MUSICAL HEALTH: THE EFFECTS OF ACTIVE MUSIC-MAKING ON THE MENTAL HEALTH OF COLLEGE STUDENTS

by

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DEDICATION

“No dejes que termine sin haber crecido un poco,
sin haber sido un poco más feliz,
sin haber alimentado tus sueños.
No te dejes vencer por el desaliento.
No permitas que nadie
te quite el derecho de
expresarte que es casi un deber.
No abandones tus ansias de hacer de tu vida
algo extraordinario…”

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LIST OF ABBREVIATIONS

Abbreviation	Description
FGS	First generation college students
CIT	Cumulative inequality theory

ABSTRACT

Depression and anxiety have been identified as common mental health disorders in college students, resulting in reduced quality of life and increased psychological stress. Music interventions have been shown to have potential healing abilities; however, research on subpopulations is limited. The present study sought to explore the effects active music-making had on the mental health of college students, particularly first-generation and racial and ethnic minority students. Using a sample of 69 students from Texas State University, the research found that anxiety scores significantly declined after a single lesson in active music-making, suggesting a potential benefit for mental health. Additional findings reveal that Hispanic students may be particularly likely to benefit from these types of interventions. Further research is needed to fully understand the effectiveness of active music-making interventions on subpopulations like first generation status and race/ethnicity.

Keywords: depression, music therapy, mental health, first generation students, race and ethnicity

I. INTRODUCTION

According to the most recent study by the World Health Organization (2017), more than 260 million individuals in the United States are affected by depression, with 1 in 5 U.S. adults experiencing symptoms of sadness, hopelessness, and isolation (Smith, Robinson, and Segal 2019; National Institute of Mental Health 2019). Not only are more individuals suffering from depression, but depression is the most common mental illness among college students (Zorrilla et al. 2019; Choi and Miller 2018; Pedrelli et al. 2015). Studies show that one-third of undergraduates report significant symptoms of depression, anxiety, and suicidality (Eisenberg, Golberstein, and Hunt 2009; Drum et al. 2009; Weitzman 2004). In addition, nontraditional students, first-generation, and racial and ethnic minorities report higher prevalence of depression and psychological stress compared to the general student population (Cokley et al. 2017; Barry et al. 2016; Arbona and Jimenez 2014).

Most colleges and universities offer free access to mental health services on campuses. However, mental health services such as counseling have significant limitations (Conley et al. 2017; Storrie, Ahern, and Tuckett 2010). College counseling services are not equipped to handle the growing student body. According to Gallagher (2015), the average staff-to-student ratio of 1 to 2,081 contributes to longer waiting lines and shorter sessions. College counseling services also limit the number of counseling sessions students are allowed in a given year (Gallagher 2015). Consequently, students are left paying out-of-pocket expenses for external mental health services, which lead to greater burdens on racial and ethnic minorities (U.S. General Surgeon General 2001).

Alternative treatments have become increasingly used by individuals suffering from mental illnesses (Stegemann et al. 2019). Social scientists have found that art, poetry, and music can have significant benefits on well-being. For instance, researchers have found that listening to music can have psychological, physical, spiritual, cognitive, and social benefits (Grocke and Wigram 2007). Additionally, listening to music can reduce pain, anxiety, and distress (Kim and Stegemann 2016), while also serving as a coping mechanism against environmental stressors and loneliness (Hendricks et al. 1999). Researchers have also found that active music-making can enhance quality of life from social connectedness to personal well-being (Rickard and McFerran 2012). However, the literature reveals that health benefits of music are different across the life course (Groarke and Hogan 2016). Research shows that music listening for older adults promotes personal growth and manages psychological distress (Saarikallio 2011; Laukka 2007), while music listening for younger adults promotes self-acceptance and social connection (Rickard and McFerran 2012; Groarke and Hogan 2016). The majority of research on music focuses on receptive music and music listening. There have been no studies examining the broader relationship between active music-making in enhancing wellbeing among college students.

The purpose of this study is to investigate the role active music-making has on levels of well-being and quality of life among undergraduate students, and to explore whether first-generation and/or racial and ethnic minority status moderates the relationship between active music-making and mental health outcomes. By gaining a comprehensive understanding of how active music-making interventions affect mental health in college students, we will have a better understanding of alternative treatments

for mental health disorders, advance public awareness for the importance of music within colleges and universities, and stimulate growth in music-based treatments for mental health.

II. LITERATURE REVIEW

Music has long been an integral and essential aspect of human life. Music allows individuals to subjectively experience changes in emotions, thoughts, and behaviors. It is also a conception equally known and recognized for its therapeutic purposes, having long been associated with healing, medicine, and therapy. However, there is considerable cultural variation in the social interpretations of music (Saarikallio 2012; McClellan 2000). An understanding of the social-historical concept of active music-making will help us develop our understanding of music and its benefits.

Music as a Healing Medium

The idea of music as a healing medium for therapeutic purposes began in ancient Greece with Greek philosophers. Homer recommended music as a way to relieve emotions such as sorrow, fear, and fatigue (Cook 1981). Pythagoras of Samos believed that health in daily life could be obtained through music. Pythagoras also demonstrated that the right sequence of sounds and pitches could change behavioral patterns and accelerate the healing process[1] (Thompson and Schlaug 2015; Cook 1981). Similarly, Plato's theory of "correspondence" stated that music could have a positive effect on the soul (Pelosi 2010), while Aristotle believed that the body and soul could be affected by melodies, harmonies, and instruments (Cook 1981). These philosophical ideas of music formed the basis of the practice of music as a medium for healing.

Music for healing can be seen in different cultural contexts. Native American healing ceremonies use music primarily to heal the sick. For example, the Standing

[1] Pythagoras created a system of musical tuning based on intervals of harmonic ratios as medicine for healing. This can be seen in the form of chromatic and enharmonic scales within music education.

Rock Sioux Tribe's Sun Dance ceremonies involve music, dance, and sacrifices over the course of several days. On the final day of the ritual, a medicine man would take dust from the feet of the dancers and put it on the head of a sick person (Wheeler 2015; Gioia 2006). According to Densmore (1927), Native American healing practices often employed rhythm within music as a way to treat physical and emotional disorders. In other cultural contexts, disease and illness are attributed to supernatural causes. Shamans, who have access to the spiritual realms, include music in their ceremonies. Shamanic traditions use music as a way to alter the state of reality. Altered states of consciousness connect the physical and spiritual worlds to create physical and spiritual healing (Wheeler 2015). Music healing practices, while often varying in cultural contexts, are an integral fabric of life.

Music Therapy

While musical healing practices have been documented, a wealth of new research studies have begun to evaluate the precise effects of music on the mind and body (Alvin 1975; Cook 1981). This research has provided the foundation for the development and growth of music therapy. Music therapy is a clinical and evidence-based music intervention that seeks specific changes in an individual's physical, cognitive, and social well-being (AMTA 2016). Music therapy is defined as "the use of sounds and music within an evolving relationship between patient and therapist to support and encourage physical, mental, social, emotional and spiritual well-being" (Bunt and Stige 2014:18). It not only consists of a board-certified music therapist and a fundamental understanding of music, but also requires an individualized musical selection that is developed uniquely for the patient. Music therapy sessions consists of

"using music improvisation, receptive music listening, song writing, lyric discussion, and music performance" (AMTA 2016). Music therapy has been used to treat a variety of illnesses and conditions such as trauma, addiction, Alzheimer's, brain injuries, physical rehabilitation, emotional support, and chronic pain (AMTA 2016).

One example of music therapy can be seen in Batt-Rawden and DeNora's (2005) Music and Health Promotion Project, which explored the links between musicking, well-being, and health[2]. Musical narratives and metaphors were used as a procedure to gather eight interviews over the course of a year. CDs were used to elicit happy moments, care of self, positive emotions, and sympathy to highlight health and wellness[3]. The authors found that music heightened feelings of a "new self" and a "new lifestyle" (Batt-Rawden and DeNora 2005). These creative resources within music therapy have formed new areas of practice for music therapists, music educators, researchers, and community musicians.

Music interventions are being facilitated by sociologists, anthropologists, psychologists, musicologists, and neurologists but are not necessarily identified as music therapy (Stige 2017). Services such as choirs for the homeless, rock bands with female prisoners, music for homeless children, music with immigrant workers, and community music among young individuals living in refugee camps have been increasingly recognized to have health promoting qualities (Stige 2017; Ruud 2012). One of the reasons why these music interventions are not considered music therapy is

[2] Musicking is any activity related to music performance – music-playing, music listening, rehearsing, practicing, humming, composing, or dancing

[3] Each CD was oriented to a particular theme. CD 2 focused on the significance of music in participant's daily life, CD 3 focused on participants mood and musical choices, CD 4 focused on participants' chosen musical piece that focused on feeling their best, CD 5 focused on participant's chosen musical piece based on increased sense of well-being

because they "may involve some substantial rethinking of music therapy theories and practices" (Stige 2017:5; Bunt 2012). Music therapy is often associated with reducing music to a "pill" (Stige 2017:3), where music therapy is produced and communicated based on the scientific community. For instance, the growth of pharmaceutical treatments and the 'gold standard' of clinical research has challenged music therapists to create treatments that are supported by theoretical and empirical evidence (DeNora and Wigram 2006). Sociologists argue that the conceptualization of music therapy can have social implications for practice, research, and theory development. How knowledge is produced and recognized within the scientific community can have implications on how individuals seek innovative treatments like music therapy. DeNora and Wigram (2006) argue that controversies about the criteria for music therapy (i.e. what counts as 'good' music therapy) provides the basis for social relations and the relationships and structures of social roles within the health community.

Other questions concern the new role of *health musician*s, which incorporates the role of music therapists, music educators, community musicians, and health workers. Health musicians have emerged in new areas of research such as *Music and Health*. The literature on *Music and Health* has focused on the roles and identities of musicians involved in healthcare settings compared to those of music therapists (e.g. who have specific training in and credentials for mental health counseling) (MacDonald, Kreutz, and Mitchell 2013; Stige 2017). These debates have focused on the boundaries that divide music therapists from community musicians and health workers. According to Ruud (2012), health musicians are concerned with health-promoting rather than curative activities. The literature on *Music and Health* gives rise

to new sets of questions that can be addressed by cultural, theoretical, and sociological perspectives (Ruud 2012).

Music and Medicine

Music and health researchers have found that the effects of musical engagement on the brain impacted health and wellbeing in adults (Vella-Burrows et al. 2019). In a randomized controlled trial conducted by Mandel et al. (2007), the researchers studied how musical experiences improved the health of cardiac rehabilitation patients. Patients were assigned to either the cardiac rehabilitation group or the music and cardiac rehabilitation group. The results of the study indicated that the participants who were in music therapy sessions and cardiac rehabilitation showed a larger decrease in systolic blood pressure compared to the control group. A meta-analysis conducted by Zhang et al. (2017) explored how music therapy enhanced behavioral and cognitive function in elderly dementia patients. The authors found that music had positive effects on behavior, anxiety, cognitive function, depression, and quality of life. In a review of the literature on cancer patients, Gramaglia et al. (2019) investigated the effects of music-based interventions on cancer patient's anxiety, depression, pain, and quality of life. The study found that music decreased symptoms of anxiety, depression, and pain in 74% of the literature on cancer patients. However, the results indicated that number of music intervention sessions varied across the literature. The review showed that longer treatment durations had better outcomes than shorter treatment durations.

Music and Emotions

One area of research examines music's influence on emotions. A growing body of literature has found that music can stimulate negative and antisocial emotions

(Stratton and Zalanowski 1984). An early study by Stratton and Zalanowski (1984) assessed five different types of music on a sample of 36 randomly selected college students. Findings showed that atonal music led to significantly less relaxation compared to silence. In an updated study conducted by Stratton and Zalanowski (1997), three different population samples were assessed to determine the relationship between emotions, mood, and the types of music individuals listened to. Participants were asked to estimate the number of hours per week they listened to rock, metal, jazz, rap, country, and classical music. The Multiple Affect Adjective Check List (MAACL-R) was used to assess how participants usually or typically felt at the moment. The MAACL-R measured anxiety, depression, hostility, positive affect, and sensation seeking. The correlational analysis indicated that college students' negative emotions were related to higher levels of listening to rock, the faculty and staff samples' negative moods were associated with listening to classical music, and there was a very little relationship between music-listening and any moods in the noncollege sample. The results from the three samples requires other possible interpretations to be considered. One reason why music was associated with negative emotions could be because depressed individuals gravitate towards listening to certain types of music. It could also be argued that music serves different purposes for different demographic groups.

While some older studies have linked music to negative emotions, new evidence shows that music can modulate emotions. Cook et al. (2019) examined the role of musical genres and musical selection on emotions in a large sample of undergraduate students (N = 794). The Short Test of Music Preference (STOMP) was used to measure participant musical preferences for different genres of music, which

included genres like alternative, classical, rap/hip-hop, and religious. Musical emotion regulation strategies were assessed using a mood management and arousal subscale from the 58-item Music Uses and Gratifications Scale (Cook, Roy, and Welker 2019). A multiple regression analysis was used to predict the relationship of individuals' preferences for genres of music and the ways music regulates emotions. Results showed that preferences for pop, rap/hip-hop, and electronica/dance were positively associated with feelings of energy and excitement (emotional arousal) (Cook, Roy, and Welker 2019). Soul/ funk music preferences were also associated with emotional arousal and with using music for up-regulating positive emotions while down-regulating negative emotions (Cook, Roy, and Welker 2019). Moreover, energetic and rhythmic music was associated with musical emotion regulations. This suggests that preferences for energetic music selections has the potential to be used as a tool for emotion regulation. However, this study may not be representative of the population. The sample consisted of mostly female participants (73%) and individuals who were relatively young (M = 21.68, SD = 4.86).

Music Selection and Healing

It is not surprising that music selection is of particular importance to healing and medicine (Chi and Young 2011). Lingham and Theorell (2009) analyzed the effects of preferred simulative and preferred sedative music on psycho-physiological and emotional response in a sample of 38 university participants. Data was gathered using psychophysiological measuring equipment (AIR PAS), which included measures of heart rate, respiration rate, and expiratory carbon dioxide. The authors found that personally selected music increased heart rate and joyful/uplifting moods, while the

effects of sedative music increased feelings of calmness and relaxation. In a quantitative study by Burns et al. (2002), the researchers studied the effects of different types of music on stress. Participants were randomly assigned to classical music listening, hard-rock music listening, self-selected music listening, or silence. The authors found that types of music did not affect stress levels. One reason why selection of music did not affect stress could be because the sample size was relatively small (n = 60). Another possible reason may be that the authors used a single session of music. Research has already shown that longer treatments lead to better outcomes than shorter music sessions.

Active Music-Making and Mental Health

Although the literature on music and health is centered around music listening, song writing, and lyrical analysis, there has been an interest in the role that active music-making plays on mental health. Active music-making is defined as the act of musicking, which involves the creation, singing, or playing of music (Davis, Gfeller, and Thaut, 2008; Aalbers et al. 2017). Several studies have indicated that individuals who play music show reduced symptoms of anxiety, depression, and reduced levels of stress (Wang and Agius 2018; McFerran, Garrido, and Saarikallio 2016). In a qualitative research study in the United Kingdom, music-making interventions were used to enable mental health recovery over the course of one year. A group drumming intervention was used to enhance and facilitate mental health recovery. The authors found that a group drumming intervention could be used to connect individuals through rhythm, help generate and liberate energy, and facilitate feelings of belonging, acceptance, safety, and care (Perkins et al. 2016). In a quasi-experimental study

conducted by De la Rubia Ortí et al. (2018), the authors evaluated the impact of music on well-being in patients with mild Alzheimer's disease. The sample consisted of 25 patients ages 65+. Participants were screened for anxiety and depression using the Hospital Anxiety and Depression Scale test (HADS) and saliva samples (cortisol) were collected to measure stress before and after group music sessions. The researchers found that a 60-minute session of motor movement through singing and music listening lowered levels of stress and decreased symptoms of depression and anxiety. Leung and Cheung (2020) investigated the relationship between music and well-being among a large sample of Chinese adolescents. The sample consisted of 1,318 Chinese adolescents between the ages of 12 and 15 years living in Hong Kong. The authors found that music listening, music playing, and music training were associated with adolescents' well-being.

Instrumental music-making has also been found to enhance cognitive function and promote healthy aging (Wang and Agius 2018; Jutras 2006; Sliwka, Jarosz, and Nowobilski 2006; Ernst 2001). In a study conducted by Creech et al. (2013), the authors examined changes in well-being over the course of 9 months among a large sample of older adults living in London (N = 500). The authors compared data from CASP-12 and the Basic Needs Satisfaction scale before and after musical activities and non-musical activities. The authors found that older adults participating in group musical activities had higher levels of well-being than older adults participating in yoga, language classes, book clubs, and social support groups. These findings were also supported by Johnson, Louhivuori, and Siljander (2017), which found that older

adult choir singers reported higher physical quality of life than older adults from the general population when controlling for sociodemographic variables.

III. THEORETICAL FRAMEWORK

Conflict Theory

Conflict theory provides an important framework for understanding health disparities in the United States. Conflict theory looks at how different groups within society are perpetually competing for limited resources, which results in the powerful dominating the powerless (Simon 2016). According to Pellegrino (1999), the commodification of health in the United States results in individuals competing for prices, cost, quality, availability, and distribution of health services. This suggests that individuals with money and power will more likely be able to address their health concerns compared to disadvantaged social groups. (Wilkinson and Pickett 2020; Simon 2016; Squires and Kubrin 2012). For instance, a disproportionate number of racial and ethnic minorities experience less economic power that results in increased rates of illness (Entress and Anderson 2020; Williams 2012; Williams and Sternthal 2010; Fiscella and Williams 2004). Guntzviller, Williamson, and Ratcliff (2020) found that 76% of Hispanic/Latinx individuals report worse mental health than non-Hispanic whites. Life expectancy data also provides examples of health disparities over time. In a study that looked at health disparities between 1950 and present, the authors found that white individuals lived 4 to 6 years longer than African Americans (Williams and Sternthal 2010). These differences represent serious health concerns for racial and ethnic minorities.

Cumulative Inequality Theory

Further adding to this issue, social inequalities in health among college students contribute to inequalities in education (Reskin 2012; Dumais and Ward 2010).

Cumulative inequality theory (CIT) is a useful framework for examining the role of health in enabling college success (Jackson 2015; McClain et al. 2016). According to CIT, social systems generate inequality through demographic and developmental processes over the life course (Ferraro and Shippee 2009; Ferraro, Shippee, and Schafer 2009). A key proponent of CIT is "that personal trajectories are formed by accumulation of risk, available resources, perceived trajectories, and human agency" (Melo, Guedes, and Mendes 2019; Ferraro and Shippee 2009). Ferraro, Shippee, and Schafer (2009) argue that disadvantages in life can increase the exposure to risk factors, which can result in further subsequent disadvantages. Although studies have revealed how life circumstances influence racial disparities in education, music may have the potential to alleviate these disparities in first generation and/or racial and ethnic minority students.

IV. RESEARCH QUESTIONS, HYPOTHESES, AND RATIONALE

Despite the benefits of active music-making, there is no research that examines the benefits of music-making among college students, or which explores the benefits of music-making for specific subgroups within the college student population. There is reason to believe that music-making interventions could be beneficial for college students and uniquely beneficial for disadvantaged students, such as first-generation and racial/ethnic minority students. However, research is needed to assess the viability of music-making as a potential treatment for improving mental health among these groups.

This research aims to fill gaps in the literature by exploring whether active music-making interventions enhance mental health and if this varies based on first generation and/or racial and ethnic minority status. The research questions I aim to address in this study are: to what extent can active music-making affects well-being and does that effect vary by first-generation and/or racial/ethnic minority status? The research questions are as follows:

H1: Active music-making interventions improve mental health

H2: First generation status students will more likely benefit from active music-making than the non-first generation student population

H3: Students who are racial/ethnic minorities will more likely benefit from active music-making than the non-Hispanic White student population

Given the current research on mental health services available on campuses, it remains important to analyze whether music-making interventions can improve mental health.

V. METHODOLOGY

Sample and Intervention

The target sample included a non-probability sample of 69 undergraduate students. Participants included men and women who were at least 18 years of age. All participants in this study were volunteers. Participants were recruited from undergraduate sociology, social work, engineering, and biology courses at Texas State University and via e-flyers (See Appendix A). A cover letter and consent form were given to all interested participants before the study (See Appendix B). If individuals consented to partake in the music study, they were asked to complete a web research survey, which included a demographic and well-being questionnaire. The intervention consisted of one 30-minute active music-making session. The 30-minute active music-making session included using an online piano software to learn short musical excerpts. Participants were provided with a" how-to" sheet with music instructions.

Each participant had a total of 1 musical session. Sessions were conducted remotely using *Pianu* online lessons. Online surveys were given at the beginning and end of each 30-minute music session. Participants generally completed the survey within 10 to 15 minutes. Mental health resource sheets were provided to all participants at the end of each survey (See Appendix C). This study was also approved by the Institutional Review Board (IRB) at Texas State University (IRB #7555).

Description of Study Variables

The key independent variable was active music-making. The dependent variables were self-reported mental health and changes in mental health over time.

Measures

Sociodemographic. Participants reported sociodemographic information such as age, sex, race/ethnicity, and parents' education. Sex was categorized based on female or male. Race/ethnicity was categorized between American Indian or Alaskan Native, Asian or Pacific Islander, Black or African American, Hispanic or Latinx, White or Caucasian, or Multiple Ethnicity/Other. Race/ethnicity was recoded into three categories, Hispanics, non-Hispanic Whites, and Other. One item measured first-generation status, which was evaluated by "Has your parent or legal guardian completed a college degree?" First generation status was defined as students whose parents or legal guardians have not completed a college degree.

Mental Health. Mental health was defined broadly within the study, examining measures reflecting mental health disorders as well as measures capturing positive aspects of mental health and well-being. Mental health measures included depression, anxiety, and self-efficacy.

Depression. The Patient Health Questionnaire (PHQ-9) measured depression and emotional symptoms. The PHQ-9 is a brief 9-item questionnaire that rates the frequency of symptoms (depressive mood, loss of appetite, and sleep problems, etc.) over the past 2 weeks from 'not at all' to 'nearly every day.' The PHQ-9 has been shown to be a valid and reliable instrument (Kroenke, Spitzer, and Williams 2001; Spitzer et al., 2000).

Anxiety. Anxiety was screened using the generalized anxiety disorder screener (GAD). The GAD is a 7-item scale that rates the frequency of anxiety symptoms (feelings of nervousness, uncontrollable worrying, trouble relaxing, etc.) over the past 2 weeks from 'not at all' to 'nearly every day.' The range of scores vary from 0 to 21 (minimal anxiety to severe anxiety). The GAD is a valid and reliable instrument that has been used in multiple studies (Plummer et al., 2016; Spitzer et al., 2006).

Self-Efficacy. Participants' self-efficacy was established based on how much participants believed they could achieve their goals. The New General Self-Efficacy Scale was used to measure self-efficacy. The New General Self-Efficacy Scale is an 8-item questionnaire that shows how much participants agree or disagree with statements, such as "Even when things are tough, I can perform quite well" and "I believe I can succeed at most any endeavor to which I set my mind." The New General Self-Efficacy Scale has been shown to be a reliable and valid instrument (Scherbaum, Cohen-Charash, and Kern, 2006).

VI. RESULTS

Univariate, bivariate, and multivariate analyses were conducted using Statistical Program for Social sciences (SPSS).

Univariate Analyses

The study variables were first summarized using descriptive statistics (Table 1). The sample (n = 69) was comprised of mostly females (63%). Hispanics or Latinx (39.4%) were the largest racial/ethnic group, followed closely by non-Hispanic Whites (37.9%). The majority (73.8%) of participants were between the ages of 18 and 29. Only 46.4% of participants identified as having a parent with a college degree.

Table 1. Demographic Characteristics of the Sample (n = 69)

Variables	*f*	%
Sex		
Male	15	17.9%
Female	53	63.1%
Other	1	1.2%
Age (Years)		
18-29	62	73.8%
30+	7	8.3%
LGBTQ+		
Yes	18	21.4%
No	51	60.7%
Race/Ethnicity		
Non-Hispanic White	25	37.9%
Hispanic or Latinx	26	39.4%
Other	15	22.7%
Parents Completed a College Degree		
Yes	39	46.4%
No	30	35.7%
Relationship Status		
Single	33	39.3%
In a relationship	29	34.5%
Married	5	6.0%
Divorced	1	1.2%
Separated	1	1.2%
Living Status		
On-campus	12	14.3%
Off-campus with family/sig. Other	13	15.5%

Off-campus with friends/roommates	40	47.6%
Off-campus alone	4	4.8%
Academic Status		
Year 1 (Freshman)	9	10.7%
Year 2 (Sophomore)	11	13.1%
Year 3 (Junior)	33	39.3%
Year 4 (Senior)	7	8.3%
Year 5+ (“Super Senior”)	9	10.7%
Enrollment Status		
Enrolled after HS	41	48.8%
Transferred	23	27.4%
Delayed education	5	6.0%
Academic Hours		
Part-time	9	10.7%
Full-time	60	71.4%

As Table 2 shows, results on the depression measure at the pre-test indicated that over 33% of respondents reported having mild depression (mean = 8.95, SD = 6.53). Results from the anxiety measure also indicated that about 30% of the sample had mild levels of anxiety (mean = 7.63, SD = 6.21). The self-efficacy measure indicated that the sample is moderately self-efficacious with a mean of 27 (higher scores indicate more self-efficacy with a range between 8 and 40). The mean for mood symptoms is in the lower range, which indicates that the sample has had little mood disturbances in the last two weeks (higher scores indicate a greater degree of mood disturbances with a range between 0 and 200).

Table 2. Descriptive Statistics for Self-Reported Mental Health at Pre-Test

Variables	*f*	%	Mean SD
PHQ-9			8.95 (6.53)
Minimal Depression	18	27.3%	
Mild Depression	22	33.3%	
Moderate Depression	12	18.2%	
Moderately Severe Depression	9	13.6%	
Severe Depression	4	6.1%	
GAD7			7.63 (6.21)
Minimal Anxiety	25	37.9%	
Mild Anxiety	18	27.3%	
Moderate Anxiety	9	13.6%	
Severe Anxiety	13	19.7%	

	M	SD	Skewness	Kurtosis
GSES	27.77	4.76	-1.506	4.726

Bivariate Analysis

Table 3 presents the t-test scores of depression according to first generation status and race/ethnicity at pre-test (See Appendix D). There was no significant difference in depression scores by first generation status. However, Hispanic or Latinx students reported significantly higher mean scores for depressive symptoms (mean = 10.64, SD = 6.60) than Non-Hispanic White students (mean = 7.20 , SD = 5.40). Similarly, Hispanic or Latinx students (mean = 28.68, SD = 3.27) reported significantly lower self-efficacy than Non-Hispanic White students (mean = 28.68, SD = 3.27). There were no other differences by subgroup in pre-test scores for the other mental health variables.

Table 3. Depression, Anxiety, and Self-Efficacy Scores According to First Generation Status and Race/Ethnicity at Pre-Test (PHQ9 range 0-27, GSES range 8-40)

	Variables	M (SD)	Sig.	t	df	Sig. (2-tailed)
PHQ9	Parents College Degree		.586	-.853	63	.397
	Yes	8.35(6.12)				
	No	9.75(7.07)				
	Race/Ethnicity					
	Non-Hispanic White	7.20(5.40)	.335	-2.017	48	.005
	Hispanic	10.64(6.60)				
GAD7	Parents College Degree		.087	-1.107	128	.270
	Yes	7.10(5.74)				
	No	8.32(6.73)				
	Race/Ethnicity		.032	-1.611	98	.110
	Non-Hispanic White	6.50(5.33)				
	Hispanic	8.42(6.48)				
GSES	Parents College Degree		.663	.917	130	.361
	Yes	28.10(4.38)				
	No	27.34(5.17)				
	Race/Ethnicity		.022	2.379	100	.019
	Non-Hispanic White	28.68(3.27)				
	Hispanic	26.46(5.75)				

Table 4 provides a bivariate analysis between the pre-test and post-test mental health measures with the music intervention administered between the two groups (See Appendix E). A paired samples t-test was used to compare the two groups. On average, depression post-test scores were 2.02 points lower than depression pre-test scores. There was not a statistically significant difference between the depression pre-post scores ($t = -1.972$, $p = .053$), however the results were directional ($p<=.10$). There were no significant differences in the self-efficacy pre-post scores ($t = .082$, $p = .935$) at $a = .05$ level. Scores for anxiety were 1.95 lower than anxiety pre-test scores. There was a statistically significant difference between the anxiety pre-test scores and the anxiety post-test scores at $a = .05$ level ($t = -2.078$, $p = .042$). Since the paired samples test revealed that there was a statistical difference between the anxiety pre-test scores and the music intervention post-test scores at $a = .05$, we conclude that participants in

the active music-making intervention had significantly reduced levels of anxiety from the pre-test to the post-test.

Table 4. Paired Samples T-test for Mental Health Outcomes Between the Pre-Test Scores and Post-Test Scores

Variables Pre/Post	M(SD)	Sig. (2-tailed)
PHQ-9 pre	9.21(6.45)	.053
PHQ-9 post	7.19(6.08)	
GAD7 pre	7.86(6.39)	.042
GAD7 post	5.91(5.17)	
GSES pre	27.50(4.89)	.935
GSES post	27.56(6.04)	

Table 5 shows a paired samples T-test for changes in mental health between subgroups of first-generation status and race/ethnicity (See Appendix F). There were no significant changes in the mental health measures for whites. Hispanics had no significant changes in mental health measures, although there was a directional decline in anxiety scores ($p <= .10$).

Table 5. Paired Samples T-test for Mental Health Outcomes Between Subgroups of First Generation Status and Race/Ethnicity

Race/Ethnicity	Pre/Post	M(SD)	Sig. (2-tailed)
Non-Hispanic White	PHQ-9 pre	7.10(5.39)	.398
	PHQ9 post	5.82(5.40)	
	GAD7 pre	6.72(5.52)	.525
	GAD7 post	5.64(5.45)	
	GSES pre	28.50(3.21)	.590
	GSES post	27.75(6.88)	

Hispanic	PHQ-9 pre	11.14(6.33)	.178
	PHQ9 post	8.46(7.01)	
	GAD7 pre	8.81(6.89)	.076
	GAD7 post	6.14(5.11)	
	GSES pre	26.31(5.91)	.431
	GSES post	27.34(5.00)	

For the results presented in Table 6, All outcome measures were transformed to reflect the changes from pre to post-test scores. An independent samples t-test was then conducted to compare the subgroups on the changes that occurred in mental health (pre-test to post-test). Table 6 presents whether changes in mental health differed by race/ethnicity (See Appendix G). The results indicated that there were no statistically significant differences between the mean change scores for Non-Hispanic Whites (m = -1.28 , SD = 7.92) and Hispanics or Latinx (m = -2.67, SD = 10.25) on all outcome measures.

Table 6. Independent Samples T-Test for Mental Health Outcomes on Race/Ethnicity

	Race/Ethnicity	Mean(SD)	Sig.	t	Sig(2-tailed)
PHQ9_DIF	Non-Hispanic Whites	-1.28(7.92)	.189	.569	.572
	Hispanic or Latinx	-2.67(10.25)			
GAD_DIF	Non-Hispanic Whites	-1.08(8.36)	.878	.722	.474
	Hispanic or Latinx	-2.66(7.49)			
GSES_DIF	Non-Hispanic Whites	-.75(7.28)	.881	-.945	.349
	Hispanic or Latinx	1.03(6.97)			

Table 7 presents the t-test differences for whether changes in mental health outcomes differed for those whose parents did not complete a college degree (first generation students) and those whose parents did complete a college degree (non-first generation students) (See Appendix H). There were no significant differences for these subgroups on changes in depression, anxiety, or self-efficacy.

Table 7. Independent Samples T-Test for Mental Health Outcomes on First Generation Status

	Parents completed a college degree	Mean(SD)	Sig.	t	Sig(2-tailed)
PHQ9_DIF	Yes	-1.25(8.47)	.415	.897	.373
	No	-3.13(9.25)			
GAD_DIF	Yes	-1.21(8.20)	.566	.964	.339
	No	-3.07(7.02)			
GSES_DIF	Yes	-.232(6.34)	.433	-.427	.671
	No	.483(8.09)			

Multivariate Analysis

Table 8 provides a linear regression for the effects of changes in depression (Δ delta) on first generation status, race/ethnicity, and sex. The results of the regression indicated that the model explained 1.5% of the variance and that the model was not a significant predictor of depression ($R^2 = .015$, $F(3, 69) = .339$, $p = .797$). While race/ethnicity contributed to the model ($B = -.325$, $p < .814$), the small effect cannot demonstrate causation. Additionally analyses (not shown) reveal that first generation status, race/ethnicity, and sex were also not significantly related to changes in anxiety or self-efficacy (See Appendix I).

Table 8. Multivariate Model for the Effects of Changes in Depression on First Generation Status, Race/Ethnicity, and Sex

	Understandardized Coefficient		Standardized Coefficient		
Pre/Post Changes in Depression	B	Std. Error	Beta	t	Sig.
(Constant)	-.515	5.933		-.087	.931
Has your parent completed a college degree?	-1.895	2.151	-.107	-.881	.381
Race/Ethnicity	-.325	1.375	-.029	-.237	.814
Sex	.953	2.471	.047	.386	.701

F= .339; df(3, 69); p=.797; R=.120, R^2=.015

VII. DISCUSSION

Study Limitations and Future Directions

This study investigated the role active music-making had on mental health, but a number of factors should be considered when interpreting the results. First, as participation was voluntary, this sample is only representative of students with interest in music-playing (i.e. those interested in learning to play an instrument), and not necessarily representative of all undergraduate students. Future research should examine the benefits of music interventions to a broader sample of student participants. In addition, this study was conducted at an unusual time, during the Covid pandemic. Thus the mental health measures and the potential benefit of the intervention could have been influenced by those circumstances, further reducing the generalizability of the study.

Second, the sample size was small, and this makes comparisons between subgroups particularly difficult due to lack of statistical power. An improvement in self-reported mental health outcomes, and some differences by subgroups, justifies future research on the effects of music making by subgroup. In addition, there was no control group in this study, suggesting that there may be other factors contributing to the changes in self-reported mental health outcomes. The repeated measures (pretest and posttest) may also have familiarized participants with test measures, thereby confounding the effects of the music intervention.

Thirdly, it is important to consider the impact the duration had on the benefits of the music intervention. Gramaglia et al. (2019) suggested that multiple music sessions had better outcomes than shorter music sessions. Future research should

evaluate the duration and the total number of sessions to potentially maximize the benefits of the music intervention.

Fourth, the current research does not provide a full understanding of the specific benefits of music and its healing outcomes. Future research could include comparisons of specific sets of capacities, such as music and relaxation. Further research could also compare the music intervention with other art-based interventions to determine whether music is unique in its effects.

Finally, this study did not examine other relevant sociodemographic characteristics. In this study, 3 participants self-identified as having multiple ethnicities and 18 identified as LGBTQ+. Future research should consider subpopulations such as students who identify as LGBTQ+ and/or students who identify as having multiple ethnicities.

Conclusion

The purpose of this study was to investigate the effects active music-making had on levels of well-being and quality of life among undergraduate students. Despite the small sample size, the differences between the pre-post scores suggest that music-making interventions can be a source for improving mental health. These results affirm the findings by Wang and Agius (2018), and Cook, Roy, and Welker (2019), all of which suggested that music improves behavioral outcomes and emotional outcomes. The results also suggest that Hispanic students might be particularly likely to benefit from active music making interventions.

Most of the literature on music and health is centered around passive music interventions. No other studies have examined the role that music-making plays on

subgroups within the college population. Overall, this study provides a relatively new and unique overview of subpopulations that can be used as a preliminary start to identify specific subgroups of individuals that could benefit from particular forms of music interventions. More research using a larger sample size is needed to fully understand how music interventions effect specific subgroups within the college student population.

APPENDIX SECTION

APPENDIX A

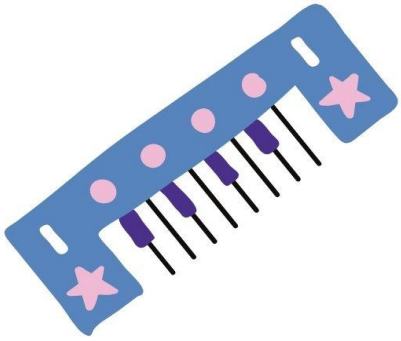
IRB: #7555 | Date Approved: 12/9/2020 | Expiration Date: 11/30/2021

MUSICAL HEALTH

If you are over 18 years old, this study may be for you.

MUSIC AS A HEALING MEDIUM

We're looking for adults 18 years or older to examine the effects of active music-making on the mental health of college students.



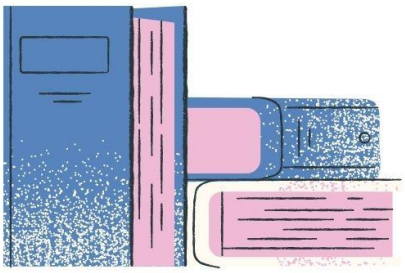
MUSIC ACTIVITY

Participants will be asked to participate in:

- (2) 15-minute surveys
- (1) 30-minute online piano lesson

LOCATION

This study will be 100% online.



ARE YOU ELIGIBLE?

- 18 years old or older
- Undergraduate student enrolled in a TX State University program

CONTACT

If you're unsure if you meet the requirements, call or email a member of the study team:
Kassandra G. Rocha
kgr9@txstate.edu
(512) 245-4678

Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB Chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 (meg201@txstate.edu).

APPENDIX B

You are invited to participate in a research study to learn more about the effects of active music-making on mental health. The information gathered will be used to help researchers understand alternative treatments for mental health disorders and to help advance public awareness for the importance of music within colleges and universities. You are being asked to participate because you are an undergraduate student at Texas State University.

We are seeking participants who are at least 18 years old and who are enrolled in a Texas State undergraduate program. Participation is voluntary. You do not have to be in this study if you do not want to. You will not be paid for your participation in this study.

If you agree to be in this study, you will participate in the following:

- (2) 15-minute surveys
- (1) 30-minute online piano lesson

You will first complete the survey and then participate in the online piano lesson. The second survey will be completed the same day (after the online piano lesson) for a total of 1 hour (60 minutes) of participation.

If you have any questions or concerns about participation, you may contact the Principal Investigator, **Kassandra G. Rocha**: **kgr9@txstate.edu**.

This project was approved by the Texas State IRB on 12/9/2020. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB Chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu).

Study Title: Musical Health: The Effects of Active Music-Making on the Mental Health of College Students

Principal Investigator: Kassandra G. Rocha
Email: kgr9@txstate.edu
Phone: (512) 245-4678

Faculty Advisor: Dr. Toni Watt
Email: tw15@txstate.edu
Phone: (512) 245-3287

This form will give you the information you will need to understand why this research study is being done and why you are being invited to participate. It will also describe what you will need to do to participate as well as any known risks, inconveniences, or discomforts that you may have while participating. We encourage you to ask questions at any time. If you decide to participate, you will be asked to sign this form and it will be a record of your agreement to participate. You will be given a copy of this form to keep.

PURPOSE AND BACKGROUND

You are invited to participate in a research study to learn more about the effects of active music-making on mental health. The information gathered will be used to help researchers understand alternative treatments for mental health disorders and to help advance public awareness for the importance of music within colleges and universities. You are being asked to participate because you are an undergraduate student (at least 18 years old) at Texas State University.

PROCEDURES

If you agree to be in this study, you will participate in the following:

- (2) 15-minute surveys
- (1) 30-minute online piano lesson

You will first complete the survey and then participate in the online piano lesson. The second survey will be completed the same day (after the online piano lesson) for a total of 1 hour (60 minutes) of participation.

RISKS/DISCOMFORTS

The survey will include a section requesting mental health information. In the event that some of the survey questions make you uncomfortable or upset, you are always free to decline to answer or to stop your participation at any time. Should you feel discomfort after participating and you are a Texas State University student, you may contact the

University Health Services for counseling services at (512) 245-2208. They are located in the LBJ Student Center 5-4.1

BENEFITS/ALTERNATIVES

There will be no direct benefit to you from participating in this study. However, the information that you provide will help researchers have a better understanding of alternative treatments for mental health disorders and to help advance public awareness for the importance of music within colleges and universities.

EXTENT OF CONFIDENTIALITY

Reasonable efforts will be made to keep the personal information in your research record private and confidential. Any identifiable information obtained in connection with this study will remain confidential and will be disclosed only with your permission or as required by law. The members of the research team and the Texas State University Office of Research Compliance (ORC) may access the data. The ORC monitors research studies to protect the rights and welfare of research participants.

Your name will not be used in any written reports or publications which result from this research. Data will be kept for three years (per federal regulations) after the study is completed and then destroyed.

PAYMENT/COMPENSATION

You will not be paid for your participation in this study.

PARTICIPATION IS VOLUNTARY

You do not have to be in this study if you do not want to. You may also refuse to answer any questions you do not want to answer. If you volunteer to be in this study, you may withdraw from it at any time without consequences of any kind or loss of benefits to which you are otherwise entitled.

QUESTIONS

If you have any questions or concerns about your participation in this study, you may contact the Principal Investigator, **Kassandra G. Rocha**: **kgr9@txstate.edu**.

This project was approved by the Texas State IRB on 12/9/2020. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB Chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu).

If you would prefer not to participate, please do not fill out a survey.

If you consent to participate, please complete the survey.

APPENDIX C

Mental Health Resources

The below resources are available to students who are seeking access to mental health services at any time.

Texas State Counseling Center

5-4.1 LBJ Student Center
Monday-Friday, 8 a.m. - 5 p.m.
Phone: 512.245.2208

The Center for Health Care Services

Crisis Helpline: 210.223.7233
24-Hour Helpline: 800.316.9241

Substance Abuse and Mental Health Services Administration (SAMHSA)

24-Hour Helpline: 800.662.4357

National Suicide Prevention Lifeline

24-hour Helpline: 800.273.8255

Reach out if you or someone you know is in need

APPENDIX D

Group Statistics

	RACE_GROUPS	N	Mean	Std. Deviation	Std. Error Mean
PHQ9	Non-Hispanic White	50	7.2000	5.34522	.75593
	Hispanic	50	10.6400	6.53331	.92395
GAD7	Non-Hispanic White	48	6.5000	5.33954	.77070
	Hispanic	52	8.4231	6.48481	.89928
QoL	Non-Hispanic White	48	45.2500	11.80425	1.70380
	Hispanic	50	44.2400	9.03634	1.27793
SELF_EFFICACY	Non-Hispanic White	50	28.6800	3.27912	.46374
	Hispanic	52	26.4615	5.75466	.79803
POMS	Non-Hispanic White	48	1.2500	18.60279	2.68508
	Hispanic	52	9.5000	27.01379	3.74614

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PHQ9	Equal variances assumed	1.934	.167	-2.882	98	.005	-3.44000	1.19378	-5.80902	-1.07098
	Equal variances not assumed			-2.882	94.301	.005	-3.44000	1.19378	-5.81018	-1.06982
GAD7	Equal variances assumed	4.718	.032	-1.611	98	.110	-1.92308	1.19357	-4.29167	.44552
	Equal variances not assumed			-1.624	96.778	.108	-1.92308	1.18435	-4.27375	.42759
QoL	Equal variances assumed	2.240	.138	.477	96	.635	1.01000	2.11836	-3.19492	5.21492
	Equal variances not assumed			.474	88.033	.637	1.01000	2.12980	-3.22250	5.24250
SELF_EFFICACY	Equal variances assumed	5.380	.022	2.379	100	.019	2.21846	.93235	.36871	4.06822
	Equal variances not assumed			2.404	81.577	.019	2.21846	.92299	.38221	4.05472
POMS	Equal variances assumed	6.931	.010	-1.764	98	.081	-8.25000	4.67594	-17.52924	1.02924
	Equal variances not assumed			-1.790	90.845	.077	-8.25000	4.60904	-17.40550	.90550

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
PHQ9	Cohen's d	5.96890	-.576	-.975	-.175
	Hedges' correction	6.01507	-.572	-.968	-.173
	Glass's delta	6.53331	-.527	-.930	-.118
GAD7	Cohen's d	5.96306	-.322	-.717	.073
	Hedges' correction	6.00919	-.320	-.711	.073
	Glass's delta	6.48481	-.297	-.692	.101
QoL	Cohen's d	10.48318	.096	-.300	.492
	Hedges' correction	10.56598	.096	-.298	.489
	Glass's delta	9.03634	.112	-.285	.508
SELF_EFFICACY	Cohen's d	4.70723	.471	.076	.864
	Hedges' correction	4.74291	.468	.076	.857
	Glass's delta	5.75466	.386	-.012	.779
POMS	Cohen's d	23.36097	-.353	-.748	.043
	Hedges' correction	23.54167	-.350	-.742	.043
	Glass's delta	27.01379	-.305	-.701	.093

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

Group Statistics

	Has your parent or legal guardian completed a college degree?	N	Mean	Std. Deviation	Std. Error Mean
PHQ9	Yes	74	8.3514	6.08261	.70709
	No	56	9.7500	7.00973	.93672
GAD7	Yes	74	7.1081	5.74234	.66753
	No	56	8.3214	6.73689	.90026
QoL	Yes	70	45.6857	12.97885	1.55127
	No	58	43.8621	11.89346	1.56169
SELF_EFFICACY	Yes	74	28.1081	4.38418	.50965
	No	58	27.3448	5.17264	.67920
POMS	Yes	72	4.8056	24.57850	2.89660
	No	56	8.0000	27.28170	3.64567

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PHQ9	Equal variances assumed	.608	.437	-1.215	128	.226	-1.39865	1.15077	-3.67565	.87835
	Equal variances not assumed			-1.192	108.898	.236	-1.39865	1.17363	-3.72477	.92747
GAD7	Equal variances assumed	2.974	.087	-1.107	128	.270	-1.21332	1.09623	-3.38241	.95577
	Equal variances not assumed			-1.083	107.599	.281	-1.21332	1.12074	-3.43492	1.00828
QoL	Equal variances assumed	.101	.751	.822	126	.413	1.82365	2.21940	-2.56848	6.21577
	Equal variances not assumed			.828	124.693	.409	1.82365	2.20121	-2.53292	6.18021
SELF_EFFICACY	Equal variances assumed	.190	.663	.917	130	.361	.76328	.83232	-.88336	2.40992
	Equal variances not assumed			.899	111.626	.371	.76328	.84915	-.91926	2.44583
POMS	Equal variances assumed	.720	.398	-.695	126	.488	-3.19444	4.59570	-12.28921	5.90032
	Equal variances not assumed			-.686	111.835	.494	-3.19444	4.65631	-12.42047	6.03159

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
PHQ9	Cohen's d	6.49721	-.215	-.563	.133
	Hedges' correction	6.53560	-.214	-.560	.133
	Glass's delta	7.00973	-.200	-.548	.150
GAD7	Cohen's d	6.18930	-.196	-.544	.152
	Hedges' correction	6.22586	-.195	-.540	.151
	Glass's delta	6.73689	-.180	-.528	.169
QoL	Cohen's d	12.49952	.146	-.203	.494
	Hedges' correction	12.57454	.145	-.202	.491
	Glass's delta	11.89346	.153	-.196	.502
SELF_EFFICACY	Cohen's d	4.74604	.161	-.184	.505
	Hedges' correction	4.77364	.160	-.183	.502
	Glass's delta	5.17264	.148	-.198	.492
POMS	Cohen's d	25.79333	-.124	-.473	.226
	Hedges' correction	25.94814	-.123	-.470	.225
	Glass's delta	27.28170	-.117	-.466	.233

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

APPENDIX E

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PHQ9TOTAL_2	7.1918	73	6.08655	.71238
	PHQ9	9.2192	73	6.45335	.75531
Pair 2	GAD7TOTAL_2	5.9118	68	5.17669	.62777
	GAD7	7.8676	68	6.39240	.77519
Pair 3	QoLTOTAL_2	41.4776	67	13.35796	1.63193
	QoL	45.8507	67	13.45504	1.64379
Pair 4	SELF_EFFICACY_2	27.5676	74	6.04567	.70280
	SELF_EFFICACY	27.5000	74	4.89128	.56860
Pair 5	POMS_TOTAL_2	15.4000	65	17.56488	2.17866
	POMS	8.6462	65	26.42172	3.27721

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PHQ9TOTAL_2 - PHQ9	-2.02740	8.78599	1.02832	-4.07732	.02253	-1.972	72	.053
Pair 2	GAD7TOTAL_2 - GAD7	-1.95588	7.76028	.94107	-3.83427	-.07750	-2.078	67	.042
Pair 3	QoLTOTAL_2 - QoL	-4.37313	17.17454	2.09820	-8.56233	-.18394	-2.084	66	.041
Pair 4	SELF_EFFICACY_2 - SELF_EFFICACY	.06757	7.08526	.82364	-1.57395	1.70909	.082	73	.935
Pair 5	POMS_TOTAL_2 - POMS	6.75385	26.75703	3.31880	.12378	13.38391	2.035	64	.046

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
Pair 1	PHQ9TOTAL_2 - PHQ9	Cohen's d	8.78599	-.231	-.462	.002
		Hedges' correction	8.83209	-.230	-.460	.002
Pair 2	GAD7TOTAL_2 - GAD7	Cohen's d	7.76028	-.252	-.493	-.010
		Hedges' correction	7.80405	-.251	-.490	-.010
Pair 3	QoLTOTAL_2 - QoL	Cohen's d	17.17454	-.255	-.497	-.010
		Hedges' correction	17.27290	-.253	-.494	-.010
Pair 4	SELF_EFFICACY_2 - SELF_EFFICACY	Cohen's d	7.08526	.010	-.218	.237
		Hedges' correction	7.12191	.009	-.217	.236
Pair 5	POMS_TOTAL_2 - POMS	Cohen's d	26.75703	.252	.004	.498
		Hedges' correction	26.91509	.251	.004	.496

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

APPENDIX F

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PHQ9TOTAL_2	5.8214	28	5.40955	1.02231
	PHQ9	7.1071	28	5.39780	1.02009
Pair 2	GAD7TOTAL_2	5.6400	25	5.45344	1.09069
	GAD7	6.7200	25	5.52660	1.10532
Pair 3	QoLTOTAL_2	42.2800	25	13.85496	2.77099
	QoL	45.4800	25	12.52371	2.50474
Pair 4	SELF_EFFICACY_2	27.7500	28	6.88866	1.30184
	SELF_EFFICACY	28.5000	28	3.21455	.60749
Pair 5	POMS_TOTAL_2	13.6522	23	15.87052	3.30923
	POMS	-.1304	23	18.97200	3.95594

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PHQ9TOTAL_2 & PHQ9	28	-.075	.703
Pair 2	GAD7TOTAL_2 & GAD7	25	-.160	.446
Pair 3	QoLTOTAL_2 & QoL	25	.159	.447
Pair 4	SELF_EFFICACY_2 & SELF_EFFICACY	28	.108	.585
Pair 5	POMS_TOTAL_2 & POMS	23	.049	.826

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PHQ9TOTAL_2 - PHQ9	-1.28571	7.92491	1.49767	-4.35867	1.78725	-.858	27	.398
Pair 2	GAD7TOTAL_2 - GAD7	-1.08000	8.36122	1.67224	-4.53134	2.37134	-.646	24	.525
Pair 3	QoLTOTAL_2 - QoL	-3.20000	17.13184	3.42637	-10.27168	3.87168	-.934	24	.360
Pair 4	SELF_EFFICACY_2 - SELF_EFFICACY	-.75000	7.28075	1.37593	-3.57318	2.07318	-.545	27	.590
Pair 5	POMS_TOTAL_2 - POMS	13.78261	24.13590	5.03268	3.34546	24.21975	2.739	22	.012

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confid Lower
Pair 1	PHQ9TOTAL_2 - PHQ9	Cohen's d	7.92491	-.162	-.534
		Hedges' correction	8.03715	-.160	-.526
Pair 2	GAD7TOTAL_2 - GAD7	Cohen's d	8.36122	-.129	-.522
		Hedges' correction	8.49476	-.127	-.513
Pair 3	QoLTOTAL_2 - QoL	Cohen's d	17.13184	-.187	-.580
		Hedges' correction	17.40547	-.184	-.571
Pair 4	SELF_EFFICACY_2 - SELF_EFFICACY	Cohen's d	7.28075	-.103	-.473
		Hedges' correction	7.38386	-.102	-.467
Pair 5	POMS_TOTAL_2 - POMS	Cohen's d	24.13590	.571	.124
		Hedges' correction	24.55728	.561	.122

a. The denominator used in estimating the effect sizes.

Cohen's d uses the sample standard deviation of the mean difference.

Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PHQ9TOTAL_2	8.4643	28	7.01576	1.32585
	PHQ9	11.1429	28	6.33459	1.19712
Pair 2	GAD7TOTAL_2	6.1481	27	5.11937	.98522
	GAD7	8.8148	27	6.89502	1.32695
Pair 3	QoLTOTAL_2	43.5385	26	13.14604	2.57815
	QoL	45.0000	26	9.67471	1.89737
Pair 4	SELF_EFFICACY_2	27.3448	29	5.00197	.92884
	SELF_EFFICACY	26.3103	29	5.91066	1.09758
Pair 5	POMS_TOTAL_2	17.2593	27	16.04463	3.08779
	POMS	13.7778	27	27.10426	5.21622

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PHQ9TOTAL_2 & PHQ9	28	-.177	.366
Pair 2	GAD7TOTAL_2 & GAD7	27	.249	.210
Pair 3	QoLTOTAL_2 & QoL	26	.277	.171
Pair 4	SELF_EFFICACY_2 & SELF_EFFICACY	29	.192	.319
Pair 5	POMS_TOTAL_2 & POMS	27	.412	.033

Paired Samples Test

		Paired Differences					t	df
					95% Confidence Interval of the Difference			
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper		
Pair 1	PHQ9TOTAL_2 - PHQ9	-2.67857	10.25256	1.93755	-6.65410	1.29696	-1.382	27
Pair 2	GAD7TOTAL_2 - GAD7	-2.66667	7.49359	1.44214	-5.63103	.29770	-1.849	26
Pair 3	QoLTOTAL_2 - QoL	-1.46154	13.99780	2.74519	-7.11537	4.19230	-.532	25
Pair 4	SELF_EFFICACY_2 - SELF_EFFICACY	1.03448	6.97179	1.29463	-1.61745	3.68641	.799	28
Pair 5	POMS_TOTAL_2 - POMS	3.48148	25.17534	4.84500	-6.47755	13.44051	.719	26

Paired Samples Effect Sizes

					95% Confidence Int	
			Standardizer[a]	Point Estimate	Lower	Up
Pair 1	PHQ9TOTAL_2 - PHQ9	Cohen's d	10.25256	-.261	-.636	
		Hedges' correction	10.39776	-.258	-.627	
Pair 2	GAD7TOTAL_2 - GAD7	Cohen's d	7.49359	-.356	-.742	
		Hedges' correction	7.60388	-.351	-.731	
Pair 3	QoLTOTAL_2 - QoL	Cohen's d	13.99780	-.104	-.489	
		Hedges' correction	14.21224	-.103	-.481	
Pair 4	SELF_EFFICACY_2 - SELF_EFFICACY	Cohen's d	6.97179	.148	-.219	
		Hedges' correction	7.06694	.146	-.216	
Pair 5	POMS_TOTAL_2 - POMS	Cohen's d	25.17534	.138	-.242	
		Hedges' correction	25.54587	.136	-.239	

a. The denominator used in estimating the effect sizes.

Cohen's d uses the sample standard deviation of the mean difference.

Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

APPENDIX G

Group Statistics

	RACE_GROUPS	N	Mean	Std. Deviation	Std. Error Mean
PHQ9_DIFF	Non-Hispanic White	28	-1.2857	7.92491	1.49767
	Hispanic	28	-2.6786	10.25256	1.93755
GAD_DIFF	Non-Hispanic White	25	-1.0800	8.36122	1.67224
	Hispanic	27	-2.6667	7.49359	1.44214
QoL_DIFF	Non-Hispanic White	25	-3.2000	17.13184	3.42637
	Hispanic	26	-1.4615	13.99780	2.74519
GSES_DIFF	Non-Hispanic White	28	-.7500	7.28075	1.37593
	Hispanic	29	1.0345	6.97179	1.29463
POMS_DIFF	Non-Hispanic White	23	13.7826	24.13590	5.03268
	Hispanic	27	3.4815	25.17534	4.84500

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PHQ9_DIFF	Equal variances assumed	1.773	.189	.569	54	.572	1.39286	2.44890	-3.51689	6.30261
	Equal variances not assumed			.569	50.776	.572	1.39286	2.44890	-3.52404	6.30976
GAD_DIFF	Equal variances assumed	.024	.878	.722	50	.474	1.58667	2.19877	-2.82970	6.00303
	Equal variances not assumed			.719	48.309	.476	1.58667	2.20821	-2.85250	6.02583
QoL_DIFF	Equal variances assumed	.661	.420	-.398	49	.693	-1.73846	4.37298	-10.52629	7.04937
	Equal variances not assumed			-.396	46.362	.694	-1.73846	4.39045	-10.57413	7.09721
GSES_DIFF	Equal variances assumed	.023	.881	-.945	55	.349	-1.78448	1.88779	-5.56769	1.99872
	Equal variances not assumed			-.945	54.659	.349	-1.78448	1.88925	-5.57115	2.00218
POMS_DIFF	Equal variances assumed	.080	.779	1.470	48	.148	10.30113	7.00992	-3.79325	24.39551
	Equal variances not assumed			1.475	47.299	.147	10.30113	6.98583	-3.75021	24.35247

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
PHQ9_DIFF	Cohen's d	9.16295	.152	-.373	.676
	Hedges' correction	9.29272	.150	-.368	.666
	Glass's delta	10.25256	.136	-.390	.660
GAD_DIFF	Cohen's d	7.92192	.200	-.346	.745
	Hedges' correction	8.04328	.197	-.341	.733
	Glass's delta	7.49359	.212	-.337	.757
QoL_DIFF	Cohen's d	15.61165	-.111	-.660	.439
	Hedges' correction	15.85580	-.110	-.650	.432
	Glass's delta	13.99780	-.124	-.673	.427
GSES_DIFF	Cohen's d	7.12514	-.250	-.771	.272
	Hedges' correction	7.22417	-.247	-.760	.268
	Glass's delta	6.97179	-.256	-.777	.270
POMS_DIFF	Cohen's d	24.70436	.417	-.147	.977
	Hedges' correction	25.09893	.410	-.145	.962
	Glass's delta	25.17534	.409	-.162	.972

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

APPENDIX H

Group Statistics

	Has your parent or legal guardian completed a college degree?	N	Mean	Std. Deviation	Std. Error Mean
PHQ9_DIFF	Yes	43	-1.2558	8.47150	1.29189
	No	30	-3.1333	9.25029	1.68886
GAD_DIFF	Yes	41	-1.2195	8.20826	1.28192
	No	27	-3.0741	7.02701	1.35235
QoL_DIFF	Yes	39	-4.3846	19.53487	3.12808
	No	28	-4.3571	13.56251	2.56307
GSES_DIFF	Yes	43	-.2326	6.34274	.96726
	No	31	.4839	8.09473	1.45386
POMS_DIFF	Yes	39	8.8205	24.37737	3.90350
	No	26	3.6538	30.21383	5.92542

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PHQ9_DIFF	Equal variances assumed	.673	.415	.897	71	.373	1.87752	2.09289	-2.29559	6.05063
	Equal variances not assumed			.883	58.935	.381	1.87752	2.12632	-2.37734	6.13238
GAD_DIFF	Equal variances assumed	.332	.566	.964	66	.339	1.85456	1.92437	-1.98757	5.69669
	Equal variances not assumed			.995	61.461	.324	1.85456	1.86337	-1.87092	5.58004
QoL_DIFF	Equal variances assumed	2.659	.108	-.006	65	.995	-.02747	4.28673	-8.58867	8.53372
	Equal variances not assumed			-.007	64.950	.995	-.02747	4.04404	-8.10410	8.04915
GSES_DIFF	Equal variances assumed	.621	.433	-.427	72	.671	-.71643	1.67882	-4.06309	2.63023
	Equal variances not assumed			-.410	54.771	.683	-.71643	1.74622	-4.21627	2.78341
POMS_DIFF	Equal variances assumed	1.395	.242	.760	63	.450	5.16667	6.79693	-8.41591	18.74924
	Equal variances not assumed			.728	45.740	.470	5.16667	7.09563	-9.11828	19.45162

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
PHQ9_DIFF	Cohen's d	8.79793	.213	-.255	.680
	Hedges' correction	8.89225	.211	-.252	.673
	Glass's delta	9.25029	.203	-.268	.670
GAD_DIFF	Cohen's d	7.76441	.239	-.250	.725
	Hedges' correction	7.85405	.236	-.247	.717
	Glass's delta	7.02701	.264	-.230	.752
QoL_DIFF	Cohen's d	17.30614	-.002	-.487	.484
	Hedges' correction	17.50908	-.002	-.481	.478
	Glass's delta	13.56251	-.002	-.487	.483
GSES_DIFF	Cohen's d	7.12528	-.101	-.562	.362
	Hedges' correction	7.20060	-.099	-.556	.358
	Glass's delta	8.09473	-.089	-.550	.375
POMS_DIFF	Cohen's d	26.84572	.192	-.306	.689
	Hedges' correction	27.17068	.190	-.302	.681
	Glass's delta	30.21383	.171	-.329	.668

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

APPENDIX I

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.120[a]	.015	-.028	8.90962

a. Predictors: (Constant), What is your gender? - Selected Choice, Has your parent or legal guardian completed a college degree?, RACE_GROUPS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	80.638	3	26.879	.339	.797[b]
	Residual	5477.307	69	79.381		
	Total	5557.945	72			

a. Dependent Variable: PHQ9_DIFF

b. Predictors: (Constant), What is your gender? - Selected Choice, Has your parent or legal guardian completed a college degree?, RACE_GROUPS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.515	5.933		-.087	.931
	Has your parent or legal guardian completed a college degree?	-1.895	2.151	-.107	-.881	.381
	RACE_GROUPS	-.325	1.375	-.029	-.237	.814
	What is your gender? - Selected Choice	.953	2.471	.047	.386	.701

a. Dependent Variable: PHQ9_DIFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.146[a]	.021	-.025	7.85530

a. Predictors: (Constant), What is your gender? - Selected Choice, Has your parent or legal guardian completed a college degree?, RACE_GROUPS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	85.699	3	28.566	.463	.709[b]
	Residual	3949.169	64	61.706		
	Total	4034.868	67			

a. Dependent Variable: GAD_DIFF

b. Predictors: (Constant), What is your gender? - Selected Choice, Has your parent or legal guardian completed a college degree?, RACE_GROUPS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.975	5.582		-.175	.862
	Has your parent or legal guardian completed a college degree?	-1.869	1.964	-.119	-.952	.345
	RACE_GROUPS	-.391	1.267	-.039	-.309	.759
	What is your gender? - Selected Choice	1.273	2.252	.071	.565	.574

a. Dependent Variable: GAD_DIFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.192[a]	.037	-.009	17.25168

a. Predictors: (Constant), What is your gender? - Selected Choice, RACE_GROUPS, Has your parent or legal guardian completed a college degree?

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	717.589	3	239.196	.804	.496[b]
	Residual	18750.083	63	297.620		
	Total	19467.672	66			

a. Dependent Variable: QoL_DIFF

b. Predictors: (Constant), What is your gender? - Selected Choice, RACE_GROUPS, Has your parent or legal guardian completed a college degree?

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.939	11.628		.769	.445
	Has your parent or legal guardian completed a college degree?	1.335	4.356	.039	.306	.760
	RACE_GROUPS	-3.779	2.788	-.171	-1.356	.180
	What is your gender? - Selected Choice	-4.441	4.816	-.116	-.922	.360

a. Dependent Variable: QoL_DIFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.197[a]	.039	-.008	26.86764

a. Predictors: (Constant), What is your gender? - Selected Choice, RACE_GROUPS, Has your parent or legal guardian completed a college degree?

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1785.989	3	595.330	.825	.485[b]
	Residual	44034.073	61	721.870		
	Total	45820.062	64			

a. Dependent Variable: POMS_DIFF

b. Predictors: (Constant), What is your gender? - Selected Choice, RACE_GROUPS, Has your parent or legal guardian completed a college degree?

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	25.615	18.647		1.374	.175
	Has your parent or legal guardian completed a college degree?	-4.199	6.914	-.077	-.607	.546
	RACE_GROUPS	-6.146	4.466	-.175	-1.376	.174
	What is your gender? - Selected Choice	-.784	7.745	-.013	-.101	.920

a. Dependent Variable: POMS_DIFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.067[a]	.004	-.038	7.21939

a. Predictors: (Constant), What is your gender? - Selected Choice, Has your parent or legal guardian completed a college degree?, RACE_GROUPS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.290	3	5.430	.104	.957[b]
	Residual	3648.372	70	52.120		
	Total	3664.662	73			

a. Dependent Variable: GSES_DIFF

b. Predictors: (Constant), What is your gender? - Selected Choice, Has your parent or legal guardian completed a college degree?, RACE_GROUPS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.160	4.795		-.450	.654
	Has your parent or legal guardian completed a college degree?	.608	1.728	.043	.352	.726
	RACE_GROUPS	.380	1.114	.041	.341	.734
	What is your gender? - Selected Choice	.357	2.001	.022	.178	.859

a. Dependent Variable: GSES_DIFF

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