lee, J. (2016). Yoga for children and adolescents after completing cancer treatment. *Journal of Pediatric Oncology Nursing, 33*(1), 64-73. https://doi.org/10.1177/1043454214563936

James-Palmer, A., Anderson, E. Z., Zucker, L., Kofman, Y., & Daneault, J. F. (2020). Yoga as an intervention for the reduction of symptoms of anxiety and depression in children and adolescents: a systematic review. *Frontiers in Pediatrics, 8*(78) 1-16. https://doi.org/10.3389/fped.2020.00078

Janjhua, Y., Chaudhary, R., Sharma, N., & Kumar, K. (2020). A study on effect of yoga on emotional regulation, self-esteem, and feelings of adolescents. *Journal of Family Medicine and Primary Care, 9*(7), 3381–3386. https://doi.org/10.4103/jfmpc.jfmpc_153_20

Jensen, P., & Kenny, D.. (2004). The effects of yoga on the attention and behavior of boys with Attention-Deficit/ hyperactivity Disorder (ADHD). *Journal of Attention Disorders, 7*(4), 205–216. https://doi.org/10.1177/108705470400700403

Johnson, C., Burke, C., Brinkman, S., &Wade, T. (2016). Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behaviour Research and Therapy, 81*, 1–11.

https://doi.org/10.1016/j.brat.2016.03.002

Jothi, V. K. (2019). *Effects of 6 Weeks of Yoga on Optimistic Behaviour among College Students* (Doctoral dissertation, Tunku Abdul Rahman University College).

Kabat-Zinn, J., and R. Burney. (1981). The clinical use of awareness meditation in the self-regulation of chronic pain. *Pain, 11,* S273.

Kabat-Zinn, J., Massion, A., Kristeller, J., Peterson, L., Fletcher, K., Pbert, L., Lenderking, W., & Santorelli, S. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry, 149* (7), 936–943. https://doi.org/10.1176/ajp.149.7.936

Kale, D., & Kumari, S. (2017). Effect of 1-month yoga practice on positive-negative affect and attitude toward violence in schoolchildren: A randomized control study. *The International Journal of Educational and Psychological Researches, 3*(1), 180–185. https://doi.org/10.4103/jepr.jepr_69_16

Kaiser, A., & Malik, S. (2015). Emotional maltreatment as predictor of mental health problems among adolescents: Moderating role of optimism. *Journal of Behavioral Sciences, 25*(2), 130–147. https://doi.org/10.1016/j.chiabu.2018.03.011

Kaleeswari G, Kalyani C, Jayarani J, & Rohilla K. (2021) Effect of yoga on pulse rate and blood pressure among women. *Journal of Family Medicine & Primary Care, 10*(10), 3670–3674. https://doi.org/10.4103/jfmpc.jfmpc_113_21

Kaligal, C., Kanthi, A., Mahadevappa, V., & Deepeshwar, S. (2022). Influence of yoga on cognitive functions in individuals with mental disorders: A systematic review of randomized controlled trials. *Integrative and Complementary Therapies, 29*(1),

15-24. https://doi.org/10.1089/ict.2023.29061.cka

Katzman, M., Vermani, M., Gerbarg, P., Brown, R., Iorio, C., Davis, M., Cameron, C., & Tsirgielis, D. (2012). A multicomponent yoga-based, breath intervention program as an adjunctive treatment in patients suffering from generalized anxiety disorder with or without comorbidities. *International Journal of Yoga*, *5*(1), 57–65. https://doi.org/10.4103/0973-6131.91716

Kaur, N., & Shourie, S. (2019). Looking for gender differences among adolescents on well-being. *IAHRW International Journal of Social Sciences Review*, *7*(1), 132-136.

Kennes, A., Peeters, S., Janssens, M., Reijnders,J., Simons, M., Lataster, J., & Jacobs, N. (2021). Optimism and mental health in adolescence: A prospective validation study of the Dutch Life-Orientation Test-Revised (LOT-R-A) for adolescents. *Psychologica Belgica, 61*(1) 104-115). https://doi-org.ezp.waldenulibrary.org/10.5334/pb.799

Khalsa, S., Hickey-Schultz, L., & Cohen, D. (2012). Evaluation of the mental health benefits of yoga in a secondary school: A preliminary randomized controlled trial. *Journal of Behavioral Health Services and Research 39*(1)**,** 80–90. https://doi.org/10.1007/s11414-011-9249-8

Khalsa, M. K., Greiner-Ferris, J. M., Hofmann, S. G., & Khalsa, S. B. (2015). Yoga-enhanced cognitive behavioural therapy (Y-CBT) for anxiety management: a pilot study. *Clinical Psychology & Psychotherapy*, *22*(4), 364–371. https://doi.org/10.1002/cpp.1902

Knowles, E. S., & Condon, C. A. (1999). Why people say "yes": A dual-process theory of acquiescence. *Journal of Personality and Social Psychology, 77*(2), 379–386. https://doi.org/10.1037/0022-3514.77.2.379

Köse, A. (2019). Program evaluation competencies for prospective school counseling practitioners. *Uluslararası Eğitim Programları ve Öğretim Çalışmaları Dergisi, 9*(1), 33-52.

Kwok, S., Engle, J., & Datta, A. (2022). Resilience of adolescents and teenagers with self-limited and genetic-generalized epilepsy during the COVID-19 pandemic. *Epilepsy & Behavior Reports, 17,* 1 – 9. https://doi.org/10.1016/j.ebr.2021.100520

Killingley, D. (2013). Manufacturing yogis: Swami Vivekananda as a yoga teacher. In M. Singleton & E. Goldberg (Eds.), *Gurus of modern yoga (pp.* 17 – 37). https://doi.org/10.1093/acprof:oso/9780199938704.003.0002

Kinser, P. A., Elswick, R. K., & Kornstein, S. (2014). Potential long-term effects of a mind-body intervention for women with major depressive disorder: sustained mental health improvements with a pilot yoga intervention. *Archives of Psychiatric Nursing, 28*(6), 377–383. https://doi.org/10.1016/j.apnu.2014.08.014

Kinser, P. A., Goehler, L. E., & Taylor, A. G. (2012). How might yoga help depression? A neurobiological perspective. *Explore (NY), 8*(2), 118-126. https://doi.org/10.1016/j.explore.2011.12.005. PMID: 22385566

Kim, Y., Kwak, K., & Lee, S. (2016). Does optimism moderate parental achievement pressure and academic stress in Korean children? *Current Psychology, 35*(1), 39-43. https://doi.org/10.1073/pnas.1900712116

Koren, T., Yifa, R., Amer, M., Krot, M., Boshnak, Nl, Ben-Shaanan, T. L., Azulay0-Debby, H., Zalayat, I., Avishai, E., Hajjo, H., Schiller, M., Haykin, H., Korin, B., Farfara, D., Hakim, F., Kobiler, O., Rosenblum, K, & Rolls, A. (2021). Insular cortex neurons encode and retrieve specific immune responses. Cell, 184(24), 5902-5915. https://doi.org/10.1016/j.cell.2021.10.013

Laakso, M., Fagerlund, Å., Pesonen, A. K., Lahti-Nuuttila, P., Figueiredo, R. A., Karlsson, C., & Eriksson, J. G. (2021). Flourishing students: The efficacy of an extensive positive education program on adolescents' positive and negative affect. *International Journal of Applied Positive Psychology*, *6*, 253-276.

Lai, J. C. (2009). Dispositional optimism buffers the impact of daily hassles on mental health in Chinese adolescents. *Personality and Individual Differences, 47*, 247–249. https://doi.org/10.1016/j.paid.2009.03.007

Lavretsky, H., Epel, E., Siddarth, P., Nazarian, N., Cyr, N., Khalsa, D., Lin, J., Blackburn, E., & Irwin, M. (2013). A pilot study of yogic meditation for family dementia caregivers with depressive symptoms: effects on mental health, cognition, and telomerase activity. *International Journal of Geriatric Psychiatry*, *28*(1), 57–65. https://doi.org/10.1002/gps.3790

Lester, E., Macklin, E., Plotkin, S., & Vranceanu, A. (2020). Improvement in resiliency factors among adolescents with neurofibromatosis who participate in a virtual mind–body group program. *Journal of Neuro-Oncology*, *147*(2), 451-457. https://doi.org/10.1007/s11060-020-03441-8

Liu, Q., Zhou, Z., Yang, X., Niu, G., Tian, Y., & Fan, C. (2017). Upward social

comparison on social network sites and depressive symptoms: A moderated mediation model of self-esteem and optimism. *Personality and Individual Differences, 113,* 223–228. https://doi.org/10.1016/jpaid.2017.03.037

Long, M. N. (2022). Yoga: The symptomatic, behavioral, and emotional impact on children with a life-long illness. *Pediatric Nursing, 48*(6).

Luxhman, G., Vanama, M. S., Farwa, A., Aljeena, Q., Ayesha, S., & Hamid, M. A. (2021). Yoga for the management of attention-deficit/hyperactivity disorder. *Cureus, 13*(12).

Kest, B. (2007). Bryan Kest's Power Yoga.

Khalsa, S. B. S., Hickey-Schultz, L., Cohen, D., Steiner, N., & Cope, S. (2012) Evaluation of the mental health benefits of yoga in a secondary school: A preliminary randomized controlled trial. *Journal of Behavioral Health Services and Research, 39,* 80–90. http://dx.doi.org/10.1007/s11414-011-9249-8

Kuttner, L., Chambers, C. T., Hardial, J., Israel, D. M., Jacobson, K., & Evans, K. (2006). A randomized trial of yoga for adolescents with irritable bowel syndrome. *Pain Research and Management, 11,* 217–223. https://doi.org/10.1155/2006/731628

Magyar-Moe, J. L. (2009). Worksheet 3.1: The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). *Therapist's Guide to Positive Psychological Interventions*.

Mala, V. (2018). Adolescent students' problems and yoga as a preventive measure. Journal on Educational Psychology, 11(4), 1 – 7. https://doi.org/10.26634/jpsy.11.4.14216

Malboeuf-Hurtubise, C., Léger-Goodes, T., Mageau, G. A., Joussemet, M., Herba, C., Chadi, N., Lefrançois, D., Camden, C., Bussières, È. L., Taylor, G., Éthier, M. A., & Gagnon, M. (2021). Philosophy for children and mindfulness during COVID-19: Results from a randomized cluster trial and impact on mental health in elementary school students. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *107*, 110260. https://doi.org/10.1016/j.pnpbp.2021.110260

Maynard, R., Brendel, E., Bulanda, J., Heyne, D., Thompson, M., & Pigott, D. (2015). Psychosocial Interventions for School Refusal with Primary and Secondary Students: A Systematic Review. Campbell Systematic Reviews 2015: 12. *Campbell Collaboration*.

McCall M. (2014). In search of yoga: Research trends in a western medical database. *International Journal of Yoga*, *7*(1), 4–8. https://doi.org/10.4103/0973-6131.123470

McKusick, M. (2018). *Sun salutations in school: A pilot study of yoga with school-aged children.* Unpublished doctoral dissertation, University of British Columbia.

Milam, J., Slaughter, R., Verma, G., & McConnell, R. (2014). Hair cortisol, perceived stress, and dispositional optimism: A pilot study among adolescents. *Journal of Traumatic Stress Disorders and Treatment, 3*(3), 1000126. https://doi.org/10.4172/2324- 8947.1000126

Milaneschi, Y., Kappelmann, N., Ye, Z., Lamers, F., Moser, S., Jones, B., Burgess, S., Penninx, H., & Khandaker, G. (2021). Association of inflammation with depression and anxiety: evidence for symptom-specificity and potential causality

from UK Biobank and NESDA cohorts. *Molecular psychiatry*, *26*(12), 7393–7402. https://doi.org/10.1038/s41380-021-01188-w

Miller A. H. (2020). Beyond depression: The expanding role of inflammation in psychiatric disorders. *World Psychiatry: Official journal of the World Psychiatric Association (WPA)*, *19*(1), 108–109. https://doi.org/10.1002/wps.20723

Miller, J. J., Fletcher, K., & Kabat-Zinn, J. (1995). Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders. *General Hospital Psychiatry, 17*(3), 192–200.

Mills, N., Scott, J., Wray, N, Cohen, & Baune, B. (2013). The role of cytokines in depression in adolescents: A systematic review. *Journal of Child Psychology & Psychiatry, 54*(8), 816–835. https://doi.org/10.1111/jcpp.12080

Mishra M, & Sinha R. (2001). Effect of yogic practices on depression and anxiety. *Journal of Projective Psychology & Mental Health. 8*(1), 23–27.

Miovic, M. (2004). An introduction to spiritual psychology: Overview of the literature, east and west. *Harvard review of psychiatry*, *12*(2), 105-115.

Miron, O., Yu, K. H., Wilf-Miron, R., & Kohane, I. S. (2019). Suicide rates among adolescents and young adults in the United States, 2000-2017. *Journal of the American Medical Association, 321*(23), 2362–2364. https://doi.org/10.1001/jama.2019.5054

Mendelson, T., Greenberg, M. T., Dariotis, J. K., Gould, L. F., Rhoades, B. L., & Leaf, P. J. (2010). Feasibility and preliminary outcomes of a school-based mindfulness

intervention for urban youth. *Journal of Abnormal Child Psychology, 3*8(7), 985–994. https://doi.org/10.1007/s10802-010-9418-x

Mullen, R., Protti, T.A., Block-Lerner, J., Marks, D., Sandoz, E., & Ricardo, P. (2021). Curriculum-based yoga and acceptance and commitment training intervention for undergraduate students: A mixed-methods investigation. *Journal of Contextual Behavioral Science, 19*, 92–99. https://doi.org/10.1016/j.jcbs.2020.12.005

Müller, N., Krause, D., Barth, R., Myint, A. M., Weidinger, E., Stettinger, W., & Schwarz, M. J. (2019). Childhood adversity and current stress are related to pro- and anti-inflammatory cytokines in major depression. *Journal of Affective Disorders, 253*, 270-276. https://doi.org/10.1016/j.jad.2019.04.088

Muthappan, S., Ilangovan, K., Subramanian, R., Durairajan, M., & Elumalai, R. (2020). Bibliometric analysis of yoga scientific publications: An analysis of PubMed database 1948 - 2018. COLLNET *Journal of Scientometrics and Information Management, 14*, 301 - 309. https://doi.org/10.1080/09737766.2021.1913976

Nicotera, N., & Viggiano, E. (2021). A pilot study of a trauma-informed yoga and mindfulness intervention with young women incarcerated in the juvenile justice system. *Journal of Addictions & Offender Counseling, 42*(2), 80-96 https://doi.org/10.1002/jaoc.12095

Nuesh, E., Hauser, K., & Bernardy, J. (2013) Comparative efficacy of pharmacological and non-pharmacological interventions in fibromyalgia syndrome. *Annals of Rheumatic Disorder, 72*, 955–962. https://doi.org/10.1136/annrheumdis-2011-201249

Nanthakumar, C. (2020), Yoga for anxiety and depression – a literature review. *The Journal of Mental Health Training, Education and Practice, 15*(3), 157-169. https://doi.org/10.1108/JMHTEP-09-2019-0050

Nerurkar, A., Bitton, A., Davis, R., Phillips, R., & Yeh, G. (2013) When physicians counsel about stress: Results of a national study. *Journal of the American Medication Association, Internal Medicine,173,* 76–77. htpps://doi.org/10.1001/2013.jamainternmed.480

Noggle, J. J., Steiner, N. J., Minami, T., & Khalsa, S. B. S. (2012). Benefits of yoga for psychosocial well-being in a US high school curriculum: A preliminary randomized controlled trial. *Journal of Developmental & Behavioral Pediatrics, 33*(3), 193–201. https://doi.org/10.1097/DBP.0b013e31824afdc4

Norton, G., & Johnson, W. (1983). A comparison of two relaxation procedures for reducing cognitive and somatic anxiety. *Journal of Behavior Therapy and Experimental Psychiatry*, *14*(3), 209-214. https://doi.org/ 10.1016/0005-7916(83)90050-2

Nyer, M., Roberg, R., Nauphal, M., & Streeter, C. C. (2019). *Yoga as a treatment for depression*. The Massachusetts General Hospital Guide to Depression (pp. 223-231). Humana Press.

Ornish, D., Gotto, A., & Miller, R. (1979). Effects of a vegetarian diet and selected yoga techniques in the treatment of coronary heart disease. *Clinical Research, 1,* 54-59. https://doi.org/10.1001/jama.1983.03330250034024

Ornish, D., Scherwitz, L., & Doody, R. (1983). Effects of stress management training and dietary changes in treating ischemic heart disease. *Journal of the American Medication Association, 249*, 54–59.

Pandya, S.P. (2018). Yoga, emotional awareness, and happiness in children: A multi-city study of the Chinmaya Bala Vihar programme. *Child & Youth Care Forum, 47*, 897–917. https://doi.org/10.1007/s10566-018-9468-8

Patel, N., Nivethitha, L., & Mooventhan, A. (2018). Effect of a yoga-based meditation technique on emotional regulation, self-compassion, and mindfulness in college students. *Explore, 14*(6), 443-447. https://doi.org/10.1016/j.explore.2018.06.008

Parker, A. G., Hetrick, S. E., Jorm, A. F., Mackinnon, A. J., McGorry, P. D., Yung, A. R., Scanlan, F., Stephens, J., Baird, S., Moller, B., & Purcell, R. (2016). The effectiveness of simple psychological and physical activity interventions for high prevalence mental health problems in young people: A factorial randomised controlled trial. *Journal of Affective Disorders, 196*, 200–209. https://doi.org/10.1016/j.jad.2016.02.043

Peery, A. F., Crockett, S. D., Murphy, C. C., Jensen, E. T., Kim, H. P., Egberg, M. D., ... & Sandler, R. S. (2022). Burden and Cost of Gastrointestinal, Liver, and Pancreatic Diseases in the United States: update 2021. *Gastroenterology*, *162*(2), 621-644.

Phan, T. N., Alam, S., & Wagner, K. D. (2021). Yoga for Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. *Psychiatric Annals*, *51*(9), 437-442.

Phillips, S., King, N., Michaelson, V., & Pickett, W. (2018). Sex, drugs, risk and resilience: Analysis of data from the Canadian Health Behaviour in school-aged Children (HBSC) study. *The European Journal of Public Health, 29*(1), 38–43. https://doi.org/10.1093/eurpub/cky169

Pimple, J., & Agrawal, T. (2020). Efficacy of practicing positive psychological interventions, yoga, and mindfulness meditation in COVID-19 lockdown. *International Journal of Indian Psychology, 8*(2), 293-303.

Pituch, K. A., & Stevens, J. P. (2016). *Applied multivariate statistics for the social sciences* (6th ed.). Routledge.

Prathikanti, S., Rivera, R., Cochran, A., Tungol, J. G., Fayazmanesh, N., & Weinmann, E. (2017). Treating major depression with yoga: A prospective, randomized, controlled pilot trial. *PloS one, 12*(3), e0173869. https://doi.org/10.1371/journal.pone.0173869

Quiroga, C., & Walton, B. (2014). Needs and strengths associated with acute suicidal ideation and behavior in a sample of adolescents in mental health treatment: Youth and family correlates. *Residential Treatment for Children & Youth, 31*(3), 171–187. https://doi org/10.1080/0886571X.2014.943560

Raccanello, D., Rocca, E., Vicentini, G., & Brondino, M. (2023). Eighteen Months of COVID-19 Pandemic through the Lenses of Self or Others: A Meta-Analysis on Children and Adolescents' Mental Health. *Child & Youth Care Forum*, *52*(4), 737–760. https://doi.org/10.1007/s10566-022-09706-9

Raj, S., Sachdeva, S., Jha, R., Sharad, S., Singh, T., Arya, Y., & Verma, S. (2019). Effectiveness of mindfulness based cognitive behavior therapy on life satisfaction, and life orientation of adolescents with depression and suicidal ideation. *Asian Journal of Psychiatry, 39*, 58-62. https://dio.org/10.1016/j.ajp.2018.12.001

Rawlett, K. E., Friedmann, E., & Thomas, S. A. (2019). Mindfulness based intervention with an attentional comparison group in at risk young adolescents: a pilot randomized controlled trial. *Integrative medicine research*, *8*(2), 101-106.

Reed, D. J. (2016). Coping with occupational stress: The role of optimism and coping flexibility. *Psychology Research and Behavior Management, 9*, 71–79. https://doi.org/10.2147/PRBM.S97595

Regev, S., Odes, S., Slonim-Nevo, V., Goren, G., Friger, M., Greenberg, D., Vardi, H., Schwartz, D., Sergienko, R., & Sarid, O. (2022). Normative data for the Brief Symptom Inventory for patients with Crohn's disease. *Psychology & Health, 37*(2), 246–257. https://doi.org/10.1080/08870446.2020.1862841

Rengasamy, M., Marsland, A., McClain, L., Kovats, T., Walko, T., Pan, L., & Price, R. B. (2021). Longitudinal relationships of cytokines, depression, and anhedonia in depressed adolescents. *Brain, Behavior, and Immunity, 91*, 74–80. https://doi.org/10.1016/j.bbi.2020.09.004

Roche, L., Barrachina, M. T., & Fernández, I. (2016). Effect of 'Exercise Without Movement' yoga method on mindfulness, anxiety, and depression. *Complementary Therapies in Clinical Practice, 25*, 136–141. https://doi.org/10.1016/j.ctcp.2016.09.008

Rincón Uribe, F.A., Espejo, C.A., & Pedroso, J.D. (2020). Role of optimism in adolescent mental health: a protocol for a systematic review. *British Medical Journal Open, 10(7)*. https://dio.org/10.1136/bmjopen-2019-036177

Saboo, N., & Kacker, S. (2022). Effect of a 6-month yoga intervention on heart rate variability among pre-diabetics. *International Journal of Health Sciences, 16*(6), 32-38. https://doi.org/10.4103/ijoy.ijoy_74_21

Saccaro, L. F., Schilliger, Z., Dayer, A., Perroud, N., & Piguet, C. (2021). Inflammation, anxiety, and stress in bipolar disorder and borderline personality disorder: A narrative review. *Neuroscience and Biobehavioral Reviews, 127,* 184–192. https://doi.org/10.1016/j.neubiorev.2021.04.017

Sanford, M., Boyle, M., McCleary, L., Miller, J., Steele, M., Duku, E., & Offord, D. (2006). A pilot study of adjunctive family psychoeducation in adolescent major depression: feasibility and treatment effect. *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*(4), 386–495. https://doi.org/10.1097/01.chi.0000198595.68820.10

Saxena, K., Verrico, C. D., Saxena, J., Kurian, S., Alexander, S., Kahlon, R. S., Arvind, R. P., Goldberg, A., DeVito, N., Baig, M., Grieb, A., Bakhshaie, J., Simonetti, A., Storch, E. A., Williams, L., & Gillan, L. (2020). An evaluation of yoga and meditation to improve attention, hyperactivity, and stress in high school students. *The Journal of Alternative and Complementary Medicine*, *26*(8), 701-707. https://doi.org/10.1089/acm.2020.0126

Schrock, J. M., McDade, T. W., Carrico, A. W., D'Aquila, R. T., & Mustanski, B. (2021). Traumatic events and mental health: The amplifying effects of pre-trauma systemic inflammation. *Brain, Behavior, and Immunity, 98*, 173–184. https://doi.org/10.1016/j.bbi.2021.08.208

Sahasi, G., Mohan, D., & Kacker, C. (1989). Effectiveness of yogic techniques in the management of anxiety. *Journal of Personality and Clinical Studies, 5*(1), 51–55.

Scheier, M., Swanson, J., Barlow, M., Greenhouse, J. B., Wrosch, C., & Tindle, H. (2021). Optimism versus pessimism as predictors of physical health: A comprehensive reanalysis of dispositional optimism research. *American Psychologist, 76*(3), 529. https://doi.org/10.1037/amp0000666

Schiller, M., Ben-Shaanan, T. L., & Rolls, A. (2021). Neuronal regulation of immunity: Why, how and where. *Nature Reviews Immunology, 21*, 20–36. https://doi.org/10.1038/s41577-020-0387-1

Schuch, F. B., Stubbs, B., Meyer, J., Heissel, A., Zech, P., Vancampfort, D., & Carvalho, A. F. (2019). Physical activity protects from incident anxiety: A meta-analysis of prospective cohort studies. *Depression and Anxiety, 36*(9), 846-858. https://doi.org/10.1002/da.22915

Schonert-Reichl, K., & Lawlor, M. (2010). The effects of a mindfulness-based education program on pre- and early adolescents' well-being and social and emotional competence. *Mindfulness, 1*(3), 137–151 https://doi.org/10.1007/s12671-010-0011-8

Segal, Z, Teasdale, J., & Williams, J. (2004). Mindfulness-based cognitive therapy: Theoretical rationale and empirical status. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 45–65). Guilford Press.

Shahidi, M., Mojtahed, A., Modabbernia, A., Mojtahed, M., Shafiabady, A., Delavar, A., & Honari, H. (2011). Laughter yoga versus group exercise program in elderly depressed women: a randomized controlled trial. *International Journal of Geriatric Psychiatry, 26*(3), 322–327. https://doi.org/10.1002/gps.2545

Sharma, V., Das, S., Mondal, S., Goswami, U., & Gandhi, A. (2006). Effect of Sahaj Yoga on neuro-cognitive functions in patients suffering from major depression. *Indian Journal of Physiology and Pharmacology, 50*(4), 375–383.

Shen, L., van Schie, J., Ditchburn, G. *et al.* (2018). Positive and negative emotions: Differential associations with sleep duration and quality in adolescents. *Journal of Youth and Adolescence 47***,** 2584–2595. https://doi.org/10.1007/s10964-018-0899-1

Sibinga, E. M., Perry-Parrish, C., Chung, S. E., Johnson, S. B., Smith, M., & Ellen, J. M. (2013). School-based mindfulness instruction for urban male youth: a small randomized controlled trial. *Preventive Medicine, 57*(6), 799–801. https://doi.org/10.1016/j.ypmed.2013.08.027

Shohani, M., Badfar, G., Nasirkandy, M. P., Kaikhavani, S., Rahmati, S., Modmeli, Y., Soleymani, A., & Azami, M. (2018). The effect of yoga on stress, anxiety, and

depression in women. *International Journal of Preventive Medicine, 9*, 21. https://doi.org/10.4103/ijpvm.IJPVM_242_16

Sibinga, E. M., Perry-Parrish, C., Chung, S. E., Johnson, S. B., Smith, M., & Ellen, J. M. (2013). School-based mindfulness instruction for urban male youth: A small randomized controlled trial. *Preventive medicine*, *57*(6), 799-801.

Silk, J. S., Pramana, G., Sequeira, S. L., Lindhiem, O., Kendall, P. C., Rosen, D., & Parmanto, B. (2020). Using a smartphone app and clinician portal to enhance brief cognitive behavioral therapy for childhood anxiety disorders. *Behavior Therapy*, *51*(1), 69-84. https://doi.org/10.1016/j.beth.2019.05.002

Spinazzola, J., Rhodes, A. M., Emerson, D., Earle, E., & Monroe, K. (2011). Application of yoga in residential treatment of traumatized youth. *Journal of the American Psychiatric Nurses Association, 17*(6), 431–444. https://doi.org/10.1177/1078390311418359

Spinhoven, P., Klein, N., Kennis, M., Cramer, A. O. J., Siegle, G., Cuijpers, P., Ormel, J., Hollon, S. D., & Bockting, C. L. (2018). The effects of cognitive-behavior therapy for depression on repetitive negative thinking: A meta-analysis. *Behaviour Research & Therapy, 106*, 71–85. https://doi.org/10.1016/j.brat.2018.04.002

Stasiak, K., Hatcher, S., Frampton, C., & Merry, S. N. (2014). A pilot double blind randomized placebo-controlled trial of a prototype computer-based cognitive behavioural therapy program for adolescents with symptoms of depression.

Behavioural and cognitive psychotherapy, 42(4), 385–401. https://doi.org/10.1017/S1352465812001087

Stephens I. (2017). Medical yoga therapy. *Children (Basel, Switzerland*), *4*(2), 12. https://doi.org/10.3390/children4020012

Streeter, C. C., Gerbarg, P. L., Whitfield, T. H., Owen, L., Johnston, J., Silveri, M. M., Jensen, J. E. (2017). Treatment of major depressive disorder with Iyengar Yoga and coherent breathing: A randomized controlled dosing study. *Journal of Alternative and Complementary Medicine, 23*(3), 201–207. http://doi.org/10.1089/acm.2016.0140

Stuad, R. (2105) Cytokine and immune system abnormalities in fibromyalgia and other central sensitivity syndromes. *Current Rheumatology Review, 11*(12),109–115. https://doi.org/10.2174/1573397111666150619094819

Sugawara, H., & Kobayashi, Y. (2022). Relaxation wffect of yoga in patients with achizophrenia. *International Medical Journal, 29*(1).

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (5th Ed). Pearson.

Tanksale, R., Sofronoff, K., Sheffield, J., & Gilmour, J. (2021). Evaluating the effects of a yoga-based program integrated with third-wave cognitive behavioral therapy components on self-regulation in children on the autism spectrum: A pilot randomized controlled trial. *Autism: The International Journal of Research and Practice, 25*(4), 995–1008. https://doi.org/10.1177/1362361320974841

Taubman, D. S., Parikh, S. V., Christensen, H., & Scott, J. (2019). Using school-based interventions for depression education and prevention. In A. Javad & F. N. Kostas (Eds.), *Advances in Psychiatry* (pp. 1-32). Springer. https://doi.org/10.1007/978-3-319-70554-5_1

Telles, S., Sharma, S. K., & Balkrishna, A. (2014). Blood pressure and heart rate variability during yoga-based alternate nostril breathing practice and breath awareness. *Medical Science Monitor Basic Research., 20*, 184–193. https://doi.org/10.12659/MSMBR.892063

Torner, L., Toschi, N., Nava, G., Clapp, C., & Neumann, I. D. (2002). Increased hypothalamic expression of prolactin in lactation: involvement in behavioural and neuroendocrine stress responses. *The European Journal of Neuroscience, 15*(8), 1381–1389. https://doi.org/10.1046/j.1460-9568.2002.01965.x

Tyser, J., Scott, W., Readdy, T., & McCrea, S. (2014). The role of goal representations, cultural identity, and dispositional optimism in the depressive experiences of American Indian youth from a Northern PlainsTribe. *Journal of Youth Adolescence, 43,* 329–342. https://doi.org/10.1007/s10964-013-0042-2

Tumminia, M., Colaianne, B., Roeser, R. (2020). How is mindfulness Linked to negative and positive affect? Rumination as an explanatory process in a prospective longitudinal study of adolescents. *Journal Youth Adolescence 49*, 2136–2148. https://doi.org/10.1007/s10964-020-01238-6

Uebelacker, L., Tremont, G., Gillette, L., Epstein-Lubow, G., Strong, D., Abrantes, A. M., Tyrka, A., Tran, T., Gaudiano, B., & Miller, I.. (2017). Adjunctive yoga v.

health education for persistent major depression: a randomized controlled trial. *Psychological Medicine*, *47*(12), 2130–2142. https://doi.org/10.1017/S0033291717000575

Usán, P., Salavera, C., & Quílez-Robres, A. (2022). Self-efficacy, optimism, and academic performance as psychoeducational variables: Mediation approach in students. *Children*, *9*(3), 420.

Walss-Bass, C., Suchting, R., Olvera, R. L., & Williamson, D. E. (2018). Inflammatory markers as predictors of depression and anxiety in adolescents: Statistical model building with component-wise gradient boosting. *Journal of Affective Disorders*, *234*, 276–281. https://doi.org/10.1016/j.jad.2018.03.006

Varambally, S., Venkatasubramanian, G., & Gangadhar, B. N. (2012). Neurological soft signs in schizophrenia - The past, the present and the future. *Indian Journal of Psychiatry*, *54*(1), 73–80. https://doi.org/10.4103/0019-5545.94653

Vinay, A. V., Venkatesh, D., & Ambarish, V. (2016). Impact of short-term practice of yoga on heart rate variability. *International Journal of Yoga*, *9*(1), 62-66. https://doi.org/10.4103/0973-6131.171714

Visceglia, E., & Lewis, S. (2011). Yoga therapy as an adjunctive treatment for schizophrenia: a randomized, controlled pilot study. *Journal of Alternative and Complementary Medicine (New York, N.Y.)*, *17*(7), 601–607. https://doi.org/10.1089/acm.2010.0075

Vollbehr, N. K., Bartels-Velthuis, A. A., Nauta, M. H., Castelein, S., Steenhuis, L. A., Hoenders, H., & Ostafin, B. D. (2018). Hatha yoga for acute, chronic and/or

treatment-resistant mood and anxiety disorders: A systematic review and meta-analysis. *PloS one*, *13*(10), e0204925. https://doi.org/10.1371/journal.pone.0204925

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, *54*(6), 1063.

Wenger, M. A., Bagchi, B. K., & Anand, B. K. (1961). Experiments in India on "voluntary" control of the heart and pulse. *Circulation, 24*, 1319-1325. http://dx.doi.org/10.1161/01.CIR.24.6.1319

Welch, M. D. (2016). School-based application of a cognitive-behavioral intervention for students with anxiety and co-occurring academic skill deficits. Unpublished Doctoral dissertation, University of Dayton.

Wharton, E., & Kanas, N. (2019). Mindfulness-based stress reduction for the treatment of anxiety disorders. *International Journal of Group Psychotherapy*, *69*(3), 362–372. https://doi/10.1080/00207284.2019.1599289

White, D. (2012). Yoga, brief history of an idea. *Yoga in practice*, *5*(1), 1-23.

Whitney, D., & Peterson, M. (2019). US National and State-Level Prevalence of Mental Health Disorders and Disparities of Mental Health Care Use in Children. *JAMA pediatrics, 173*(4), 389–391. https://doi.org/10.1001/jamapediatrics.2018.5399

Xie J, Lin Y, Guo C, Chen F. (2006) Study on influences of yoga on quality of life of schizophrenic inpatients. *Journal Nursing (China), 13*, 9–11. https://doi.org/10.1002/14651858.CD012807.pub2

Yin, J., Tang, L., & Dishman, R. K. (2021). The effects of a single session of mindful exercise on anxiety: A systematic review and meta-analysis. *Mental Health and Physical Activity, 21*, 1–12. https://doi.org/10.1016/j.mhpa.2021.100403

Young, J. F., Benas, J. S., Schueler, C. M., Gallop, R., Gillham, J. E., & Mufson, L. (2016). A randomized depression prevention trial comparing interpersonal psychotherapy--adolescent skills training to group counseling in schools. *Prevention Science*, *17*(3), 314–324. https://doi.org/10.1007/s11121-015-0620-5

Zainal, N. H., & Newman, M. G. (2021). Increased inflammation predicts nine-year change in major depressive disorder diagnostic status. *Journal of Abnormal Psychology*, *130*(8), 829–840. https://doi.org/10.1037/abn0000716.supp

Zou, R., Zhang, D., Niu, G., Xie, X., Fan, C., Tian, Y., & Zhou, Z. (2016). Cross-sectional age differences in dispositional optimism in Chinese children and adolescents. *Personality and Individual Differences, 102*, 133–138. https://doi.org/10.1016/j.paid.2016.06.063