The Effect of Therapeutic Music Playlists as a Sleep Aid on Perceived Sleep Quality for College Students: A Pilot Research Protocol

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Lauren Leonardi

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Lauren Leonardi

State University of New York at New Paltz

We, the thesis committee for the above candidate for the

Master of Science degree, hereby recommend

acceptance of this thesis.

Jingwen Zhang, PhD, LCAT, MT-BC, Thesis Advisor
Department of Music, SUNY New Paltz

Kathleen Murphy, PhD, LCAT, MT-BC, Thesis Committee Member
Department of Music, SUNY New Paltz

Karyn Stuart-Rohm, PhD, LCAT, MT-BC, Thesis Committee Member
Department of Music, SUNY New Paltz

Submitted in partial fulfillment
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Contents

Abstract

Sleep is essential for our wellness and everyday performance. Poor sleep quality is highly prevalent among college students, with over 60% of them experiencing poor sleep quality (Becker et al., 2018). Multiple factors lead to poor sleep quality among college students, including academic stress, substance misuse, and unstable routines (Phillips et al., 2017; Summer, 2024a). A therapeutic playlist consists of songs in a specially arranged order to elicit desired response (McFerran & Grocke, 2022). To assist the client in achieving a restful state, it is recommended to choose music with the appropriate musical elements. These musical elements may include moderate tempos, soothing instrumentation, and the absence of sudden dynamic changes (Gaston, 1968; McFerran & Grocke, 2022). This research protocol aims to explore the use of therapeutic playlists as a sleep aid for college students experiencing sleep disturbances. The proposed research study will focus on how a therapeutic playlist will impact the perceived sleep quality of four college students, utilizing a multiple baseline design. In addition, it seeks to provide recommendations for music therapists and healthcare professionals using music with clients experiencing sleep disturbances.

Key words: Sleep disturbances, Sleep deprivation, Therapeutic Playlists, Sedative music, Music and Sleep, Music Listening and Sleep

Chapter 1

Introduction

Sleep is a daily biological process necessary to support all areas of health and wellness. However, one out of three adults in the United States does not receive sufficient sleep (Center for Disease Control [CDC], 2016). A lack of sleep impacts physical and mental health, resulting in sleep disturbance (National Institute of Health [NIH], 2024). Sleep disturbance is an umbrella term that includes insomnia, sleep apnea, hypersomnia, circadian rhythm disorders, and parasomnia (NIH, 2024).

Defining Sleep Disturbances

Insomnia is a common sleep disorder in which people have varying difficulties falling asleep and remaining asleep throughout the night (Kaur, 2023; Suni, 2024). Acute insomnia is defined as sleep disturbances that occur sporadically and last no more than three months, typically caused by a specific life stressor (Kaur, 2023; Suni, 2024). Chronic insomnia is defined as sleep disturbances that occur for at least three months, occurring three or more times per week (Kaur, 2023; Suni, 2024). It is estimated that around ten to thirty percent of the general population experiences chronic insomnia (Kaur, 2023; Roth, 2007; Suni, 2024). Chronic insomnia can either be classified as Insomnia Disorder, where sleep disturbances are the primary concern, or secondary insomnia, in which sleep disturbances are a symptom of some other disorder (American Psychiatric Association [APA], 2013).

Sleep apnea is another common sleep disorder in which the patient’s breathing becomes inhibited when they are asleep (Cleveland Clinic, 2024; Mayo Clinic, 2023). Obstructive sleep apnea is caused by the relaxation of the muscles in the throat, resulting in physical upper airway blockages (Mayo Clinic, 2023). In obstructive sleep apnea, the brain will send a signal to reopen the airways when oxygen levels are low (Mayo Clinic, 2023). This can repeat throughout the night, making it difficult for patients to achieve deeper stages of sleep (Mayo Clinic, 2023). In central sleep apnea, there is a malfunction in the brain's ability to send breathing signals during sleep (Mayo Clinic, 2023). Central sleep apnea also disturbs sleep, as many will wake up with a shortness of breath throughout the night (Mayo Clinic, 2023).

Sleep disorders can be comorbid with countless other mental health and physical health disorders (APA, 2013). Sleep disorders may also be comorbid with other sleep disorders (Mayo Clinic, 2023). A common example of this is a patient with both sleep apnea and insomnia (Mayo Clinic, 2023). In the cases of both secondary insomnia and comorbid insomnia, a real challenge can form. It can be difficult to determine what disorder is causing the sleep disturbances.

College Students and Sleep Disturbances

Over 60% of college students report having poor sleep quality (Becker et al., 2018). The American College Health Association ([ACHA], 2023) reports that 7.3% of college students were diagnosed with Insomnia Disorder and 1.9 % of college students were diagnosed with sleep apnea. In addition to chronic insomnia, acute insomnia is also highly prevalent among college students (Hershner & Chervin, 2014). Acute insomnia may result after a student does not sleep for 24 hours to complete assignments and study for exams (Hershner & Chervin, 2014). This sudden disruption of the sleep routine harms college students' academic performance. Studies that tested students on their memory, using motor and cognitive tasks after an all-nighter, found that students showed little to no improvement in how they completed the tasks (Hershner & Chervin, 2014).

Multiple factors may cause college students' sleep disturbances, with academic stress being the most prominent. Over 20% of students reported that stress disturbs their sleep at least once a week (Lund et al., 2010). Academic stress is a pressure that students experience as a result of their challenging academic environment and experiences navigating the transitional period at the start of college (Beiter et al., 2015; Lund et al., 2010). During this transitional period, students commonly grapple with uncertainties about the future (Beiter et al., 2015; Hu et al., 2024; Lund et al., 2010). Hu et al. (2024) found that college students who experienced greater academic pressures were at an elevated risk of encountering sleep disruptions. Upperclassmen tend to experience a higher level of academic stress, due to increasingly difficult coursework, pressure to graduate on time, and post-graduation stress (Beiter et al., 2015). The higher rates of anxiety and depression for upperclassmen likely correlate with these substantial academic pressures (Beiter et al., 2015).

The lack of a routine in college can also contribute to an inconsistent sleep schedule (Hershner & Chervin, 2014; Lund et al., 2010). Students' bedtimes and wake times tend to vary based on their class schedule, work schedule, and weekend plans (Hershner & Chervin, 2014; Lund et al., 2010). In addition, substance misuse is prominent among college students and can significantly diminish sleep quality (ACHA, 2023). An overuse of alcohol, caffeine, over-the-counter (OTC) medicines, as well as marijuana and other recreational drugs, can be harmful to college students' sleep and wakefulness (Bryan, 2024; Pacheco, 2024a; Pacheco, 2024b).

Sleep is considered a basic need on the hierarchy pyramid in *Maslow's Hierarchy of Needs* (Pichère & Cadiat, 2015). This indicates that sleep is the foundation of higher needs, including safety and security, social acceptance, esteem, and self-actualization (Pichère &

Cadiat, 2015). College students with diminished sleep quality risk experiencing significant difficulties in achieving academic and social success in college (Hershner & Chervin, 2014). Creswell et al. (2023) report a positive correlation between sleep duration and grade point average (GPA) in first-year university students. Sleep-deprived students achieving lower grade point averages likely correlate with the fact that adequate sleep is crucial for memory consolidation and cognitive restoration (Summer, 2024b; Suni, 2023). Students with a lower GPA are more likely to fail out of college, since they cannot achieve the GPA requirements to remain enrolled in classes (Westrick et al., 2023). Failing out of college can also lead to students becoming ineligible to receive federal financial aid in the United States (Federal Student Aid, n.d.). The social implications of failing out of college may include missing out on meaningful friendships and networking opportunities (Honor Society, 2023).

Treatment Options for Sleep Disturbances

Sleep disturbances can be treated with medications, medical machinery, and therapies. The most common way of treating insomnia is through prescribed and/or over-the-counter medications. However, medication is not always the most suitable option for everyone because of the side effects and the risk of increased dependency (Chawla, 2024; Suni, 2024; Yan et al., 2024). Long-term medication use may lead to cognitive impairment and sleep disturbances, such as unfavorable shifts in circadian rhythm (Chawla, 2024; Hu et al., 2023; Shum et al., 2014). Sleep apnea is typically treated through the use of a continuous positive airway pressure (CPAP) machine (Cleveland Clinic, 2024; Mayo Clinic, 2023). A CPAP machine allows the airway passages to remain open during sleep with a mask that provides air pressure to the patient (Cleveland Clinic, 2024; Mayo Clinic, 2023). A CPAP machine is the most reliable treatment method for sleep apnea; however, they are often costly, require daily maintenance, and the mask may cause discomfort (Cleveland Clinic, 2024).

Psychological counseling, including cognitive behavioral therapy for insomnia (CBT-I), is a therapy used to treat insomnia symptoms (Newsom, 2024). CBT-I combines cognitive restructuring and psychoeducation on sleep hygiene (Newsom, 2024). This option is also not suitable for everyone due to the high cost and significant time investment (Newsom, 2024).

Biological Response to Music

Music-based interventions have the potential to be a promising alternative to more common treatment options, since the side effects are minimal and it is widely accessible to the public (Hu et al., 2023; Lund et al., 2022; Yan et al., 2024). Historically, music listening has been used intuitively as therapeutic support for stress relief. Study findings by Tervaniemi et al. (2021) suggest that music listening may be linked to reduced cortisol levels, which is a hormone involved in stress. Furthermore, sedative music "[reduces] activity in the neuroendocrine and sympathetic nervous systems, resulting in decreased anxiety, heart rate, respiratory rate, [and] blood pressure" (Lai & Good, 2006, p. 135). It also minimizes the impact of the hormone and neurotransmitter, noradrenaline, which plays a role in how long it takes for someone to fall asleep (Chang et al., 2012; Lai & Good, 2006).

Therapeutic Playlists

Therapeutic playlists are a potential music-based intervention to help with sleep quality among college students. The term 'therapeutic playlist' is defined as an "intentionally sequenced and purposefully selected set of songs that are meaningful to an individual or group in addressing a therapeutic goal" (McFerran & Grocke, 2022, p. 68). Therapeutic playlists are commonly utilized amongst young adults, since their preferred music is ingrained in their everyday lives (McFerran & Grocke, 2022). In addition, therapeutic playlists tend to utilize current technology, which makes this passive music-based intervention better suited for younger client populations (McFerran & Grocke, 2022). For the therapeutic playlists to improve sleep quality, it is recommended that each of the selections meet the criteria for sedative music.

Sedative music consists of musical elements that promote low arousal levels, high predictability, and lighter moods (McFerran & Grocke, 2022). Gaston (1968) identified common musical elements in sedative music, including "flowing melodies, smooth rhythms, moderate tempos, smooth modulations, and the predominant use of string and woodwind instruments" (p. 139).

Scant literature in music therapy has explored the use of therapeutic playlists to improve sleep quality for college students. Studies in music-based interventions on this topic were conducted by non-music therapy professionals; therefore, they have limited applications in music therapy (Chang et al., 2012; Hu et al., 2023; Yan et al., 2024). College students who experience poor sleep quality may struggle to achieve academic and social success in college (Hershner & Chervin, 2014). This study attempts to explore the use of a therapeutic playlist to improve sleep quality among college students with sleep disturbances. There is a need for research on the application of therapeutic playlists to help with sleep disturbances in college students, due to the negative impact sleep deprivation has on students and their learning environment.

Chapter 2

Literature Review

The Role of Sleep in Daily Functioning

From an evolutionary perspective, it is believed that humans slept during the nighttime to conjure up enough energy to hunt for food in the daytime (Brinkman et al., 2023). From a biological perspective, sleep encourages cells in our brain and body to repair and regenerate to maintain healthy bodily function (Brinkman et al., 2023; Suni, 2023). A lack of sleep can increase risk factors for various health conditions, including hypertension, type 2 diabetes, and stroke (Cleveland Clinic, 2023a; Lund et al., 2010; Phillips et al., 2017). Sleep deprivation can lead to impaired cognitive functioning and, therefore, can be considered a detriment to overall well-being (Summer, 2024b; Suni, 2023; 2024).

Defining the Sleep Cycle

Sleep is a cyclic process that involves a progression through multiple stages, ending with the rapid eye movement stage (REM) (Summer, 2024b; Suni, 2023). A single sleep cycle can take around 90 to 120 minutes to complete, where an individual experiences multiple sleep cycles a night (Summer, 2024b; Suni, 2023). The first two stages are referred to as N1 and N2, and are the lightest stages of sleep (Summer, 2024b; Suni, 2023). N3, or slow wave sleep, is considered the deepest non-REM stage of sleep and is linked to biologic and neurologic restoration (Summer, 2024b; Suni, 2023). REM sleep is considered the final stage of the sleep cycle and is linked to higher neurological activity and vivid dreaming (Summer, 2024b; Suni, 2023). Failure to achieve REM sleep can inhibit the regeneration of new neurons in the brain, thereby hindering emotional processing and memory (Summer, 2024b).

Circadian Rhythm

A circadian rhythm is the timing of an individual's sleep schedule to their daily schedule, acting as an internal biological 'clock' that indicates when it's time to wake up and fall asleep (Hammond, 2022; Summer, 2024a). It has been theorized that young adults prefer later bedtimes, due to puberty, which appears to correspond to biological delays to their circadian rhythm (Lund et al., 2010; Hershner & Chervin, 2014). A circadian rhythm is considered to be disordered when it is consistently out of sync with the patient's environment (Summer, 2024a).

The instability of college schedules may result in an unpredictable sleep schedule, leading to circadian rhythm disruptions (Hershner & Chervin, 2014; Phillips et al., 2017; Summer, 2024a). Phillips et al. (2017) found that college students who experience an irregular sleep-wake schedule had an average circadian rhythm delay of 2.2 hours and experienced higher rates of daytime sleepiness. The irregular sleepers in this study were likely experiencing delayed sleep-wake phase disorder (Phillips et al., 2017; Summer, 2024a). Delayed sleep-wake phase disorder causes patients to have bedtimes and wake-up times that are several hours later than what is considered normal (Phillips et al., 2017; Summer, 2024a). This circadian rhythm disorder is most prevalent in young adults, with a diagnosis rate of 4.6% (Summer, 2024a). Delayed sleep wake phase disorder can be especially difficult for college students to manage, since following a normative sleep cycle is essential for receiving enough sleep to wake up in time for morning commitments (Phillips et al., 2017; Summer, 2024a). Students are less likely to receive enough hours of sleep when attempting to follow a normative sleep schedule (Phillips et al., 2017; Summer, 2024a). College students with disordered circadian rhythms are more likely to skip classes and, as a result, were found to have lower GPAs than those with normative circadian rhythms (Gilstrap et al., 2022; Phillips et al., 2017).

Substance Misuse

Substance misuse is commonplace in the college environment and can be detrimental to college students' sleep quality. Despite decreasing the time it takes to fall asleep, alcohol can cause increased awakenings throughout the night, disruptions to the sleep cycle stages, and disruptions to the circadian rhythm (Bryan, 2024). Long-term cannabis use can disrupt sleep as it decreases the amount of rapid eye movement (REM) sleep, increases sleep latency onset, and increases awakenings throughout the night (Pacheco, 2024a). A lack of REM sleep can be detrimental to a college student, due to memory processing and emotional processing occurring during this stage (Pacheco, 2024a; Summer, 2024b; Suni, 2023). These processes are important to achieving academic success and navigating new social situations (Pacheco, 2024a; Summer, 2024b; Suni, 2023).

Sleep and Chronic Mental Health Disorders

The ACHA (2023) reports that 28.4% of college students surveyed have been diagnosed with depression. Depression is a unique disorder since symptoms of depression can appear as a singular depressive disorder, coincide with other disorders, appear seasonally, or coincide with specific life events (APA, 2013). Insomnia and fatigue are key symptoms of several depressive disorders (APA, 2013). These symptoms can further aggravate depressive symptoms due to insomnia, creating deficits in cognitive function, which can add to preexisting feelings of worthlessness (Chan et al., 2010; Lund et al., 2022; Shum et al., 2014). Recent research findings suggest that music listening interventions may improve depression induced sleep deprivation (Chan et al., 2010; Lund et al., 2022; Shum et al., 2014). These findings note decreased Pittsburgh Sleep Quality Index (PSQI) scores and reduced depressive symptoms in their study participants (Chan et al., 2010; Lund et al., 2022; Shum et al., 2014). Lower PSQI scores indicate better perceived sleep quality (Buysse et al., 1989). These results suggest that depressive symptoms and insomnia may have a direct relationship with one another (Chan et al., 2010; Lund et al., 2022; Shum et al., 2014).

The ACHA (2023) reports that 2.9% of college students surveyed have been diagnosed with bipolar disorder and other related mood disorders, such as cyclothymic disorder. Bipolar disorder involves the cycling of manic episodes and depressive episodes (APA, 2013). During a depressive episode, clients will have heightened depressive symptoms (APA, 2013). During manic and hypomanic episodes, clients will have increased energy and motivation and not feel the need to sleep (APA, 2013). The pattern of cycling through not needing sleep and needing more sleep than normal can bring about many sleep disturbances, such as a circadian rhythm disorder, due to their internal need for sleep rapidly changing (APA, 2013). Unstable circadian rhythms resulting from mood changes may present significant challenges when attempting to establish long-term sleep hygiene (APA, 2013). Cyclothymic disorder involves shifting between manic and depressive episodes that are less extreme than those experienced by someone with bipolar disorder (APA, 2013). Içel and Başoğul (2021) observed a significant decrease in PSQI scores when patients being treated for bipolar disorder attended a nightly sedative music listening group.

The ACHA (2023) reports that 0.4% of college students surveyed have been diagnosed with schizophrenia and other conditions with psychotic features (p.15). Schizophrenia, like bipolar disorder, can cause patients to experience sleep disturbances on and off medications (Içel & Başoğul, 2021; Lu et al., 2022). Sleep disturbances amongst patients with schizophrenia can occur during positive symptoms, such as hallucinations, as well as negative symptoms, such as anhedonia (Içel & Başoğul, 2021; Lu et al., 2022). These can take a toll on patients' circadian rhythm and, in turn, make maintaining consistent sleep hygiene challenging (Içel & Başoğul, 2021; Lu et al., 2022). Içel and Başoğul (2021) and Lu et al. (2022) created nighttime sedative music listening groups for patients receiving psychiatric care and observed a significant decrease in PSQI scores over time, as well as improved symptom management. These results suggest that improved sleep quality can make symptom management easier for these patients (Içel & Başoğul, 2021; Lu et al., 2022).

Sleep and Chronic Pain Disorders

The ACHA (2023) reports that 7.6% of college students surveyed have been diagnosed with chronic pain disorders, such as fibromyalgia and arthritis. Chronic pain disorders can take a physical toll on sleep quality. This can bring about significant challenges to effective symptom management, since sleep deprivation can lead to reduced pain tolerance, and an increased temperature range in which a stimulus would be deemed painful (Krause et al., 2019). Fibromyalgia is a chronic pain disorder that is characterized by a dysfunction of the body's pain receptors (CDC, 2022; Picard et al., 2014). The result is increased pain all over the body, eventually leading to deficits in sleep quality and mental health (CDC, 2022; Picard et al., 2014). Picard et al. (2014) provided sedative music for individuals with fibromyalgia and found that Jenkins Sleep Scale (JSS) scores and Fibromyalgia Impact Questionnaire (FIQ) scores both decreased, suggesting improved sleep quality and more manageable pain levels.

The ACHA (2023) reports that 0.6% of college students surveyed have been diagnosed with cancer. Osteosarcoma is a type of cancerous tumor that attacks the bones and leaves patients in great physical pain (Liu et al., 2019). This type of cancer requires chemotherapy and surgery to increase the survival rate, which can take a severe toll on patients' sleep quality and mental health (Liu et al., 2019). Liu et al. (2019) utilized a mindfulness-based approach in conjunction with music therapy for patients with osteosarcoma, resulting in lower PSQI scores over time. In both of the interventions for fibromyalgia and osteosarcoma, as sleep quality appeared to improve and pain levels became more manageable (Picard et al., 2014; Liu et al., 2019). These findings suggest potential for music therapy interventions to help improve sleep quality in chronic pain disorders that aren't as well-researched.

Sleep Disturbance Treatment Options: Medication

When a patient presents with symptoms indicative of a sleep disorder, medication is commonly the first option for treatment, as it is typically the most convenient intervention to start with (Chawla, 2024; Lund et al., 2022; Yan et al., 2024). Medications used to treat insomnia come in several different drug classes, which include sedative hypnotics, antidepressants, and orexin antagonists (Chawla, 2024; Cleveland Clinic, 2023a). Sedative hypnotics are the most well-known type of sleep medication and include benzodiazepines, nonbenzodiazepine receptor agonists, and selective melatonin agonists (Chawla, 2024). These medications are typically meant to be taken short-term to decrease the amount of time it takes to fall asleep (Chawla, 2024). Orexin antagonists are a newer class of sleep medications and target circadian rhythm disorders as well as shortening sleep onset time (Chawla, 2024). Antidepressants and anti-seizure medications are also commonly prescribed for insomnia to treat the underlying causes of insomnia, as well as for their sedative side effects (Chawla, 2024; Cleveland Clinic, 2023a). Antidepressants, other than Doxepin, are only approved by the Food and Drug Administration (FDA) to treat depression, anxiety, and mood disorders (Chawla, 2024). They are not FDA-approved to treat insomnia (Chawla, 2024).

Sleep aid medications are not always thoroughly researched and can come with many side effects and adverse reactions (Chawla, 2024; Suni, 2024; Yan et al., 2024). Client populations who are prescribed these medications are likely to be prescribed other psychotherapeutic drugs, which increases the possibility of a drug interaction (Pacheco, 2023b). Combining sleep aid medications with additional depressants can lead to decreased respiratory rate and death, due to both medications slowing down the central nervous system (Pacheco, 2023b). Sleep aid medications are also contraindicated for patients with obstructive sleep apnea, due to the negative respiratory symptoms associated with muscle relaxation (Mayo Clinic, 2023). Dependency on these medications may develop, likely due to sleep being a cyclic function (Chawla, 2024; Hu et al., 2023; Shum et al., 2014). In addition, the use of these medications may result in long-term effects, such as diminished cognition and negative shifts in circadian rhythm, which can create challenges when attempting to build a healthier sleep schedule (Chawla, 2024; Hu et al., 2023; Shum et al., 2014).

Sleep Disturbance Treatment Options: CBT-I

Cognitive behavioral therapy for insomnia (CBT-I) is an evidence-based therapy designed to treat insomnia (Lund et al., 2022; Newsom, 2024; Yan et al., 2024). CBT-I consists of a combination of sleep-specific cognitive restructuring and behavioral interventions (Newsom, 2024). Stimulus control is often used, which aims to break any bedroom habits that make sleep more challenging (Newsom, 2024). Another type of behavioral intervention is sleeping restriction, which aims to achieve a one-to-one ratio of the time spent in one’s bed to the quantity of sleep (Newsom, 2024). To achieve this, clients will only enter their beds when they are feeling sleepy (Newsom, 2024). When clients wake up in the middle of the night, they will leave their bed until they feel sleepy again to strengthen the cognitive association between the bed and sleeping (Newsom, 2024). Compression is an alternative intervention to sleep restriction, gradually reducing one's time in their bed to align with their quantity of sleep (Newsom, 2024). To help build a proper sleep-wake routine, clients are encouraged to maintain a consistent wake-up time while avoiding daytime naps (Newsom, 2024). CBT-I also incorporates relaxation techniques and psychoeducation to further help the client practice healthy sleep habits after treatment (Newsom, 2024).

This type of therapy is not recommended for everyone since sleep restriction and compression interventions initially reduce the amount of sleep someone receives (Lund et al., 2022; Newsom, 2024; Yan et al., 2024). Also, comforting negative thought patterns related to sleep may result in minimal emotional discomfort (Newsom, 2024). In addition, CBT-I is expensive, due to the limited number of therapists qualified to perform this type of therapy (Newsom, 2024; Yan et al., 2024). CBT-I also takes around 6-8 sessions to yield results, which is a large financial and time investment (Newsom, 2024; Yan et al., 2024). College students often don't have the means to make large financial and time investments, due to their busy schedules and high levels of financial stress (Beiter et al., 2015; Yan et al., 2024).

Defining Sedative Music

The term 'sedation' refers to achieving a more relaxed state and is not exclusive to sleep. The term 'sedative music' is common amongst researchers seeking to study the impact of music listening on sleep quality. This is likely because E. Thayer Gaston (1968) utilized this terminology when he outlined musical elements, making music suitable for sedation purposes. Much of the music used in past research on music and sleep has a tempo of 60-80 beats per minute, as this tempo resembles the human heart rate while resting (Heiderscheit et al., 2022; Liu et al., 2016; Lu et al., 2022). The choice of tempo is directly related to the concept of entrainment in music therapy. Entrainment is defined as humans becoming biologically in sync with the rhythmic cues of the music they are listening to (Chan et al., 2010; Loewy et al., 2006; Loewy, 2020).

In terms of sedation, music with a slower tempo is typically used to transition a client to a resting state, which creates a state suitable for sleep (Loewy et al., 2006; Loewy, 2020). Musical selections are typically played for 30-45 minutes at bedtime, as this is considered to be the average amount of time it takes to fall asleep (Hu et al., 2023; Lund et al., 2022; Yan et al., 2024). Other musical elements that frequently appear in sedative music selections include simple and repetitive rhythms, simple harmonies, and a lack of significant melodic jumps and dynamic shifts (McFerran & Grocke, 2022). These musical elements discourage cognitive alertness and attention, providing music more suitable for a client to maintain a restful state (McFerran & Grocke, 2022).

Music interventions are recognized as more effective when the client's music preferences are taken into consideration (Heiderscheit et al., 2022; Jiang et al., 2013; Lund et al., 2022; Smith & Layman, 2022). Walworth (2003) found that patients who were given the choice of listening to a preferred musical genre, artist, or song while taking a single-word test reported lower anxiety levels. However, there was no statistically significant difference in anxiety levels between the preferred genre or artist group and the preferred song group (Walworth, 2003). These results indicate that any type of musical preference honored will help sedative music interventions and, therefore, will be more effective than using non-preferred music (Walworth, 2003). Jiang et al. (2013) found that participants reported lower levels of anxiety while listening to non-preferred sedative music compared to listening to non-preferred stimulative music. However, when participants preferred the stimulative music over the sedative music played, they would report lower anxiety levels for the stimulative music (Jiang et al., 2013). These results indicate that music preference can outperform music with all of the sedative musical elements when it comes to helping clients relax (Jiang et al., 2013).

Therapeutic Playlists for Sedation

In music therapy practice, therapeutic playlists are frequently created with young adults (McFerran & Grocke, 2022). This is due to their preferred music being highly entwined in their everyday lives, especially with the prominence of music streaming platforms (McFerran & Grocke, 2022). However, there is a divide amongst music therapists as to whether creating playlists of recorded music is considered as therapeutic as live music (McFerran & Grocke, 2022). This divide may also arise from sedative music playlists being commonly used within the auxiliary level of practice (Bruscia, 2014). Bruscia (2014) defines the auxiliary level of practice as “any practice that has musical or nonmusical goals that are not health-related but beneficial nonetheless” (p. 207). Some examples of this use of music include nursing staff playing relaxing music in the waiting room and patients listening to their own personal music playlist to improve sleep quality (Bruscia, 2014). A music therapist collaborating with a client who experiences sleep difficulties on a therapeutic playlist would be considered an augmentative use of music. Bruscia (2014) defines the augmentative use of music as “any practice in which music or music therapy is used to enhance the efforts of other treatment modalities and to make supportive contributions to the client’s health” (p. 207). The use of a therapeutic playlist at the augmentative level of practice is classified as music therapy because the sedative music playlist specifically targets enhanced sleep quality to further support the patient’s overall health (Bruscia, 2014). In addition, the music therapist brings their specialized training in therapeutic concepts, the use of an ongoing assessment process, and an emphasis on a therapeutic relationship (Bruscia, 2014; McFerran & Grocke, 2022; Loewy, 2020).

The iso principle, pioneered by Altshuler (1948), is defined as music that is chosen to "...match the client's mood as you begin working together, and then as necessary, modulate to a more desirable or beneficial mood" (as cited in Bruscia & AMTA, 2018, p. 4). While the iso principle can naturally illicit entrainment to music, the iso principle is not exclusive to the client's physiological reaction to music and addresses the client's entire being (Bruscia & AMTA, 2018; Heiderscheit et al., 2022; McFerran & Grocke, 2022). Entrainment primarily involves a shift in the rhythm and pulse of the music, whereas the iso principle can evoke a shift using additional musical elements (Loewy, 2020; McFerran & Grocke, 2022; Smith & Layman, 2022). In the iso principle, "[Music] immediately goes through the senses and the perceptual system to express ideas, evoke feelings, create meaning, and inspire transcendence" (Bruscia & AMTA, 2018, p. 4). Both music therapy concepts of entrainment and the iso principle are the reasons why smooth transitions between the songs of a therapeutic playlist are important to achieve the desired shift from being awake to falling asleep (Loewy, 2020; McFerran & Grocke, 2022; Smith & Layman, 2022).

Therapeutic Playlists in Research

Therapeutic playlists used in research studies tended to be created in three of the following manners: predetermined music by researchers (Hu et al., 2023; Lu et al., 2022; Scullin et al., 2019; Yan et al., 2024), patients bringing in their preferred music (Chang et al., 2012; Lund et al., 2022; Shum et al., 2014), or with the involvement of a music therapist (Heiderscheit et al., 2022; Loewy et al., 2006; Smith & Layman, 2022). Researchers may opt to preselect the music for the playlists to compare the effectiveness of specific musical elements or to use music proven to assist in relaxation (Hu et al., 2023; Lu et al., 2022; Scullin et al., 2019; Yan et al., 2024). Several researchers have encouraged participants to bring in their preferred music, and if the participant did not provide their music, several playlists of different genres were provided (Chang et al., 2012; Lund et al., 2022; Shum et al., 2014). Researchers may opt to have participants bring in their music to account for their individual music preferences without having to perform a formal music preference assessment (Chang et al., 2012; Lund et al., 2022; Shum et al., 2014).

Very few studies come from the perspective of a music therapist collecting data on the effectiveness of therapeutic playlists in a clinical setting. Smith and Layman (2022) outline research coming from the perspective of the music therapist, detailing the progression of their sessions and creating a therapeutic playlist with their clients. Heiderscheit et al. (2022) outline the process of designing a music listening protocol for patients on mechanical ventilation.

All of the music therapy professionals utilized a collaborative and client-focused process while creating and altering the therapeutic playlist (Heiderscheit et al., 2022; Smith & Layman, 2022). Research led by music therapists is ideal because of their specialized knowledge of the therapeutic uses of music (Heiderscheit et al., 2022; Smith & Layman, 2022). These studies are crucial to laying down the foundation to build effective protocols to help music therapy clients with sleep disturbances.

Music's Impact on Sleep in College Students

Hu et al. (2023) and Yan et al. (2024) evaluated the effects of sedative music on the sleep quality of college students with sleep difficulties. Hu et al. (2023) provided participants with researcher-selected ambient music, whereas Yan et al. (2024) provided participants with either researcher-selected jazz or classical music. Yan et al. (2024) and Hu et al. (2023) both reported a significant decrease in PSQI scores of the students in both music groups. Hu et al. (2023) noted that the actigraphy readings indicated that the students in the music group experienced reduced sleep onset latency and improved sleep efficiency. Results from both studies indicate that music listening can be a cost-effective method of helping improve sleep quality and increase the likelihood of academic success in college students (Hu et al., 2023; Yan et al., 2024).

Chang et al. (2012) evaluated the effects of music with sedative elements on adults with chronic insomnia, whereas Liu et al. (2016) evaluated the effects of music on the sleep quality of pregnant women. Chang et al. (2012) and Liu et al. (2016) both provided participants the option of listening to researcher-selected music with sedative elements or listening to their preferred music. All the researcher-selected music consisted of a moderate tempo, simple melodies, stable dynamics, and a 'relaxing' timbre (Chang et al., 2012; Liu et al., 2016). Chang et al. (2012) and Liu et al. (2016) both found that adults who suffer from insomnia, who listened to music at bedtime, presented with lower PSQI scores than those who didn't. Chang et al. (2012) also measured objective sleep quality markers and found that adults with insomnia who listened to music before bedtime spent less time in the N2 stage of sleep and experienced a greater amount of REM sleep compared to the control group. Although both studies do not specifically focus on the sleep quality of college students, adults, and pregnant women who also attend college, and, therefore, these findings are considered applicable to college students.

Contraindications

Music-based interventions for improving sleep quality are considered to be a low-risk intervention (Chan et al., 2010; Loewy, 2020; Lund et al., 2022). However, no intervention is free from contraindications, as suggested in the current research. The use of sedative music increases the activation of the parasympathetic nervous system, which is contraindicated in patients who experience obstructive sleep apnea (Lai & Good, 2006; Mayo Clinic, 2023). The activation of the parasympathetic nervous system is associated with a decreased rate of respiration (Lai & Good, 2006). In obstructive sleep apnea, this can further contribute to the narrowing of the airways, worsening the patient's symptoms (Cleveland Clinic, 2024; Mayo Clinic, 2023).

Scullin et al. (2019) found that instrumental music worsened the participants' objective sleep quality, due to the increased presence of nocturnal earworms. Nocturnal earworms are a phenomenon that entails a person not being able to get a song out of their head while they are trying to sleep (Scullin et al., 2019). They state that "nocturnal earworms [are] associated with longer sleep onset latency, lower sleep efficiency, greater time in N1, and less time in N3" (Scullin et al., 2019, p.55). It is not explained why this phenomenon only occurred with instrumental music in this study (Scullin et al., 2019). However, it makes sense that the music in this study caused this phenomenon, as the researchers described the music as 'highly familiar' (Scullin et al., 2019). If the music used in this study was less recognizable, then it is possible that nocturnal earworms would not have occurred in reaction to the lyrical and instrumental music. It is worth noting that these results greatly contrast with the majority of other studies on this topic, which commonly base their musical selections on E. Thayer Gaston's sedative music guidelines (Liu et al., 2016; Lu et al., 2022; Yan et al., 2024). This is likely due to the poor experiential design where participants were expected to fall asleep to pre-selected 'relaxing' music in a sleep lab during the middle of the day (Scullin et al., 2019). This may have posed challenges to properly assess the effectiveness of the music-based intervention due to the possibility of conflicts with the participants' circadian rhythms. In addition, the music was only played for ten minutes, which is not enough time for the music to take effect (Scullin et al., 2019). This duration of time is also clearly not time for a typical sleep cycle to occur (Summer, 2024b; Suni, 2023; 2024).

Another contraindication is the possibility of discomfort using earbuds or earphones during sleep (Lund et al., 2022; Picard et al., 2014; Yan et al., 2024). This discomfort has the potential to negatively impact participants' views of their sleep, no matter how suitable the music choices are. Another limitation to these studies is the lack of inclusivity of participants with functional hearing loss (Hu et al., 2023; Liu et al., 2019; Lund et al., 2022). No studies have provided a solution to this, likely because functional hearing is essential to music listening (Liu et al., 2019; Lund et al., 2022; Picard et al., 2014). A potential solution to make music listening interventions accessible for participants with hearing loss is the use of hearing aids with Bluetooth capability. These hearing aids allow for the possibility of playing music from any Bluetooth-compatible device directly in the user's ear (Hernandez, 2024). However, wearing hearing aids while trying to sleep may bring about the same discomfort as wearing traditional earbuds.

Data Collection in Published Experiments

Data evaluating sleep quality is collected in a variety of ways. The most common subjective data collection method is the Pittsburgh Sleep Quality Index (PSQI). This is a Likert scale type system, ranging from a score of zero to twenty-one, where a lower score indicates better sleep quality and a higher score indicates poorer sleep quality (Buysse et al., 1989). A PSQI score of five or greater indicates that the participant is likely suffering from insomnia or another related sleep-wake disorder (Buysse et al., 1989). Another subjective method of data collection is personal sleep logs (Cordi et al., 2019; Chang et al., 2012; Loewy, 2020). There are two types of personal sleep logs described in the literature. The first type of log is a journal entry describing how the participant felt they slept (Cordi et al., 2019; Gilstrap et al., 2022). In the second, participants are asked to answer a few researcher-selected questions related to their perceived sleep quality (Hu et al., 2023; Chang et al., 2012; Lu et al., 2022). Other standardized rating scales used in research on this topic include the Jenkins Sleep Scale (JSS), the Insomnia Severity Index (ISI), and the Epworth Sleepiness Scale (ESS) (Picard et al., 2014; Yan et al., 2024).

Several studies utilize objective data collection methods. Polysomnography (PSG) is a diagnostic test used to detect disordered sleep through several biologic measures (Mayo Clinic, 2025). Polysomnography measures the pulmonary, cardiac, and neurologic functions during sleep (Mayo Clinic, 2025). Another objective measure used to collect data on sleep quality is actigraphy. Actigraphy is a wearable device that can detect the user’s movement (Cleveland Clinic, 2023b). Actigraphy devices can be used to measure sleep metrics, such as sleep duration and nighttime awakenings, by tracking the user’s inactivity (Cleveland Clinic, 2023b; Creswell et al., 2023; Hu et al., 2023). Actigraphy devices can also detect circadian rhythm disorders through their ability to track bedtimes and wake-up times (Cleveland Clinic, 2023b; Loewy, 2020; Smith et al., 2018). Actigraphy devices are limited in their ability to accurately detect the time spent in each stage of the sleep cycle (Smith et al., 2018).

Several studies conducted on music-based interventions for sleep have noted a discrepancy between the PSG results and subjective rating scale results (Chang et al., 2012; Lazic & Ogilvie, 2007; Loewy, 2020). These mixed results may indicate that music elicits a strong emotional response (Chang et al., 2012; Lazic & Ogilvie, 2007; Loewy, 2020). This emotional response originates from music engaging the limbic system, which is the part of the brain involved in emotional processing (Chan et al., 2010; Liu et al., 2016; Lu et al., 2022; Tervaniemi et al., 2021). This emotional response to the music may positively influence how the participants fill out the subjective rating scales (Cordi et al., 2019; Chang et al., 2012; Loewy, 2020). In addition, there are very few studies that include the use of PSG testing with the involvement of a music therapist. Lowey (2020) suggests this is likely due to researchers who work in a sleep lab not fully understanding the value of a music therapist. Also, very few music therapists have access to a sleep lab (Loewy, 2020). Despite the disconnect, both PSG and subjective results are important in determining effective music-based interventions. Combining the two ensures researchers have a more detailed understanding of the participant's sleep quality (Loewy, 2020).

The disconnect between the objective and subjective results may also be a result of the participants having sleep state misperception (Bernstein, 2023; Chang et al., 2012; Cordi et al., 2019). Sleep state misperception, or paradoxical insomnia, is when someone doesn't feel well-rested despite their sleep being objectively normal (Bernstein, 2023). Likely causes for sleep state misperception are life stressors and chronic mental health disorders (Bernstein, 2023). If participants are reporting improved perceptions of sleep, despite a lack of sufficient PSG results, there is a possibility that music-based interventions can help improve symptoms of paradoxical insomnia (Bernstein, 2023; Chang et al., 2012; Cordi et al., 2019; Scullin et al., 2019). Improved perception of one's sleep could positively impact sleep hygiene (Scullin et al., 2019). If the participant perceives their sleep quality to be improved from new habits, they will likely continue these habits (Scullin et al., 2019). A positive perception of one's sleep quality could lead to better sleep hygiene in the long term (Scullin et al., 2019).

The Future of Music and Sleep

In general, research addressing the use of music therapy as a resource to support sleep quality improvement is extremely limited. Research on the sleep habits of college students appears to be abundant, however, the use of music therapy as an intervention to improve sleep quality is extremely limited. Few studies have been conducted by or include a music therapist, which could yield less effective music-based interventions. Diminished sleep quality puts college students at risk for academic failure and declining mental health (Beiter et al., 2015; Lund et al., 2010; Zhuang & Jenatabadi, 2022). In addition, countless mental health and chronic pain conditions cause sleep disturbances, which further impact symptom management and overall quality of life. College students experience a variety of unique life stressors, making them vulnerable to sleep disturbances (Hu et al., 2023; Yan et al., 2024). There is a clear need for additional music therapy research to improve the sleep quality of college students.

Purpose of the Proposed Study

The purpose of this proposed research is to investigate the use of therapeutic playlists as a sleep aid for college students who experience sleep disturbances. This proposed research study will focus on how a therapeutic playlist will impact the perceived sleep quality in four college students who experience sleep disturbances. This research protocol aims to provide suggestions for music therapists and healthcare professionals to consider when using music with their clients experiencing sleep disturbances. The proposed study aims to fulfill this need by utilizing specialized assessments and tools, along with the expertise of a board-certified music therapist. The involvement of a music therapist is crucial due to their specialized training in musical elements and therapeutic concepts (Heiderscheit et al., 2022; Loewy et al., 2006; Smith & Layman, 2022).

Chapter 3

Method

Human Research Ethics Board (HREB) Statement

The research proposal should be approved by the HREB before being executed.

Theoretical Framework

The theoretical framework for this research is the post-positivist perspective. Postpositivism refers to the “theoretical perspective [that] allows that, regardless of a researcher’s faithful adherence to objectivist scientific methods, findings are not considered absolute truths but rather are conjectural and circumstantial” (Phillips & Burbules, 2000, as cited in Wheeler & Murphy, 2016, p. 240). This theoretical orientation is a response to the positivist approach, which takes on a much more ‘black and white’ stance to the cause and effect found in research (Wheeler & Murphy, 2016). The postpositivist orientation is the most suitable for this research for a variety of reasons. The primary factor is that a person’s circadian rhythm is biologically innate (Hammond, 2022; Summer, 2024a). In addition, a participant’s life stressors, obligations, and sleep environment may shift throughout the study, all of which can massively impact sleep quality. Postpositivism combines the objective measures of researching sleep quality and the subjective differences in sleep experience to get the most comprehensive understanding of a participant's sleep quality (Wheeler & Murphy, 2016).

Design

This research employs the use of a multiple baseline design: multiple subjects that examine the effects of a therapeutic playlist, consisting of music with sedative elements, on the sleep quality of four college students. In this study design, "...individual baselines are established, consistent response patterns are observed, and then the independent variable is systematically introduced to one baseline at a time" (Kennedy, 2005, as cited in Wheeler & Murphy, 2016, p. 643). The application of multiple baselines ensures the reliability of the study results and prevents the influence of natural recovery and other external factors on the data (Wheeler & Murphy, 2016). For example, students' sleep quality may become worse during the weeks of final exams. In addition, this study utilizes an ABA format, which introduces the intervention after the baseline phase. The design compares the research subjects' response to the intervention to their condition during the baseline and post-intervention. Since sleep experience is highly subjective, it would be most suitable to compare the participant's sleep quality baseline to their sleep quality in response to the intervention.

Recruitment

The four participants in this study will be current undergraduate or graduate students who meet the following inclusion criteria: 18 years or older and able to give consent; having functional hearing and/or Bluetooth hearing aids to supplement any significant hearing loss; obtaining a score of five or above on the Pittsburgh Sleep Quality Index (PSQI); be fluent in English; do not currently use music listening as a sleep aid.

This research study will be advertised through student association-approved flyers displayed around the SUNY New Paltz campus. These flyers will include information regarding the aims of the research study, eligibility criteria, participant involvement, and the contact information of the student researcher. These posters will be placed on bulletin boards located in crowded campus buildings, such as the student union building, the dining hall, and the library. In addition, the student researcher will reach out to the SUNY New Paltz Center for Student Engagement on Instagram to inquire about posting the flyer to their Instagram. All of these advertisement methods are intended to reach a diverse range of students, to decrease the possibility of bias.

Potential participants will fill out the PSQI when recruited and must score a five or above before further participation in this study. A score of five or above on the PSQI is considered to be the criterion for poor sleep quality (Buysse et al., 1989). If there are more than four participants who fill out the PSQI for this study, the participants with the highest scores will be selected, as they would correlate to the poorest sleep quality (Buysse et al., 1989). Students with poorer sleep quality will be prioritized because they demonstrate a greater need for interventions.

Data Collection

Pittsburgh Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) is a questionnaire that assesses various sleep disturbances (Buysse et al., 1989). The PSQI consists of questions on bedtimes, wake times, the presence of specific sleep disturbances, medication use, and other abnormal bedtime behaviors (Buysse et al., 1989). The PSQI is designed to measure one month of sleep quality (Buysse et al., 1989). The PSQI is scored based on sub-scores in the areas of subjective sleep quality, sleep latency, sleep duration, sleep efficiency, specific sleep disturbances, the use of sleep medication, and daytime dysfunction (Buysse et al., 1989). The sub-scores each range from zero to three and are added to create the final PSQI score (Buysse et al., 1989). The final PSQI score ranges from zero to twenty-one, with higher scores indicating poorer sleep quality (Buysse et al., 1989). In this study, the PSQI will be utilized as a screening tool to assess the participants' baseline and to examine the participants' perception of their sleep quality after the music intervention.

Sedative Music Listening Assessment

The student researcher developed the sedative music listening assessment (SMLA, Appendix B) under the supervision of the thesis advisor. The interview portion of the assessment consists of questions about how the participant accesses music and specific concerns about their sleep quality. In addition, questions about the participant's sedative music and sound preferences will be asked. For the music listening component of this assessment, the student researcher will play two to four excerpts of music with sedative elements, lasting approximately 30 seconds per excerpt. The selections, compiled by the student researcher, cover many different genres of music, ranging from classical to video-game music. The excerpts of music played are dependent on each participant's responses to the interview questions to further narrow down their specific music preferences. The participants will rate each excerpt they listen to on a Likert scale of one to ten, with one as the least relaxing and ten as the most relaxing. When asked about music preferences, the responses may not always be suitable for improving sleep, and this playlist, designed by the student researcher, will expose them to sedative music.

Daily Sleep Logs

The daily sleep logs (DSL, Appendix A) in this study were developed by the student researcher under the supervision of her thesis advisor. This is a six-question log that assesses the participant's sleep duration and subjective sleep quality from the previous night. The DSL will be emailed to the participants as a Microsoft form in the late afternoon to allow them to fill this out when they first wake up. The Microsoft form is a HIPAA-compliant platform that the students of SUNY New Paltz can safely access through their institutional account.

Playlist Construction

The therapeutic playlist will be constructed by the student researcher, with the guidance of their thesis advisor, who is a licensed creative-arts therapist and board-certified music therapist. The playlist will be created on Spotify and will consist of songs that fit the criteria for sedative music. The sedative music selected will depend on the participant's musical preference and their responses to the music-listening experience provided in the assessment. The order of the songs on the playlists will consider the iso principle as described by Bruscia and AMTA (2018). The purpose of this therapeutic playlist is to help the research participant transition from being awake to falling asleep.

The Sedative Ranking Scale (SRS, Table 1) was developed by the student researcher based on the iso principle, musical elements outlined by Gaston (1968), McFerran and Grocke (2022), and Loewy (2020). The student researcher's observations from her clinical training and personal experience using music as a sleep aid also informed the development of the SRS. The SRS rates each musical element of a song from one to four, with a one indicating the strongest sedative musical elements and a four indicating the weakest sedative musical elements. The rated musical elements include tempo, instrumentation, dynamics, rhythm, melody, harmony, and repetitiveness. The musical element sub-scores will then be added up to create a final SRS score. The playlist will begin with songs scoring the highest on the SRS and slowly transition to the songs that scored the lowest on the SRS. Songs with stronger sedative elements will be the quietest and slowest songs with few dynamic shifts. Songs with weaker sedative musical elements are still considered to be under the umbrella of sedative music, however, these songs may have slightly faster tempos or louder dynamics as compared to the other songs in the playlist. The SRS ensures that the playlist will transition from songs that contain the weakest sedative musical elements to songs that contain the strongest sedative musical elements. As per good practice guidelines, the playlist will be at least 30-45 minutes in duration (Hu et al., 2023; Lund et al., 2022; Yan et al., 2024). The playlist can be longer, especially if the participant expresses struggling to remain asleep throughout the night.

Table 1

Sedative Ranking Scale (SRS)

Musical Element	**1**	**2**	**3**	**4**
Tempo	Under 60 bpm	60-65 bpm	70-75 bpm	Over 75 bpm
Instrumentation	Binaural Beat and Drone Heavy	Strictly Melodic instruments with a soft timbre and/or primarily nature sounds	Melodic instruments with soft timbre, non-pitched percussion instruments with soft timbre	Melodic instruments with any timbre, non-pitched percussion instruments with any timbre
Primary Dynamics	Pianissimo	Piano	Mezzo Piano	Mezzo Forte or Louder
Rhythm	Primarily Simple	Somewhat Simple	Somewhat Complex	Primarily Complex
Melody	Ostinato (no leaps, no stepwise motion)	Simple Melodic Line (1-2 leaps, primarily stepwise motion)	Somewhat Simple Melodic Line (mix of 3-4 leaps and stepwise motion)	Complex Melodic Line (More than 4 leaps can consist of stepwise motion)
Harmony	No harmony	Minimal use of Simple Consonant Harmony	Consistent use of simple consonant harmony	Consonant and Dissonant Harmonies
Repetitiveness	Consists of 0 changes in rhythm, melodic line, harmonies, tempo, and dynamics	Consists of 1-2 changes in rhythm, melodic line, harmonies, tempo, and dynamics	Consists of 3-4 changes in rhythm, melodic line, harmonies, tempo, and dynamics	Consists of more than 4 changes in rhythm, melodic line, harmonies, tempo, and dynamics

Music Streaming Platforms

The researcher will use Spotify to make the playlist, while the participants can access the playlist from their device using Spotify. The student researcher plans to apply for a grant to pay for the Spotify Premium subscriptions for the participants. Spotify Premium is ideal for this study because there are no advertisements. Advertisements in between the songs of the therapeutic playlist will disrupt the smooth transitions and may startle participants.

Timeline of the Proposed Study

Before the study period, all participants will have taken the PSQI. Day one in this study would be the day of the assessment meetings for all four participants. Participant number one will be the first to participate in this study, starting on the day of the assessment meeting. Seven days later, Participant number two will begin participating in this study. One week after Participant number two starts, Participant number three will begin participating in this study. One week after Participant number three starts, Participant number four will begin participation.

For the first seven days of each participant's timeline, they will resume their normal bedtime routine. A sleep log, in the form of a Microsoft form, will be sent every night to the participant's email. Every morning, they will fill out the Microsoft form, summarizing their sleep from the prior night.

After the first seven days, each participant will be emailed the therapeutic playlist composed by the student researcher with input from her thesis advisor. For the next 30 days, each participant will begin to play their playlist after they lie down in their bed, intending to fall asleep at their regular bedtime. They will be requested not to change anything about their usual nighttime routine outside the use of the therapeutic playlist. Sleep logs will continue to be emailed every night. The participant will continue to fill out the Microsoft forms in the morning.

After the 30 days, each participant will complete the PSQI again, in addition to filling out a sleep log, reflecting on their sleep from the 30th day. Buysse et al. (1989) noted that the PSQI is considered valid when one month is being measured.

For the remaining seven days, the participant will discontinue the use of the therapeutic playlist. Their night routine will revert to how it was before the intervention. After the seventh day, each participant will fill out a final sleep log, reflecting on their sleep from the previous night, as well as completing the PSQI for the final time.

Table 2

Study Timeline

Intervention Phase	Baseline (A)	Intervention (B)	Post (A')
Time Point	Week 1 (Days 1-7)	Week 2-5 (Days 8-35)	Week 6 (Days 36-42)
Participant's Task	PSQI Daily Sleep Log	Daily listening to the Therapeutic Playlist Daily Sleep Log	PSQI (After Day 42) Daily Sleep Log

Data analysis

The data collected from this research will be derived from the 42 sleep logs and the three PSQI scores. The PSQI scores will be analyzed to assess changes in participants' scores between the pretest, posttest one, and posttest two. The sleep logs will be analyzed by calculating the percentage of non-overlapping data. The percentage of non-overlapping data is a calculation that is commonly used in single-subject case studies (Psyched Videos, 2022). It assesses the percentage of intervention phase responses that are above the most favorable response out of the baseline responses (Psyched Videos, 2022). A higher percentage of non-overlapping data indicates that the intervention is more likely to be effective (Psyched Videos, 2022). The formula for this calculation is the number of intervention values exceeding the highest baseline value, divided by the total number of intervention values (Psyched Videos, 2022). This decimal is then multiplied by 100 to get a percentage. For the sleep logs, the values that will be assessed using this calculation include the following: amount of sleep (in hours) received, length of time it takes to fall asleep, how many times the participant awakened in the middle of the night, subjective ratings of overall sleep quality, subjective ratings of how well rested the participant feels, and any notable changes to their sleep quality.

Chapter 4

Discussion

Assessments

The proposed study utilizes the sedative music listening assessment (SMLA) and the sedative ranking scale (SRS). The SMLA was created by the student researcher due to the lack of standardized assessments that narrow down sedative music and sound preferences. The SRS was created by the student researcher due to the lack of standardized scales that evaluate music for its sedative impact. This scale is being used to order the therapeutic playlist to allow for a smooth transition between the songs. Due to limited time and resources, the student researcher could not test the validity of these newly developed assessments. If researchers and clinicians are interested in using these assessment tools in the future, further research is needed to test the validity. There is a great need for standardized tools that focus on sedative music in music therapy practice. In addition to improving overall sleep quality, sedative music is used by music therapists to decrease pain perception and anxiety (McFerran & Grocke, 2022).

Results

The intended study aims to evaluate the effects of therapeutic playlists on the perceived sleep quality of four college students. A data analysis of the daily sleep logs and the PSQI will be conducted to gather the results for this study. This intended study utilizes a multiple-baseline design: multiple subjects, where subjects serve as their own control. One of the limitations of this study is the lack of a control group. Due to this and the small sample size, these results cannot represent the general population. The preliminary results from this study could indicate the benefits of music playlists for college students as a part of sleep hygiene practices. If the results prove to be significant, the next step would be to replicate this study with a larger sample size and to conduct this study with students of different genders.

Future Studies

In addition, this research aims to explore the feasibility of providing therapeutic playlists to participants in future studies. It may be beneficial to conduct future research with music therapists taking an active role in creating therapeutic playlists. Music therapists provide knowledge about the therapeutic impacts of music, which ensures the therapeutic playlist is tailored for its intended goal.

Jiang et al. (2013) and Walworth (2003) both suggest the importance of considering participant music preference in reducing anxiety levels. Research comparing the effects of preferred stimulative music versus researcher-selected sedative music on sleep quality has yet to be conducted. This type of research would be best performed with a music therapist, due to their knowledge of the therapeutic effects of different musical elements.

In addition, there are limited studies that measure the subjective and objective data of sleep quality. Chang et al. (2012), Cordi et al. (2019), and Scullin et al. (2019) utilize polysomnography (PSG) in their studies assessing music’s effect on sleep quality and report varying results. Conducting more studies utilizing objective measures would provide a more well-rounded understanding of a participant’s sleep quality. Although PSG is the strongest measure of objective sleep parameters, it may be a cost-prohibitive method, due to high procedure costs (Pacheco, 2023a). Actigraphy is a low-cost alternative to PSG that has been used to measure basic sleep metrics (Cleveland Clinic, 2023b; Loewy, 2020). Smartwatches and smartphone applications that track sleep have become more commonplace and may be another cost-effective alternative to measure objective sleep parameters (Ozlo, 2024).

Further research is necessary on using music as a sleep aid for college students experiencing sleep disturbances. Addressing the sleep disturbances of college students is essential, as these students face risks of academic failure, financial burdens, and missed networking opportunities (Hershner & Chervin, 2014; Honor Society, 2023; Westrick et al., 2023). The proposed study addresses this need through the use of specialized assessments and tools, under the supervision of a board-certified music therapist. The inclusion of a music therapist in this research is crucial due to their clinical training and understanding of therapeutic concepts like the iso principle and entrainment (Heiderscheit et al., 2022; Smith & Layman, 2022). Additionally, more tools focusing on sedative music are beneficial for clinical music therapy practice, as sedative music is not only used for sleep. In music therapy, addressing sleep disturbances first can enhance the effectiveness of meeting other therapeutic goals, as sleep is a physiological need (Pichère & Cadiat, 2015).

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Appendix A

Daily Sleep Logs

Instructions: Complete this sleep log when you first wake up. Answer the following questions based on how you slept last night.

1. What time did you go to bed last night? ________ (am/pm)

2. What time did you wake up? _________ (am/pm)

3. Approximately, how long did it take to fall asleep last night?
   _______ hrs, _______ mins

4. Did you wake up at any point during the night (circle one)? Yes No

   If you answered "Yes", how many times did this occur? _________

5. Rate your overall sleep quality on a scale of 1 (horrible) to 10 (amazing):

   1 2 3 4 5 6 7 8 9 10

6. How well rested do you feel today on a scale of 1 (not well rested at all) to 10 (very well rested)?

   1 2 3 4 5 6 7 8 9 10

7. Did you notice any notable changes in your sleep last night? For Days 7-35, did the music affect your sleep in any way?

Appendix B

Sedative Music Listening Assessment (SMLA)

<u>Basic Assessment:</u>

1. How long have you been having trouble sleeping?
2. What are the factors that may contribute to your difficulties in sleeping?

<u>General Music Preference:</u>

1. How do you listen to music?
2. If you use a music streaming platform, which music streaming platform do you use?

<u>Relaxing Music/Sound Preference:</u>

1. What genres of music (and/or artists) do you like to listen to when you want to relax?
2. Are there any genres of music or artists you dislike?
3. What type of musical sounds do you find to be relaxing? This can include sounds from acoustic and electronic music.
4. What type of nature sounds do you find to be relaxing?

(ex. rain, waterfalls, beach waves, thunder, wind, birds, crickets, forest etc.)

5. Are there any other sounds that you find to be relaxing? (ex. windchime, white noise, ASMR sounds, audiobook, clock ticking etc.)

<u>Sedative Sampling:</u>

For the second part of the music preference assessment, I will be playing 2-4 (30 seconds each) excerpts of sedative music. These excerpts are based on your answers in the first part.
Rate the following excerpts on a scale of 1 (horrible) to 10 (amazing).

<u>Link to the Playlist of the Music Samples:</u>
<u>https://open.spotify.com/playlist/0cpKYBUOzmzEbln9WbxY62?si=cGEQyVkkT1GhZII263jz-w&pi=u-2XjamI4pSNOP</u>

<u>Classical:</u>

- ☐ "Equilibrium" by Roger Saint-Denis

1 2 3 4 5 6 7 8 9 10

- ☐ “Claire de Lune” by Ave Maria (Originally by Claude Debussy)

1 2 3 4 5 6 7 8 9 10

Nature Sound Heavy:

- ☐ “Hymn to the Old Growth” by Hymn to the Old Growth

1 2 3 4 5 6 7 8 9 10

- ☐ “Bloom” by RejSende

1 2 3 4 5 6 7 8 9 10

Downtempo Jazz:

- ☐ “Fly me to the Moon” by Cozy Apartment and Cozy Bedroom

1 2 3 4 5 6 7 8 9 10

- ☐ “Calm Passion” by Jazzy Coffee, Cozy Coffee Shop and Relaxing Jazz Piano

1 2 3 4 5 6 7 8 9 10

Video Game:

- ☐ “Florama Town (From “Pokémon DPPt”)” by Darren Ang

1 2 3 4 5 6 7 8 9 10

- ☐ “Sweden” by C418

1 2 3 4 5 6 7 8 9 10

Popular TV Show/Movie (Lofi versions):

- ☐ “Star Wars (the Force Theme)” by Less Gravity

1 2 3 4 5 6 7 8 9 10

- ☐ "Avatar's Love (Lofi Version)" by Samuel Kim and Mik

1 2 3 4 5 6 7 8 9 10

<u>Lofi:</u>

- ☐ "Consciousness" by Living Room

1 2 3 4 5 6 7 8 9 10

- ☐ "Space 420" by Chau Sara

1 2 3 4 5 6 7 8 9 10

<u>Drones:</u>

- ☐ "Steady State" by Matheo Lyon

1 2 3 4 5 6 7 8 9 10

- ☐ "Emotional Privilege" by Jodi R

1 2 3 4 5 6 7 8 9 10

<u>Country (with Lyrics):</u>

- ☐ "What I Learned From Loving You" by Kenny Rogers

1 2 3 4 5 6 7 8 9 10

- ☐ "You Are My Sunshine" by Johnny Cash

1 2 3 4 5 6 7 8 9 10

<u>Pop (with Lyrics):</u>

- ☐ "Supermarket Flowers" by Ed Sheeran

1 2 3 4 5 6 7 8 9 10

☐ "One Day" by Tate McRae

1 2 3 4 5 6 7 8 9 10