Moving Online Together: Enhancing Mental Health and Social Connection Through a Virtual Dance Class During COVID-19

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ABSTRACT

Physical activity has profound acute effects on the body and brain, causing a cascade of beneficial physiological and psychological processes to occur. Dance, a multidimensional form of physical activity, has shown similar positive effects in long-term studies, but no studies to date have looked at the relationship between mental health and social outcomes of dance. In March of 2020, the quarantine that took place due to COVID-19 caused a sense of social isolation, lack of physical connection, and increased mental health issues. In this study, we explore the hypothesis that online dance can acutely improve mental health and connection during a time of isolation. N=47 healthy adults completed a series of self-reported Qualtrics questionnaires before and after a single 60-minute online dance session. Data were analyzed using paired-samples t-tests, Pearson's correlations, and linear regressions. Online dance acutely improved mental health by increasing positive affect and self-esteem while decreasing negative affect and depression. Social and community connectedness were also enhanced, with those who experienced the largest decreases in negative affect demonstrating the largest gains in social connectivity. Further, an individual’s trait learning style influenced class efficacy, with tactile learners benefitting the most in mood state and visual learners benefitting the most socially. Finally, we found that greater levels of experienced enjoyment improved mood state, whereas greater levels of perceived difficulty resulted in increased anxiety. We suggest best practices for online dance, provide future areas of research, and highlight the importance of using online learning to increase dance accessibility to diverse populations.
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GENERAL AUDIENCE ABSTRACT

The quarantines that occurred because of the COVID-19 pandemic in 2020 negatively impacted mental health and decreased social interactions across the globe. Dance has been shown to improve long-term mental health outcomes, primarily in clinical populations, but it is not known if dance can acutely improve both mental health and social connection. A sample of 47 participants ranging from 18 to 70 years of age (avg. = 32.47 +/- 2.32 years) showed that a single 60-minute session of an online self-selected dance class acutely improved mental health by increasing positive affect and self-esteem while decreasing negative affect and depression. Social and community connection was also improved in these participants, with visual learners seeing the most enhancements in social measures. Further, those who enjoyed the class most experienced the largest improvements in mood state, while those who perceived the class as difficult experienced increased feelings of anxiety. This study was novel in its analysis of both mental health and social connection, and as a result, we suggest the future use of online dance to improve these health components in a variety of populations.
Acknowledgments

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Finally, I would like to thank the VT Sports Medicine Staff for lifting me with their unwavering strength and resolve, particularly since the start of this pandemic. From day one, they have helped me learn and grow into a better healthcare provider and a better version of myself. They encouraged me every step of the journey, both academically and professionally, and that support has been instrumental to this degree. Battling COVID-19 has felt like an insurmountable challenge at times, but their kindness and resilience has been an inspiration to me as we’ve worked the front lines of sports medicine together this year. They are some of the most stellar humans I know and I am honored to be part of such an amazing family for the rest of my life.
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Attribution

This project & report document is derived from two manuscripts; the first was prepared by Rachel Rugh, Ashlee Humphries, and Julia Basso, and the second was prepared by Ashlee Humphries and Julia Basso.

The manuscript by Rugh, Humphries, and Basso is currently under review. It focuses on the qualitative data from this study, specifically discussing learning style, class experience, and dance history from an educational perspective. The manuscript by Humphries and Basso is in preparation and will be submitted in 2021. This work focuses primarily on mental health, social connection, subjective exercise experience, and the social-emotional connection.

The data contained in this study has been presented at the Mid-Atlantic Teaching Artists Retreat (2020) and has been accepted for presentation at the ACSM Annual Meeting (2021).

Declaration of Interest Statement: Class instructor Rachel Rugh is both an adjunct faculty member at Virginia Tech and director of the dance studio we utilized for this study, New River Moving Arts. The studio was compensated by the university in order to provide classes at no cost to the 47 study participants; however, no additional financial compensation was received.
Introduction

The COVID-19 crisis, originating in Wuhan, China during the latter end of 2019 (Huang et al., 2020), has brought severe change to the lives of people throughout the globe. After the World Health Organization (WHO) declared COVID-19 as a pandemic in March 2020, a period of social isolation and reliance on digital communication increased drastically, which contributed to increased feelings of anxiety in individuals around the globe (Gao et al., 2020). Although some studies show that the pandemic has had a negative impact on physical activity, many people have turned to exercise as an outlet for anxious or depressive feelings, since a negative association exists between physical activity level and anxiety/depressive related disorders (Puccinelli et al., 2021; Goodwin, 2003). Dance, an artistic form of exercise, has been shown to improve mood, enhance self-confidence, and decrease anxiety when used as an intervention in people with persistent mental illness (Hackney & Earhart, 2010). However, little has been done to investigate the mental health effects of dance in healthy populations, especially those undergoing a psychosocial stressor such as the current COVID-19 crisis.

Previous research has shown that dance is beneficial for mental health issues, including depression, anxiety, schizophrenia, and disordered eating, among others (Lee et al., 2015; Vaverniece et al., 2012; Koch et al., 2014). Qualitative studies have shown that dance reduces self-reported symptoms of depression, with participants providing four primary reasons for the beneficial effects, including dancing for their own health, social acceptance, connection with others, and not wanting to stop due to unexpected benefits (Murrock & Graor, 2016). Additionally, dance has been shown to reduce psychological distress and improve stress management, with effects lasting up to 6 months after the intervention (Bräuninger, 2012). Importantly, dance has also been shown to improve mental well-being among non-clinical populations, especially
amongst children and the elderly (Lee et al., 2015; Vaverniece et al., 2012; Koch et al., 2014). In the realm of improving social connection, dance has also shown favorable outcomes. Murrock & Graor (2016) studied disadvantaged adults who experience depression from social isolation and their response to a 12-week dance intervention. The research revealed feelings of social acceptance, connection with others, and adoption of a group identity among participants. Further, Bognar (2017) found that patients with Parkinson’s disease developed a sense of social connectedness through dance, improving outlook on life and decreasing feelings of negativity toward disease diagnosis. These studies have focused on long-term interventions of at least 6 weeks in duration; however, a major gap in the literature is the focus on the acute effects of dance on psychological health. Additionally, no studies to date have looked at the relationship between mental health and social outcomes of dance.

Therefore, the present study examined the effects of an online dance class on mental health and social connectivity during the COVID-19 pandemic. We hypothesized that a single 60-minute session of online dance would significantly decrease negative affective states and increase positive affective states. Additionally, we hypothesized that dance would acutely increase levels of social connectivity and that the enhancements in affective state would predict these social outcomes. These findings have important clinical implications for individuals experiencing social isolation during the pandemic and otherwise.
Literature Review

The positive effects of exercise on mental health are well established in the field of exercise science and physiology, both in terms of acute and longitudinal effects. These effects include, but are not limited to, increases in cell proliferation, brain function, cognition, cardiorespiratory fitness, and the mood-boosting releases of endorphins (Lubans, 2016). Additionally, a negative association exists between physical activity level and anxiety/depressive related disorders, including major depression, panic attacks, and social phobias (Goodwin, 2003). Similarly, the acute effects of dance on mental health markers has been studied, though not nearly as extensively. Using art as a way to promote well-being has been a staple in societies for centuries and engaging in these practices reduces symptoms of mental illness (Jensen & Bonde, 2018); dance is a unique blend of athleticism and art, deserving careful consideration as a method to boost mental health.

The purpose of this literature review (and subsequent study) is to examine the published research related to the use of dance in improving mental health and social connectivity, particularly through an online medium. In doing so, we aim to add to the body of literature surrounding this topic, benefiting dancers, dance teachers, and medical practitioners.

General Movement & Mental Health

The science of movement and its resultant health benefits is not a new concept in the medical community. For the past several decades, obesity has been identified as a key health issue around the world, but particularly in the United States. Those suffering from obesity are more prone to developing chronic illness such as cardiovascular disease, diabetes, and organ failure (Smith, 2016). Increasing physical fitness and cardiopulmonary endurance not only mitigates these risks from a body weight standpoint—exercise also induces a cascade of physiological reactions that support mental health. The release of endogenous opioids or endorphins during exercise
triggers mechanisms in the brain that promote happiness (Alam, 2019). Other benefits of exercise include mood enhancement, anxiety prevention, and sleep regulation (Weir, 2011). Recent literature shows that in the middle of a pandemic, exercise has been particularly beneficial in boosting mood. Amatriain-Fernández et al. (2020) note that exercise combats the effects of depression, acute stress, and exhaustion, all of which are often experienced by people in quarantine. Surely there is no time like the present to promote exercise as a way to counteract the impact of a pandemic on the mental health of the world’s population.

**Dance & Mental Health**

Different styles of dance have been applied to diverse populations to treat mental health disorders. One such study administered a one-hour salsa dance class every week for 10 weeks to adults with a serious and persistent mental illness (SMI). Participants reported enjoyment with the classes, improvements in mood, more confidence, and less anxiety (Hackney & Earhart, 2010). In college-aged students, jazz dance classes yield a positive increase in mental health scores over an eight-week period (Wang, 2019). Cognitive, emotional, and motor improvements are seen in patients with Parkinson’s disease, dementia, and Alzheimer’s disease (de Natalie, 2017; Abraha, 2017; Gomez, 2017). Further, in children with Autism, yoga and dance are considered to be an effective treatment for improving behavioral outcomes, along with martial arts and horseback riding (Bremer, 2016). While populations, health conditions, and dance styles are diverse, the positive impacts of dance on mental health and the improvement of mental health disorders is encouraging. The broad audience now using dance therapy as a modality gives us hope that dance’s multidimensional nature can be applied to the treatment of a myriad of situations for both healthy and clinical populations.

**Dance & Social Connection**
Humans, like animals, desire social alignment with one another. Shamay-Tsoory et al. (2019) explains the social alignment theory as a blending of motor, cognitive, and emotional synchronization, which humans achieve by activating different areas of the brain as they build relationships. This pattern of motor, cognitive, and emotional blending can be seen in the course of a dance class; individuals move together in physical and emotional ways to produce a piece of art that is visually satisfying for the viewer. The performer also receives benefits from the performance, some of which are social in nature. Murrock & Graor (2016) studied disadvantaged adults who experience depression from social isolation and their response to a 12-week dance intervention. The research revealed feelings of social acceptance, connection with others, and adoption of a group identity among participants. Additionally, patients with Parkinson’s disease who participate in dance develop a new sense of social connectedness, which improves their life outlook and decreases negative feelings toward their diagnosis (Bognar, 2017). These studies reinforce the idea that people from different walks of life with diverse struggles can find meaning and connection through dance.

**Online Learning During COVID-19**

The COVID-19 pandemic increased rates of social isolation from as low as 10% across the USA, Europe, and China to upwards of 24%, with millennials experiencing loneliness more than any other age group (Hwang et al., 2020; Smith & Lim, 2020). As a result, recent studies detail the mental health impacts of COVID-19, including increased symptoms of anxiety, depression, stress, avoidance behaviors, insomnia, anger, and fear (Torales et al., 2020; Talevi et al., 2020). These alarming symptoms call for a need to address an increasing mental health crisis along with the physical health crisis we face. Recent literature shows that in the middle of a pandemic, exercise has been particularly beneficial in boosting mood, especially in combatting the effects of
depression, stress, and exhaustion, all of which are often experienced by people in quarantine (Amatriain-Fernández et al., 2020).

Due to stay-at-home orders, social media, video conferencing, and other forms of digital communication have seen an increased use, not only for personal reasons, but for conducting necessary work and school functions (Clair et al., 2021). Dance classes have made a similar shift; since March 2020, many studios, companies, and teams have transitioned to online collaboration or have cancelled movement classes completely. This presents a unique challenge to dance teachers as they learn how to use a two-dimensional format of education for a skill that is so three-dimensional in nature. Gingrasso (2020) identifies several obstacles in virtual dance instruction, such as an inability to give tactile cues or not being able to see the whole body in movement due to screen restrictions. However, while some may argue that online learning inhibits social connection, Smith-Merry (2019) identifies online forums as a useful tool in maintaining social connectivity during times when face-to-face connection is limited. We hypothesize that online dance instruction may be a way to combat social isolation and mental health issues resulting from the pandemic.

**Theoretical Framework**

As summarized in the above sections, physical activity reduces symptoms of mental illness through a variety of physiological pathways. Dance, an art and an athletic exercise, has shown to reduce some of these same symptoms as well as improve feelings of social connectedness. We posit that dance instruction given through a virtual platform will have similar effects as the literature describes for in-person dancing.

One theory that can be applied to this study is the theory of interaction. It was developed by Homans (1950) and was used to study connections between individuals after a series of
interactions (or lack thereof). Homans concluded, “If the frequency of interaction between two or more persons increases, the degree of their liking for one another will increase, and vice versa” (Cresswell & Cresswell, 2018). In regards to our study, this theory holds that we would expect positive social connectedness outcomes to increase as interactions between individuals in our study take place during virtual dance classes.

Summary

It is at this moment in a historical pandemic that we propose this research, since the examination of an online dance class’s effectiveness on mental health and social connectedness has never been more important. We have demonstrated how dance and physical activity influence both mental well-being and social connectedness, though the avenues of virtual dance classes have yet to be explored extensively. Current evolutionary theories posit that dance has evolved as a form of imitation for the purposes of social communication, connection, and learning (Laland, 2016), and we aim to add our voices to those theories. By sharing this information with dancers, dance teachers, and clinicians, we hope to advocate for dance as a treatment and/or prevention tool for improving symptoms associated with mental health.
Materials and Methods

This cross-sectional quantitative study consisted of a repeated-measures design; participants took a self-report, questionnaire-based assessment both before and after a movement class. Our primary study endpoints included mental health measures, which were assessed using the following scales: 1) self-esteem as assessed by the Rosenberg Self-Esteem Scale (Rosenberg, 1989); 2) positive and negative affect as assessed by the Positive and Negative Affect Schedule – Short Form (Watson et al., 1988); 3) anxiety as assessed by the Beck Anxiety Inventory (BAI) (Steer & Beck, 1997); and 4) depression as assessed by the Beck Depression Inventory (BDI) (Beck et al., 1961).

Rosenberg Self-Esteem Scale (Rosenberg, 1989): The Rosenberg Self-Esteem Scale (RSES) is the most widely used self-esteem measure; it consists of a 10-item scale that measures positive and negative feelings towards oneself using a 4-point Likert scale. Total scores range from 0-30, with a score lower than 15 suggesting low self-esteem.

Positive and Negative Affect Schedule – Short Form (Watson et al., 1988): The Positive and Negative Affect Schedule – Short Form (PANAS – SF) is a reliable and validated questionnaire consisting of two 10-item scales that assess mood using a 5-point Likert scale. These two scales assess both positive (PA) and negative affect (NA); the sum of the items for PA and NA are scored separately and each range from 10-50.

Beck Anxiety Inventory (Steer & Beck, 1997): The Beck Anxiety Inventory (BAI) is a valid and reliable tool consisting of a 21-item questionnaire, where items are scored using a 4-point Likert scale. The sum of the items yields a total anxiety score ranging from 0 to 63.
Beck Depression Inventory (Beck et al., 1961): The Beck Depression Inventory (BDI) is a consistent and reliable tool that utilizes a 21-item self-reported inventory to measure the severity of depressive symptoms.

Social measures, another primary endpoint, included the following: 1) social connectedness as assessed by the Social Connectedness Scale (Lee & Robbins, 1995); 2) loneliness as assessed by the UCLA Loneliness Scale (Russell, 1996); and 3) community inclusion as assessed by the Inclusion of Community in Self Scale (Mashek et al., 2007).

Social Connectedness Scale (Lee & Robbins, 1995): The Social Connectedness Scale (SCS) is a highly reliable and valid tool used to assess the degree of an individual’s connection to others within their social environment. It utilizes a 20-item questionnaire that is scored using a 6-point Likert scale.

UCLA Loneliness Scale (Russell, 1996): The UCLA Loneliness Scale is a validated tool that measures a person’s subjective feelings of loneliness and social isolation. It is a 20-item questionnaire that allows participants to self-rate each item as “often,” “sometimes,” “rarely,” or “never” feeling the described statements.

Inclusion of Community in Self Scale (Mashek et al., 2007): The Inclusion of Community in Self Scale (ICS) is a reliable and valid single-item measure of community connectedness. Participants self-select one of seven pictorial models that best identifies their feelings towards the relationship of themselves to their community, represented by circles that converge to varying degrees.

Secondary study endpoints included the following: exercise experience as assessed by the Subjective Exercise Experiences Scale (McAuley & Courneya, 1994); learning style assessed by the Barsch Learning Styles Inventory (Barsch, 1991); dance history as assessed by a self-reported
level of dance expertise and years of dance experience; and class experience as assessed by a self-designed visual analog scale (VAS) to rate perceived difficulty and enjoyment.

*Subjective Exercise Experiences Scale* (McAuley & Courneya, 1994): The Subjective Exercise Experiences Scale (SEES) assesses three categories of subjective response to exercise: positive well-being, psychological distress, and fatigue. It is a questionnaire that is highly consistent across a variety of populations and is comprised of a 12-item scale, with each item rated using a 7-point Likert scale.

*Barsch Learning Styles Inventory* (Barsch, 1991): The Barsch Learning Styles Inventory is a valid and reliable tool containing 24 statements that participants self-report as “often true,” “sometimes true,” and “seldom true” about themselves. Once scored, the scale divides participants into three major learning style preferences: visual, auditory, and tactile.

All methods were approved by the Virginia Tech Institutional Review Board (IRB) and Human Research Protection Program (HRPP) and were performed in accordance with the relevant guidelines and regulations.

**Participant Recruitment**

This acute experimental study consisted of a repeated-measures design; participants took a self-report, questionnaire-based assessment both before and after an online dance class. Participants were recruited via online communication through social media, advertisements on Dancing Alone Together (dancingalonetogether.org), networking with New River Moving Arts (newrimerovingarts.com), and Virginia Tech’s Listserv resources. Interest emails were directed to the researchers, who replied with a link to Sign Up Genius, where participants could sign up for a self-selected class of their choice. After registering for their class, they received an email with a
link to the pre-participation Qualtrics survey; part of the pre-participation survey included an eligibility screening.

**Inclusion and Exclusion Criteria**

Potential participants were eligible to complete both surveys if they were age 18 or older, capable of engaging in physical activity, living within the United States, and English speaking (since the dance classes were taught in English). Participants also needed to pass the Physical Activity Readiness Questionnaire (PAR-Q) (Thomas et al., 1992) before participating. Additional exclusionary criteria included not ambulatory and intellectual impairment that would impact psychological assessment or intervention participation, as our aim was to study primarily healthy populations. Participants were screened for former or current psychiatric diagnoses and medication intake, but these did not serve as exclusionary criteria; rather, these pieces of information provided researchers with a broader picture of the mental and physical health of the individual. Participants were also asked to take the pre-intervention survey either on a day they did not plan on exercising or before their daily exercise session (not immediately after exercise).

**Pre-Intervention Procedures**

During the pre-intervention survey, participants signed an electronic informed consent, then answered a series of questions to assess demographic information, including age, gender, race, ethnicity, employment status, education, income, living environment, height, weight, and body mass index (BMI). Among these questions, the participants were asked if they lived in a rural or urban community; COVID-19 has created a perfect storm for a major mental health epidemic, and isolation is especially impactful on rural communities (Murrock & Graor, 2016). Based on the findings in this demographic, we wanted to determine whether individuals in rural and urban communities require different strategies in online movement education to enhance mental health.
The aforementioned mental health and social connectedness tools used to examine primary and secondary study endpoints were also included in this pre-intervention survey. Participants were also asked about their exercise history and prior dance experience.

Study personnel reviewed the pre-intervention assessment to ensure that the participant was eligible for the study. If the participant was deemed ineligible, they were sent an email informing them of their inability to be included in the study. Eligible participants (n=47, mean age=32.5 +/- 2.32 SEM) were sent a standard email confirming their participation with the date and time of their scheduled movement class. Twenty-four hours prior to the class, participants were sent a reminder and a Zoom link to the class.

**Dance Class Design**

At their scheduled time, participants logged into Zoom and engaged in a 60-minute dance class. Participants were asked to activate their camera (to ensure similar levels of engagement with the movement class), but had the option to mute their microphones. Additionally, at the beginning of every class, participants were reminded to clear a space of approximately 8 by 10 feet to minimize any risks associated with dancing in their home. Additionally, choreography was taught and group performance/observation was included at the end of class. These classes were taught by New River Moving Arts faculty and included three genres of dance: contemporary/modern, ballet, and jazz. Participants were able to self-select their preferred dance genre prior to the class. All classes were taught at a beginner level, but movement options were offered for each dance exercise to accommodate dancers of all skill levels. Dance classes were held in the late afternoon/evening hours, which varied based on the participant’s time zone. Participants received the dance class at no cost.
Post-Intervention Procedures

Thirty minutes into the dance class, the participants received an emailed link to a post-intervention Qualtrics survey; this was to encourage greatest adherence in finishing both surveys. At the end of class, dance teachers instructed the participants to complete the survey within two hours after the Zoom meeting ended. This interval was selected because the greatest number of acute physiological effects of exercise exist within 120 minutes after cessation of activity (Basso & Suzuki, 2017). The survey contained questions about perceived difficulty level of the dance class, level of enjoyment, and if the participant had completed any other exercise during the day besides dancing. All primary endpoint measures were re-assessed in the post-intervention survey as part of the repeated measures study design. Data from both the pre- and post- intervention surveys was scored using Qualtrics.

Data Collection

All data were collected using Qualtrics. Participants accessed Qualtrics through a link sent to their emails and completed their self-report survey using a personal computer. Survey submissions were accepted over the course of the four weeks of the study where dance classes were conducted. All data were de-identified after the study period was over by assigning a number/letter ID to each response. This coded information was stored in password protected computers in password protected servers at Virginia Tech, which only the research staff had access to. Per the IRB protocol, all codes will be destroyed 3 years past the date of publication.

After all surveys had been collected, each question was scored on Qualtrics using an assigned numeric system. This assigned score was based on the scoring instructions for each specific evaluation tool; for example, a “yes” answer was scored as a 1 while a “no” answer was given a score of zero in the Physical Activity Readiness Questionnaire (PAR-Q) (Thomas et al.,
1992). In other tools, such as the Beck Anxiety Inventory (Steer & Beck, 1997), an
ascending/descending order was assigned (“not at all” = 0, “mildly” = 1, “moderately” = 2,
“severely” = 3). Once scored on Qualtrics, the data sets were downloaded and imported into SPSS
for formal analysis.

Data Analysis

To determine the sample size to sufficiently power our study, an a-priori power analysis
was conducted using the UCSF Clinical and Translational Science Institute correlation sample size
calculator (Hulley et al., 2001). The power analysis was based on a correlation with an alpha (α)
of 0.05, a beta (β) of 0.20, and a correlation coefficient (r) of 0.4, with results indicating a sample
size of n=47.

All data were analyzed using SPSS Statistics 26.0 (George & Mallery, 2019). Change
scores were calculated by subtracting the pre-intervention from the post-intervention measures.
Paired-samples statistical analyses were used to determine whether there was a statistically
significant mean difference between the pre-intervention and post-intervention surveys regarding
affective state and social connection. Further, linear regressions were used to analyze interactions
between mental health and social connection. To examine the relationship between dance measures
(e.g., dance experience, learning style, or years of dance experience) and acute dance-induced
mental health outcomes, Pearson’s product-moment correlation was utilized. Additionally,
qualitative data were collected using the participants' response to the question, “Please share with
us any additional comments, questions, or concerns about the study.”
Results

Participant Population

We collected data from n=59 participants; however, after excluding those who did not complete both surveys, the final number of participants who completed the study was n = 47 (a 65% retention rate). The mean age was 32.47 years (+/- 2.32 SEM), ranging from 18 to 70. Of these participants, 92% had college degrees, 68% had an annual household income in middle- or high-income categories, and 76% worked full or part time (Table 1). Male participants (n = 4) and female participants (n = 43) were primarily of Caucasian descent (77%) and most were non-Hispanic (98%). Urban and rural communities were well represented at 49% and 51%, respectively (Table 1). The majority of participants (55%) were in the BMI range for normal weight (BMI of 18.5-24.9), compared to the national obesity prevalence of 42.4% in adults (Hales et al. 2020). Finally, participants’ self-selected classes revealed a preference for jazz dance (43% of participants), followed by modern (34%) and ballet (23%).

Table 1 Participant demographics detailed in both a frequency table (A) and a contingency table (B).
Mental Health Outcomes

**Acute Effects of Dance on Affective State**

Compared to baseline measures, after the dance class, participants experienced increases in positive affect ($t(46)=-2.067$, $p=.044$) and self-esteem ($t(46)=-4.264$, $p<.0001$). Decreases in negative affect ($t(46)=9.166$, $p<0.001$) and depression ($t(46)=3.808$, $<0.001$) were also found. Anxiety measures showed no statistically significant differences.
**Figure 1** Paired samples t-tests comparing baseline measures to post-intervention scores for negative affect, depression, anxiety, self-esteem, and positive affect. All except anxiety measures displayed a significant change. *Statistically significant at p<0.05

We further compared our five affective state measures using Pearson’s correlation (Figures 2A & 2B; Table 2). There was a statistically significant negative correlation between positive affect and negative affect change scores ($r = -0.427$, $p=0.003$), as well as a negative correlation between positive affect and BDI change scores ($r = -0.493$, $p<0.0001$). Self-esteem yielded a significant negative correlation to positive affect ($r = -0.317$, $p=0.030$). Inversely, the data demonstrates that a negative affective state was positively correlated with both BAI change scores ($r = 0.691$, $p<0.0001$) and BDI change scores ($r = 0.507$, $p<0.0001$). The correlation between BAI and BDI change scores was also significant ($r = 0.629$, $p<0.0001$).
Figure 2 Relationship between primary mental health outcomes. A-B. Positive affect showed a significant negative association to the change in negative affect (as measured by the Positive and Negative Affect Schedule) and depression (as measured by the Beck Depression Inventory). C-D. Negative affect showed a significant positive association to the change in anxiety (as measured by the Beck Anxiety Inventory) and depression (as measured by the Beck Depression Inventory).

*Statistically significant at p<0.05.
Table 2 Pearson’s correlations table for affective state and social connection change scores (p<0.05).

The psychological response to exercise is associated with changes in affective state

Subjective Exercise Experience Scale (SEES) positive well-being was positively associated with the change in positive affect experienced after dance (r= .356, p= .014). SEES positive well-being was also negatively associated with the change in anxiety experienced after dancing (r= -.320, p= .028). Psychological distress was positively associated with the change in both anxiety (r= .567, p<.0001) and depression (r= .328, p=.025). Fatigue levels also demonstrated positive correlations with the change in psychological distress (r= .622, p<.0001) and anxiety (r= .422, p= .003).

Social Connection Outcomes

Acute effects of dance on social connectivity

Compared to baseline measures, after the dance class, participants experienced increases in social connection (t(46)= -3.069, p= .004) and community inclusion (t(46)= -2.183, p= .034). Positive correlations were seen between social and community connectedness (r = .328, p=.025). There were no statistically significant effects associated with the UCLA Loneliness Scale.
**Figure 3** Paired samples t-tests comparing baseline measures to post-intervention scores for social connection, community inclusion, and loneliness. *Statistically significant at p<0.05

![Graph showing change scores for loneliness, community connectedness, and social connectedness.](image)

**The affective state response predicts social connectedness**

A linear regression established that changes in self-esteem statistically significantly predicted changes in social connection (Figure 4A; $F(1, 45) = 10.863, p = .002$) with improvements in self-esteem accounted for 19.4% of the explained variability in social connectivity increases with adjusted $R^2 = 17.7%$. Participants with the largest increases in self-esteem experienced the largest gains in social ($r = -.441, p = .002$) and community ($r = -.420, p = .003$) connectedness.

An identical linear regression established that changes in negative affect statistically significantly predicted changes in social connection (Figure 4B; $F(1, 45) = 5.044, p = .030$). Negative affect accounted for 10.1% of social connection variability with adjusted $R^2 = 8.1%$. Those who experienced the largest decreases in negative affect demonstrated the largest gains in social connectivity ($r = -.317, p = .030$) and community connectivity ($r = -.295, p = .044$).
**Figure 4** Relationship of social connection to primary affective state outcomes. A. The Rosenberg self-esteem scale showed a significant positive association to the change in social connectivity as measured by the Social Connectedness Scale. B. Changes in negative affect as assessed by the Positive and Negative Affect Schedule showed a significant negative association to the change in social connectivity as measured by the Social Connectedness Scale. *Statistically significant at p<0.05.

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<thead>
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<tbody>
<tr>
<td><img src="image1.png" alt="Graph A" /></td>
<td><img src="image2.png" alt="Graph B" /></td>
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**Effect of Learning Style**

We were also interested in examining whether an individual’s preferred learning style would influence mental health and social connection outcomes in a virtual setting. Using the Barsch Learning Styles Inventory, we divided participants into visual, auditory, and tactile learners (or a combination if they had an equivalent score in two categories; no individual scored evenly in all three areas). Interestingly, the predominant learning style was visual (42% of participants), followed by tactile (17%), visual/auditory (13%), auditory (9%), visual/tactile (9%), and auditory/tactile (4%).
Our findings show two prominent effects. First, visual learning scores showed a significant positive association to the change in the Inclusion in Community in Self score (Figure 5A; $p=.007$, $r=.389$), showing that visual learners experience an increased sense of community inclusion from an online dance learning experience. Second, tactile learning scores showed a significant negative association to the change in negative affect scores from the Positive and Negative Affect Schedule (Figure 5B; $p=0.028$, $r=-.320$), demonstrating that tactile learners experienced the most significant mood improvements from an online dance learning experience. No significant associations were seen between auditory learning score and primary mental health and social connectedness outcome measures.

**Figure 5** Relationship of learning styles to primary outcomes. A. The Barsch visual learning score showed a significant positive association to the change in social connectivity as measured by the Inclusion of Community in Self Scale. B. The Barsch tactile learning score showed a significant negative association to the change in negative affect score as measured by the Positive and Negative Affect Schedule. *Statistically significant at $p<0.05$. 
Effect of Class Experience

At the end of class, participants were queried on their overall experience of the class in terms of both enjoyment and difficulty level. Overall, participants reported the class as moderately to highly enjoyable, with an average of 8.4 (+/- 0.32 SEM) on a 0 to 10-point scale. In terms of the relationship to primary outcome measures, we found that class enjoyment was significantly positively associated with the change in positive affect as measured by the Positive and Negative Affect Schedule (Figure 6A; p=.015, r=.351). Additionally, participants reported the class as low to moderately difficult, with an average of 3.6 (+/- 0.23 SEM) on a 0 to 10-point scale. Perceived level of difficulty was significantly positively associated with the change in anxiety as measured by the Beck Anxiety Inventory (Figure 6B; p=.037, r=.305), which revealed that those individuals who perceived the class as most difficult had the greatest increases in anxiety from before to after class.

Figure 6 Relationship of class experience to primary outcomes. A. Perceived level of enjoyment showed a significant positive association to the change in positive affect score as measured by the Positive and Negative Affect Schedule. B. Perceived level of difficulty showed a significant positive association to the change in anxiety as measured by the Beck Anxiety Inventory. *Statistically significant at p<0.05.
Effect of Dance History

Participants were additionally queried on their dance experience, both in terms of years of dance as well as a self-reported categorization measure of dance experience (i.e., beginning, intermediate, advanced, or professional). Beginner dancers comprised 36% of participants, with intermediate dancers at 38%, advanced dancers at 17%, and professional dancers at 9%. We found that dance experience was negatively associated with the change in positive affect (Figure 7; \( p=0.006, r=-0.396 \)); that is, the more advanced the dancer, the less positive affective change they received from the class. Surprisingly, neither level of class enjoyment nor perceived difficulty were significantly related to years of dance experience.

**Figure 7** Relationship of dance history to primary outcomes. Years of dance experience showed a significant negative association to the change in positive affect. *Statistically significant at \( p<0.05 \).
Testimonials of Class Experience

During the post-intervention survey, we asked participants to provide feedback on their experience. In Table 3, we present both positive and negative or other feedback from participants. The feedback includes comments regarding the need and interest in such online movement opportunities as well as the difficulties and challenges associated with the virtual experience.

**Table 3 Participant feedback regarding their online dance class experience.**

<table>
<thead>
<tr>
<th>Positive Feedback</th>
<th>Negative/Other Feedback</th>
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<td>“I have been aching for a way to start moving my body especially since the pandemic hit. Thank you so much for this opportunity.”</td>
<td>“As much as I love the spirit of these classes...zoom is so HARD. I miss getting to chat with people before, during, and after class. They don't feel as social on Zoom.”</td>
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<td>“I really enjoyed doing this study. I felt nervous about turning the camera on for”</td>
<td>“I expected to do more choreography in the class than just ballet and movement exercises.”</td>
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<td>Comment</td>
<td>Response</td>
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<td>“I was diagnosed with minor depression and go through good and bad days. Dance always helps me out and when I first took the survey, I was not having the best day but today (post dance) has been a very good and happy day.”</td>
<td>“The only comment I have is that I had some difficulty following because I could see everyone in small boxes instead of just [the instructor].”</td>
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<tr>
<td>“This has motivated me to be involved in more classes like this after remembering and recognizing how movement, exercise, and class unity makes me feel!”</td>
<td>“The current pandemic has affected us all in isolation from friends, family and general social interactions. I was surprised the survey did not ask us to consider answering the questions from a time from before or currently during the pandemic isolation. It clearly has some impact on my answers.”</td>
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<tr>
<td>“The class was fantastic and the instructor was so lovely and cheerful. Please tell her she was a ray of sunshine in my day :)”</td>
<td>“...A lot of time during the class, I couldn't see the instructor's feet. I could see the feet of the other person she had with her, but it was hard to split attention between looking at that person's feet and listening to the instructor...I finally figured out how to pin the instructor's video because here and there someone would do something and their video would come up instead, which was annoying. It would be good if instructions on how to do that were shared at the beginning.”</td>
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<td>“I'm not a dancer, but I really enjoyed the class! Now that I've got my workout clothes on, I'm going to do some yoga (my true love) after finishing this survey.”</td>
<td>“A concern on wording it that the questionnaire asks about how ‘often’ you feel something ‘right now.’ This wording can lend itself to multiple interpretations, and I may have been back and forth on the two while taking it; thanks for the fun class!”</td>
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<tr>
<td>“This was fun! Thanks! It gave me and my husband a fun activity to do together.”</td>
<td>“Will there be any follow up to participants with the results from the study? I think this is an awesome study and I was glad I could participate, I'm very curious to see what results you receive. Thank you for the opportunity to get my body moving during this hard time for me. Keep being awesome and teaching positive classes!”</td>
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“...I was preparing for my coming qualifying exam. I really enjoyed the engagement with other people during the dance class. Thanks a lot for the class!”

“Not sure why, but I had a bit of nausea (bad lunch?), and a lot of emotional release nearing [the] end of class, and so I didn't feel super positive after exercise/dance as I might normally. Thanks for class anyhow!”
Discussion

Using dance as a way to promote well-being has been a staple in societies for centuries and engaging in such performance arts practices has been shown to enhance mental wellness (Jensen & Bonde, 2018). Here, we explored in this new era of online learning whether virtual dance could confer similar mental health benefits. Overall, our findings suggest that dance significantly enhances both social connection and affect, with the psychological response to exercise predicting affect changes and affective state changes influencing social connectivity. Further, an online dance education experience is effective at improving mood states and increasing sense of community inclusion in a group of healthy adults. This has important implications for educational opportunities that need to be online, for example, during stay at home orders during a pandemic or during distance learning where in person learning is not feasible. Importantly, we found that an individual’s trait learning style can influence the effectiveness of online learning, with tactile learners benefitting the most in terms of mood state and visual learners benefitting the most in terms of social connectivity. Additionally, an individual’s experience of the class may impact the beneficial mental and social outcomes they experience. Greater levels of experienced enjoyment will provide the greatest benefits to mood state, whereas greater levels of perceived difficulty may have detrimental effects on mood state (i.e., increased anxiety). Finally, we found that dance history is an important consideration, as novice dancers experienced the largest mental health gains. Collectively, this work suggests that dance educators can provide effective movement experiences in an online platform to both improve mood and increase social connectivity, but attention to the individual learning styles, level of enjoyment, and difficulty of the class are imperative. Below, we offer implications for each of our findings as well as discuss recommendations for future researchers and dance educators working with online platforms.
Dance Acutely Enhances Mental Health

Regarding affective state, our data shows that a dance intervention increases positive affect and self-esteem while decreases negative affect and depression; further, as negative affect and depression decrease, positive affect significantly improves. We also saw that a decrease in anxiety and depressive symptoms through a dance intervention resulted in decreased negative affect. While several researchers have examined the effects of dance on depression and anxiety in clinical populations, fewer studies have specifically analyzed positive and negative affect. Current research demonstrates that Dance Movement Therapy (DMT) focused on elements associated with happiness can significantly enhance feelings such as empowerment, pride, and determination, which are experienced as part of positive affect (van Geest et al., 2021). More closely related to our study, Koch et al. (2007) investigated the impacts of a single dance movement session on depression and positive affect in 31 psychiatric patients diagnosed with depression. Comparing dance, listening to music, and riding a stationary ergometer, they found that the dance group profited most in terms of decreased depression and more vitality. These findings are analogous to our study; a similar effect was seen after a single dance session, suggesting that a dance class is at least as effective, if not more effective, in improving affective states when compared to other forms of exercise. While our study design was not a randomized controlled trial and did not explicitly compare dance to other forms of exercise, the repeated measures design shows promising affective improvements. Future studies are warranted to examine this effect in a randomized controlled design.

In addition, the subjective exercise experience also showed a significant relationship to the dance-induced change in affective state. Specifically, as expected, those who experienced boosts
in their well-being also experienced increased positive affect and decreased anxiety. In contrast, those who experienced greater increases in psychological fatigue also had increases in symptoms of anxiety and depression; similarly, those who reported higher levels of fatigue reported elevated anxiety levels. In short, on average, dance increased the positives and decreased negatives. Previous research supports these findings; one set of researchers studied the effects of Greek traditional dance on exercise experience and affect. Their study shows that dance decreased anxiety and psychological distress while increasing positive well-being compared to a control group (Mavrovouniotis et al., 2010). Surprisingly, little has been done to investigate how SEES is involved in predicting affective state responses, though some researchers have attempted to explain the interactions and dimensions of positive and negative affect in relation to exercise experience (Ekkekakis & Petruzzello, 2001). Our research is novel in that it may be one of the first studies to demonstrate that the subjective exercise experience is related to changes in affective state.

**Dance Acutely Enhances Social Connectivity**

The current study demonstrated that online dance significantly enhanced acute social connection and community connection with positive correlations between social and community connectedness. This finding coincides with the social alignment theory, where motor, cognitive, and emotional synchrony happens as humans build relationships and activate similar brain regions (e.g., social regions of the prefrontal cortex) (Shamay-Tsoory et al., 2019). As individuals enter a dance practice, they use motor and cognitive areas of the brain to process and execute choreography, but they also exhibit emotional expression through their movements. These three elements then contribute to synchronization and harmony of movement with other dancers, increasing feelings of social connectivity (Lee et al., 2020). In our study, as participants danced, that social alignment and connection took place without physically being in the same room as the
other participants. Previous research has shown that implementing social inclusion strategies through an online-based forum is strongly suggested in the mitigation of negative effects from confinement (Ammar et al., 2020). However, the link between virtual exercise in relation to social connectivity during the pandemic has not yet been examined. Our research is notable in the fact that it is the first to study the link between dance and social connection in healthy populations.

This study also revealed that the affective state response predicts social connection as a result of an online dance class. We saw that those who experienced the largest decreases in negative affect also demonstrated the largest gains in social and community connection, while negative affect increases predicted a negative trend in social connection. Recent evidence suggests that synchronized dancing to music with others can promote social bonds, and that the positive mood enhancements induced by dance provide advantages in social interactions (Carlson et al., 2018; Ashton, Lee, & Paunonen, 2002). Our use of Zoom as a platform allowed participants to see each other during dance instruction, which could be a major reason why we saw these increases in both affect and social connection. Further, we found that participants with the greatest improvements in self-esteem experienced the greatest levels of social connectivity. Previous studies have shown that social connectedness is positively related to state self-esteem, but the literature is mixed when it comes to its impacts on anxiety (Lee & Robbins, 1998; Armstrong & Oomen-Early, 2009; Fatima et al., 2017). Interestingly, some authors have found the reverse result, where social connectedness predicts increases in self-esteem (Williams & Galliher, 2006). Though our study did not support this reverse finding, our data demonstrated that improvements in self-esteem accounted for 19.4% of the explained variability in social connectivity increases.

**Learning Style Impacts Online Dance-Induced Mental Health Effects**
Our findings suggest that an individual’s learning style influences the benefits they receive from an online dance course. First, we found that visual learners experience the biggest gains in their sense of community inclusion. This suggests that the visual platform of Zoom, in the absence of in-person interaction, can be an effective medium to build community. Visual learners are those who learn best through images, pictures, computers or other visual media. We hypothesize that visual learners may be more focused on the visual aspect of the Zoom class, and perhaps more engaged with the instructor or the other members of the class. Elements of the online class can be developed to specifically target visual learners and interactions that promote social connectivity. For example, exercises can be developed where students are instructed to follow or mimic the movements of the instructor or to move in synchrony with one another. Alternatively, choreographic exercises could be developed whereby students use the “break out” feature of Zoom to choreograph a movement phrase together (e.g., in pairs) and then share their work with the remainder of the group. Previous research has shown that both moving in synchrony with others as well as working in collaboration (as in the experience of choreographing together) increases the sense of social bonding as well as inter-brain synchrony between individuals (Behrends, Müller, & Dziobek 2012; Valencia & Froese, 2020). Additionally, mirroring practices in dance and dance movement therapy (DMT) are thought to drive empathic enhancements, with this ability being linked to increased activation in the mirror neuron system (McGarry & Russo, 2011). We hypothesize that types of online movement experiences that focus on direct visual interactions with others on the computer screen may be especially beneficial for visual learners.

Second, we found that tactile learners experience the biggest gains in their affective state. Tactile learners are those who prefer learning through the sense of touch and hands-on activities. This may make online learning difficult for tactile learners, especially in movement practices
where the instructor would typically provide tactile cues or sensory-based activities, either with another student or directly with the instructor. In the absence of person-to-person contact, exercises can be developed to support the tactile learner. For example, a guided movement practice could be conducted that focuses on internal felt states. Specifically, as the individual moves their body through space, they can be instructed to attend to bodily sensation as they contact the floor, an object in the room, other parts of the body, or even a friend or family member at home.

Other work has identified that learning styles should be taken into consideration when designing and developing online learning classes (Zapalska & Brozik, 2006). The authors of this work suggest that, “the achievement of online learning can be improved by instruction in a manner consistent with each student’s learning style. However, it is important to keep in mind that, even if a specific student learns best in a certain way, he or she should be exposed to a variety of learning experiences to become a more versatile online learner” (Zapalska & Brozik, 2006). Of course, both assessing students’ learning styles and crafting classes geared at an individual level proves challenging on many levels. Therefore, we recommend incorporating a variety of movement experiences geared towards a variety of learning styles (i.e., visual, tactile, and auditory). Interestingly, research shows that auditory learners prefer other methods of educational experiences over online learning (Zapalska & Brozik, 2006). This is in line with our findings, first showing that we had a low percentage of auditory-dominant learners (9%) and second that auditory learners did not benefit as much from the online dance experience as visual or tactile learners.

Class Experience Impacts Online Dance-Induced Mental Health Effects

Regarding class experience, those individuals who received the most enjoyment from class received the greatest mental health benefits as assessed via change in positive affect. The positive effects of exercise on mental health are well established in the field of exercise science and
physiology, both in terms of acute and long-term exercise (Basso & Suzuki, 2017; Vivar & van Praag, 2017; Mikkelsen et al., 2017). In fact, a single bout of exercise has been shown to increase positive affective states and decrease negative affective states, with improvements lasting up to 24 hours. Additionally, exercise-induced mood improvements appear to be most beneficial when the type of exercise is self-selected, as was in the case of the current study (Zervas et al., 1993). Our results show for the first time that the greatest online dance-induced mental health benefits come when the student experiences a high level of enjoyment. Other studies have revealed similar results with in-person group fitness classes. Specifically, a study in female undergraduate students using a single session of aerobic exercise found that enjoyment levels were positively associated with exercise-induced increases in positive affect (Raedeke, 2007). Though the underlying effects of exercise-induced improvements are still under investigation, studies have shown that increases in neurotransmitters such as serotonin and dopamine as well as increases in endogenous opioids and endocannabinoids may be involved (Lubans et al., 2016; Mikkelsen et al., 2017).

Additionally, we found that the perceived level of difficulty was positively associated with the change in anxiety level, meaning that participants who felt the class to be too difficult experienced greater levels of anxiety after class as compared to before. Though these classes were taught at a beginner level, some students, perhaps new to dance or the online learning platform, found the dance experience challenging, which resulted in an unanticipated increase in anxiety. Previous research has shown that the perception of task difficulty can influence the psychological response to the task. For example, if the task is experienced as difficult, the individual will likely experience negative feelings of intimidation in response to task participation (Nunan & Keobke, 1995). A lack of familiarity with the task can cause the participant to disengage from the learning process, and in a dance class setting where learning is expected, can result in an increased anxiety
level. To combat these effects, we suggest that dance instructors adapt the learning environment to include a variety of dance levels within an online program, offering movement options that can accommodate the novice to advanced dancer. Alternatively, an approach that accommodates unique skill levels (such as offering separate classes divided into beginning, intermediate, and advanced levels) could be a suitable solution.

Our findings have implications for educators interested in positively impacting students’ mental states. In the realm of virtual dance learning, dance educators should focus on creating an enjoyable experience for their students, taking into consideration the challenging nature of the online movement experience. Offerings that may be considered at a beginner or intermediate level in the in-person format may prove to be more challenging when presented in an online format.

**Dance History Impacts Online Dance-Induced Mental Health Effects**

Regarding dance history, our data revealed that the most novice dancers (i.e., those with the fewest years of dance experience) experienced the largest gains in positive affective state. This is one of the first reports to examine the association between dance history and changes in mental health after a single session of online dance. Limited investigations have explored the relationship between exercise habits or cardiopulmonary fitness levels and change in mood states after a single session of exercise. The work that has been done indicates findings that are in opposition to ours. That is, individuals who have a regular exercise regimen, compared to those who do not, report the greatest mental health benefits after an acute bout of aerobic exercise (e.g., decreases in anxiety and fatigue) (Hoffman & Hoffman, 2008; Hallgren, Moss, & Gastin, 2010; Chen et al., 2019). These studies, however, utilized a standard, aerobic exercise protocol on a cycle ergometer or treadmill, where the participants engaged in similar moderate- or vigorous-intensity exercise regimens. One limitation of the current study was that we did not record participants’ heart rate
and therefore were unable to measure or standardize the level of aerobic activity achieved. We hypothesize that our advanced dancers did not obtain an equally high heart rate as our beginner dancers, which may contribute to the lack of mental health benefits seen in our advanced dancers. That is, advanced dancers may need a more intense or vigorous dance experience to achieve the same effects as our beginner dancers.

The effect we see in our data could also rely heavily on the fact that our dance classes were taught at the beginner level, and while that was sufficient to elicit a psychological response in less experienced dancers, more advanced dancers did not find the classes challenging or engaging enough to see the same increases in positive affect. Novice dancers may have found the class more exciting due to its novel nature, which could have contributed to greater mental health gains. This hypothesis has important implications for dance instructors; that is, for the greatest benefits in a dancer’s mental health to be achieved with a single dance class, they should be instructed at an optimum difficulty level based on their current skill set. A class that is too easy will not be as beneficial for advanced dancers, while a difficult class will hinder a beginner dancer’s ability to enjoy the movement experience. The selection of technique, pace, and choreography phrases are vital to a dancer’s enjoyment levels. Our findings suggest that online dance classes could be offered separately for beginners versus advanced dancers. Alternatively, within a mixed skill-level class, the instructor can provide multiple scaffolded movement options for beginning, intermediate and advanced learners.
Implications, Impacts, and Recommendations

The findings of this study have important clinical implications for individuals experiencing social isolation during the pandemic and otherwise. Though a virtual dance class is certainly practical during COVID-19, future use of online dance instruction to reach individuals who are unable to participate in-person can still produce mental and social benefits. This study also contains educational implications for dance educators as they build a dance pedagogy with virtual students in mind. Allowing virtual participants beyond the COVID-19 pandemic could prove to be impactful for both clinical and healthy populations as they seek to improve their mental health and social connectivity.

Recommendations

One of our goals for this study was to compile best practices and suggestions for other dance instructors in regards to teaching in an online classroom. We used Zoom as our platform, but many of these principles can be applied to a variety of online video conferencing methods.

In regards to technology, troubleshooting sound issues is one of the most important aspects of online teaching. First, students need to clearly hear your feedback and instruction. Second, they need to hear the music you are using, often simultaneously while you are speaking; otherwise, following the beats or counts of music will be challenging or impossible. For this purpose, we recommend using the “share sound” feature in Zoom to help music come through clearly while also allowing participants to hear your voices. Keep in mind that the volume levels may need to be adjusted for each song choice. Visually, we recommend that students alternate between speaker and gallery view during various parts of the class. When movement material is taught, speaker view enables participants to see the instructors more clearly. Gallery view works well to increase social connectivity during group improvisation and informal performance times.
In regards to the class itself, we recommend using the spatial framework, of both the virtual and physical space, to your advantage. We also recommend keeping in mind the space in which the students are dancing, as most participants did not have more than a small space in their bedroom or living room. Therefore, we limited large movements in choreography, developing movement material within a smaller physical area or utilizing gestural movement rather than relying on large amounts of floorwork or traveling movements. While we limited movement space, we created room for more emotional processing during the class. Sometimes this came in the form of a water break with time to verbally reflect on movement material or the dancers’ emotional states on a given day; at other times, it involved providing moments for contemplative movement while the dancers focused on their breath or bodily sensations. We also took time to slow down and clarify our methods. Finally, we found that online classes can be shorter than in-person classes; both participants and instructors faced “Zoom fatigue” as teleworking and virtual meeting hours were prominent during the day. Moving forward, we recommend considering quality over quantity when it comes to online dance learning. 45 to 60 minutes of movement, reflection, and group connection may be more effective at positively influencing mood states than the 75 to 90 minutes of pure movement that might be expected in an in-person class experience.

Finally, we found that utilizing the spatial framing of the Zoom screen proved to be an aesthetically engaging and effective teaching tool. Drawing on dance film techniques such as perspective, proximity/distance, angles and framing allowed us to capitalize on the unique and novel role of the camera in online learning versus trying to make the experience exactly like an in-person class.

Limitations and Future Directions
We acknowledge several limitations of the current study. First, as we did not include a control group, future randomized controlled trials (RCTs) are warranted. Second, as females tend to self-select dance experiences, and our sample was made of primarily females (91.5%), more males will need to be intentionally incorporated in future research studies. Additionally, only three dance styles were represented based on the expertise of the instructors (ballet, jazz and contemporary/modern); we see potential for future expansion of the project into non-Western forms or social dances.

Based on the current findings, we suggest some potential directions for future research. First, though this study was sufficiently powered for its cross-sectional nature, future studies should increase the sample size, perhaps including comparisons between sexes or differences seen across dance styles. Second, future work will need to investigate the neural mechanisms underlying the beneficial mental health effects of online dance. We are also interested in how this intervention could be applied to other forms of exercise or movement classes, as well as its application in clinical populations, such as those listed in our literature review. In addition, considering that auditory learners were the smallest sample of our cohort, and they showed negligible positive effects from this study, we are also interested to explore whether there may be ways to help meet the needs of auditory learners in an online context. Could we incorporate specific parts of class in which members of the group are instructed to turn off cameras and simply listen to verbal directions from the instructor? Are there additional aural cues that could be incorporated in classes to help auditory learners feel more successful? Investigating these questions further would provide multiple opportunities for various learning styles to achieve the wellness benefits of online dance classes.
Conclusion

Recent studies show the effectiveness of a dance intervention on several mental health and social connectedness markers in a variety of patient populations. Our study examines these markers in healthy adults who participate in a dance class using an online platform. We hypothesized that this online dance intervention will produce positive changes in mental health and social connection scores from pre- to post-intervention, which it did. While we acknowledge that holistic dance learning is most ideally achieved through in-person instruction, the results of the present study suggest that online dance can be beneficial to both the body and mind when in-person learning is not available due to health risks or various other accessibility issues. Best practices for online dance learning include: repetition and scaffolding of movement material; simplicity and clarity of movement material and verbal directives; tending to both individual experience and group connection; and incorporating a variety of movement experiences geared towards various learning styles.

Perhaps most importantly, even when we can safely resume in-person learning, online classes may still play a significant role in increasing dance accessibility across a wide array of populations. Online learning has the capacity to meet various schedules, financial situations, physical limitations, learning styles, and comfort levels. Online learning can never replace the intimacy of in-person dance education, but it can and should be considered as an important element in the field of dance education at large, and future study is warranted to continue developing its efficacy as one of many tools that can be employed to deliver the mental health and physical wellness benefits of dance and movement to large and diverse populations.
References


MEMORANDUM

DATE: July 22, 2020

TO: Julia C Basso, Medha Kumari Satyal, Sarah Lynn, Ashlee Humphries

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires October 29, 2024)

PROTOCOL TITLE: Moving online together: A way to connect and enhance mental and physical well-being

IRB NUMBER: 20-415

Effective July 22, 2020, the Virginia Tech Human Research Protection Program (HRPP) determined that this protocol meets the criteria for exemption from IRB review under 45 CFR 46.104(d) category (ies) 2(ii),3(i)(B).

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit an amendment to the HRPP for a determination.

This exempt determination does not apply to any collaborating institution(s). The Virginia Tech HRPP and IRB cannot provide an exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Determined As: Exempt, under 45 CFR 46.104(d) category(ies) 2(ii),3(i)(B)
Protocol Determination Date: July 22, 2020

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.
<table>
<thead>
<tr>
<th>Date*</th>
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* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this protocol is to cover any other grant proposals, please contact the HRPP office (irb@vt.edu) immediately.
Consent

This is a research assessment administered by the Department of Human Nutrition, Foods, and Exercise at Virginia Tech. The primary purpose of this assessment is to examine the effects of a movement class on mood and social connectedness. Once you agree to participate, you will answer several questions that will determine your eligibility to participate in this research study. This screening portion will only take a few minutes of your time.

What does my participation entail? If you are eligible, you will answer a variety of questions regarding your demographic information, mood, exercise habits, and social connectedness. We ask that you take this questionnaire on a day that you did not exercise. Within 7 days of taking this survey, you will take an online movement class through Zoom at the New River Moving Arts (https://www.newrivermovingarts.com/). As soon as the movement class is over, you will then take a follow up questionnaire.
The movement class will be approximately 45 minutes in duration. Additionally, your participation in each of the questionnaires will take approximately 30 minutes, for a total of 60 minutes.

Your participation is anonymous, and your answers are confidential. You may benefit from participation in this research by engaging in physical activity, which is known to produce a variety of physical and mental health benefits. Additionally, your responses will enhance our scientific knowledge about decision-making.

Participation is voluntary and you can stop completing the assessment without submitting it at any time. For your participation in this study, you will receive the movement class for free.

Your consent to participate in this research is implied by answering "Yes" to the following consent question. If you have any questions or concerns about your rights as a research subject, you may contact the VT IRB at irb@vt.edu.

For your reference, the protocol number of this study is 20-415.

If you have any additional questions, please contact the PI of the this study, Dr. Julia C. Basso, at jbasso@vt.edu.
Thank you for your participation!

At the end of the survey, you will receive a unique participation code that you will use to sign up for the movement class.

Screening Questions

Do you agree to provide consent?

- Yes
- No

Please enter your email address, which we will use to contact you regarding eligibility for the study and class scheduling.

The following questions will determine your eligibility to participate:

What is your age (in years)?
Are you pregnant?

☐ Yes
☐ No
☐ Not applicable

Are you fluent in English?

☐ Yes
☐ No

Are you ambulatory (able to walk)?

☐ Yes
☐ No

Do you currently have any medical limitations preventing you from exercising?

☐ Yes
☐ No

Did you exercise today?

☐ Yes
☐ No
If you did exercise today, we ask that you return to take the survey on a day that you did not exercise.

- Yes
- No

How long was your exercise session today (in minutes)?

- Light (<64% maximum heart rate; e.g., taking the dog for a walk, walking up the steps)
- Moderate (64–76% of maximum heart rate; e.g., brisk walking, housework, gardening)
- Vigorous (77–95% of maximum heart rate; e.g., running, cycling, swimming, sports)

Please describe your exercise session (e.g., an outdoor yoga session).
Physical Activity Readiness Questionnaire

What time did you exercise today?

What time is it right now?

Your answers to these questions have confirmed that you are eligible for the study. You will now answer a series of questions. At the end of the survey, you will sign up for a class at the New River Moving Arts to be taken within the next 7 days.

Thank you for your participation so far! We apologize, but based on your answers to the previous questions, you do not qualify for this HIT.

Physical Activity Readiness Questionnaire

The health benefits of regular physical activity are clear; more
people should engage in physical activity every day of the week. Participating in physical activity is very safe for MOST people. This questionnaire will tell you whether it is necessary for you to seek further advice from your doctor OR a qualified exercise professional before becoming more physically active.

Once we receive your responses, we will review your results to ensure that you are cleared to engage in physical activities and able to participate in the movement class at New River Moving Arts.

Has your doctor ever said that you have a heart condition OR high blood pressure?

- yes - PLEASE SPECIFY HEART CONDITION OR HIGH BLOOD PRESSURE

- no

Do you feel pain in your chest at rest, during your daily activities of living, OR when you do physical activity?

- yes

- no
Do you lose balance because of dizziness OR have you lost consciousness in the last 12 months? Please answer NO if your dizziness was associated with over-breathing (including during vigorous exercise).

- yes
- no

Have you ever been diagnosed with another chronic medical condition (other than heart disease or high blood pressure)?

- yes - PLEASE LIST CONDITION(S)
- no

Are you currently taking prescribed medications for a chronic medical condition?

- yes - PLEASE LIST CONDITION(S) AND MEDICATIONS HERE:
- no

Do you currently have (or have had within the past 12 months)
a bone, joint, or soft tissue (muscle, ligament, or tendon) problem that could be made worse by becoming more physically active? Please answer **NO** if you had a problem in the past, **but it does not limit your current ability** to be physically active.

- **Yes** - PLEASE LIST CONDITION(S) HERE:
- **No**

Has your doctor ever said that you should only do medically supervised physical activity?

- **Yes**
- **No**

Thank you for completing this portion of the questionnaire! Please continue.

**Demographics**

The following questions will assess a variety of demographic information.
Do you live in an urban or rural community?

- Urban
- Rural

Please provide your zip code.

In which State and County do you live?

State

County

With which gender do you identify?

- Female
- Male
- Other (specify):

With which race do you identify?
With which ethnicity do you identify?

- White/Caucasian
- Black/African American
- American Indian/Alaska Native
- Asian
- Pacific Islander
- Other

What is your weight (in pounds)?

What is your height (in inches)?

<table>
<thead>
<tr>
<th>5' 0&quot; = 60&quot;</th>
<th>6' 0&quot; = 72&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>5' 1&quot; = 61&quot;</td>
<td>6' 1&quot; = 73&quot;</td>
</tr>
<tr>
<td>5' 2&quot; = 62&quot;</td>
<td>6' 2&quot; = 74&quot;</td>
</tr>
<tr>
<td>Inches</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>5' 3&quot;</td>
<td>63&quot;</td>
</tr>
<tr>
<td>5' 4&quot;</td>
<td>64&quot;</td>
</tr>
<tr>
<td>5' 5&quot;</td>
<td>65&quot;</td>
</tr>
<tr>
<td>5' 6&quot;</td>
<td>66&quot;</td>
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<tr>
<td>5' 7&quot;</td>
<td>67&quot;</td>
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<tr>
<td>5' 8&quot;</td>
<td>68&quot;</td>
</tr>
<tr>
<td>5' 9&quot;</td>
<td>69&quot;</td>
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<tr>
<td>5' 10&quot;</td>
<td>70&quot;</td>
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<tr>
<td>5' 11&quot;</td>
<td>71&quot;</td>
</tr>
<tr>
<td>6' 3&quot;</td>
<td>75&quot;</td>
</tr>
<tr>
<td>6' 4&quot;</td>
<td>76&quot;</td>
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<tr>
<td>6' 5&quot;</td>
<td>77&quot;</td>
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<tr>
<td>6' 6&quot;</td>
<td>78&quot;</td>
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<tr>
<td>6' 7&quot;</td>
<td>79&quot;</td>
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<tr>
<td>6' 8&quot;</td>
<td>80&quot;</td>
</tr>
<tr>
<td>6' 9&quot;</td>
<td>81&quot;</td>
</tr>
<tr>
<td>6' 10&quot;</td>
<td>83&quot;</td>
</tr>
<tr>
<td>6' 11&quot;</td>
<td>84&quot;</td>
</tr>
</tbody>
</table>

Which of the following best describes your education level?

- [ ] Did not finish high school or receive GED
- [ ] Finished high school or received GED
- [ ] Some college
What is your employment status?

- Working full time
- Working part time
- Laid off
- Not working
- Homemaker
- Retired
- Disability

What is your marital status?

- Single (Never Married)
- Married
- Divorced
- Living with significant other and sharing financial resources
- Widow/Widower

How many people are living in your household (including yourself)?

- 1
Of those living in your household, how many are children?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9+

How many dependents are you financially obligated to support (e.g., children)?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9+
What is your personal ANNUAL income (in US dollars)?

- Under $15,000
- $15,000 to $24,999
- $25,000 to $34,999
- $35,000 to $49,999
- $50,000 to $74,999
- $75,000 to $99,999
- $100,000 to $149,999
- $150,000 to $199,999
- $200,000 and over

What is your household’s combined ANNUAL income (in US dollars) from ALL members of the household?

- Under $15,000
- $15,000 to $24,999
- $25,000 to $34,999
- $35,000 to $49,999
- $50,000 to $74,999
- $75,000 to $99,999
- $100,000 to $149,999
- $150,000 to $199,999
- $200,000 and over
Do you currently smoke?

- Yes
- No

Are you currently abusing alcohol or drugs?

- Yes
- No

Have you been diagnosed by a physician with any intellectual, cognitive, or neurological impairments?

- Yes (Please explain)
- No

Please list all current medical or psychiatric diagnoses. If none, please type "none".
Please list all currently prescribed medications. If none, please type "none".

Have you ever danced before?
- Yes
- No

How long have you been dancing?

Please indicate months or years of experience

How would you describe your dance experience?
- Beginner
- Intermediate
- Advanced
- Professional

Please describe your previous dance experience (e.g., styles of
Have you ever taken a class at the New River Moving Arts before?

- Yes
- No

Do you currently have a class pass at the New River Moving Arts?

- Yes
- No

Thank you for completing this portion of the questionnaire! Please continue.

Global Physical Activity Questionnaire
You are now going to be asked a series of questions about the time you spend doing different types of physical activities in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work (e.g., study/training; household chores; harvesting food/crops; fishing or hunting for food; seeking employment).

In answering the following questions:
1. **Vigorous-intensity activities** are activities that require hard physical effort and cause large increases in breathing or heart rate.
2. **Moderate-intensity activities** are activities that require moderate physical effort and cause small increases in breathing or heart rate.

The following questions are about your physical activity habits during a typical **work** day.
Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like carrying or lifting heavy loads, digging or construction work for at least 10 minutes continuously?

- Yes
- No

In a typical week, how many days do you do vigorous-intensity activities as part of your work?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
How much time (in minutes) do you spend doing *vigorous-intensity* activities at *work* on a typical day?

1 hour = 60 minutes
2 hours = 120 minutes
3 hours = 180 minutes
4 hours = 240 minutes
5 hours = 300 minutes
6 hours = 360 minutes
7 hours = 420 minutes
8 hours = 480 minutes

MINUTES PER DAY

Does your *work* involve *moderate-intensity* activity that causes small increases in breathing or heart rate such as brisk walking or carrying light loads for at least 10 minutes continuously?
In a typical week, how many days do you do moderate-intensity activities as part of your work?

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7

How much time (in minutes) do you spend doing moderate-intensity activities at work on a typical day?
The next questions exclude the physical activities at work that you have already mentioned.

The following questions are about your physical activity habits.
during your **TRAVEL TO AND FROM PLACES**.

Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to **get to and from places**?

- [ ] Yes
- [ ] No

In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to **get to and from places**?

- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6
- [ ] 7

How much time (in minutes) do you spend walking or bicycling **for travel** on a typical day?

1 hour = 60 minutes

2 hours = 120 minutes
3 hours = 180 minutes
4 hours = 240 minutes
5 hours = 300 minutes
6 hours = 360 minutes
7 hours = 420 minutes
8 hours = 480 minutes

The next questions exclude the work and transport activities that you have already mentioned.

The following questions are about your **SPORTS, FITNESS, AND RECREATIONAL ACTIVITIES (LEISURE)**.

Do you do any **vigorous-intensity sports, fitness, or recreational (leisure) activities** that cause large increases in breathing or heart rate like running or football for at least 10 minutes continuously?
In a typical week, on how many days do you do vigorous-intensity sports, fitness, or recreational (leisure) activities?

- Yes
- No

1
2
3
4
5
6
7

How much time (in minutes) do you spend doing vigorous-intensity sports, fitness, or recreational activities on a typical day?
1 hour = 60 minutes
2 hours = 120 minutes
3 hours = 180 minutes
4 hours = 240 minutes
5 hours = 300 minutes
6 hours = 360 minutes
7 hours = 420 minutes
8 hours = 480 minutes

Do you do any moderate-intensity sports, fitness, or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, cycling, swimming, or volleyball for at least 10 minutes continuously?
In a typical week, on how many days do you do moderate-intensity sports, fitness, or recreational (leisure) activities?

- Yes
- No

1
2
3
4
5
6
7

How much time (in minutes) do you spend doing moderate-intensity sports, fitness, or recreational activities on a typical day?

1 hour = 60 minutes
2 hours = 120 minutes
3 hours = 180 minutes
4 hours = 240 minutes
5 hours = 300 minutes
6 hours = 360 minutes
7 hours = 420 minutes
The following question is about **SEDENTARY BEHAVIOR** including sitting or reclining at work, at home, or getting to and from places. This time can include time spent sitting at a desk, sitting with friends, traveling in a car, bus, or train, reading, playing cards, or watching television. Do not include time spent sleeping.

How much time (in minutes) do you usually spend **sitting or reclining** on a typical day?

- 1 hour = 60 minutes
- 2 hours = 120 minutes
- 3 hours = 180 minutes
- 4 hours = 240 minutes
- 5 hours = 300 minutes
- 6 hours = 360 minutes
- 7 hours = 420 minutes
- 8 hours = 480 minutes
Thank you for completing this portion of the questionnaire! Please continue.

Positive and Negative Perfection Scale (PANPS)

Below is a list of statements dealing with your general feelings about yourself. Please select the column which applies best to you for each of the following statements.

<table>
<thead>
<tr>
<th>MINUTES PER DAY</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Don't Know</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I start something I feel anxious that I might fail.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My family and friends are proud of me when I do really well.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I take pride in being meticulous when doing things.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I set impossibly high standards for myself.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
I try to avoid disapproval of others at all costs.

I like the acclaim I get for an outstanding performance.

When I am doing something I cannot relax until it’s perfect.

It feels as though my best is never good enough for other people.

Producing a perfect performance is a reward in its own right.

The problem of success is that I must work even harder.

If I make a mistake I feel that the whole thing is ruined.

I feel dissatisfied with myself unless I am working towards a higher standard all the time.

I know the kind of person I ought or want to be, but feel I always fall short of this.
Other people respect me for my achievements.

As a child however well I did, it never seemed good enough to please my parents.

I think everyone loves a winner.

Other people expect nothing less than perfection of me.

When I'm competing against others, I'm motivated by wanting to be the best.

I feel good when pushing out the limits.

When I achieve my goals I feel dissatisfied.

My high standards are admired by others.

If I fail people, I fear they will cease to respect or care for me.
I like to please other people by being successful.

I gain great approval from others by the quality of my accomplishments.

My successes spur me on to greater achievements.

I feel guilty or ashamed if I do less than perfectly.

No matter how well I do I never feel satisfied with my performance.

I believe that rigorous practice makes for perfection.

I enjoy the glory gained by successes.

I gain deep satisfaction when I have perfected something.

I feel I have to be perfect to gain people's approval.
My parents encouraged me to excel.

I worry what others think if I make mistakes.

I get fulfillment from totally dedicating myself to a task.

I like it when others recognized that what I do requires great skill and effort to perfect.

The better I do, the better I am expected to do by others.

I enjoy working towards greater levels of precision and accuracy.

I would rather not start something than risk doing it less than perfectly.

When I do things I feel others will judge critically the standard of my work.

I like the challenge of setting very high standards for myself.
Thank you for completing this portion of the questionnaire! Please continue.

**Rosenburg Self Esteem Scale**

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the whole, I am satisfied with myself.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>At times I think I am no good at all.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel that I have a number of good qualities.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I am able to do things as well as most other people.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel I do not have much to be proud of.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I certainly feel useless at times.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Minute Discounting Task

You will now be presented with a series of decision situations relating to money. These are hypothetical, but please choose your answer as if you will receive the money in the time frame selected. Please pay close attention to the amount and time frame of each option, and choose accordingly. There are no right or wrong answers in this task. Please take your time.
Which would you rather have?

$1000 in 3 weeks
$500 now

Which would you rather have?

$1000 in 1 day
$500 now

Which would you rather have?

$500 now
$1000 in 2 years

Which would you rather have?

$1000 in 4 hours
$500 now

Which would you rather have?

$1000 in 4 months
$500 now

Which would you rather have?

$500 now
$1000 in 8 years
Which would you rather have?

$500 now
$1000 in 4 days

Which would you rather have?

$500 now
$1000 in 2 hours

Which would you rather have?

$1000 in 2 days
$500 now

Which would you rather have?

$500 now
$1000 in 8 months

Which would you rather have?

$500 now
$1000 in 2 months

Which would you rather have?

$500 now
$1000 in 4 years
Which would you rather have?
$500 now $1000 in 18 years

Which would you rather have?
$1000 in 1.5 weeks $500 now

Which would you rather have?
$500 now $1000 in 9 hours

Which would you rather have?
$1000 in 1 hour $500 now

Which would you rather have?
$1000 in 6 hours $500 now

Which would you rather have?
$1000 in 1.5 days $500 now
Which would you rather have?

- $500 now
- $1000 in 1 week

Which would you rather have?

- $500 now
- $1000 in 1 month

Which would you rather have?

- $500 now
- $1000 in 3 months

Which would you rather have?

- $1000 in 6 months
- $500 now

Which would you rather have?

- $500 now
- $1000 in 1 year

Which would you rather have?

- $500 now
- $1000 in 3 years
Which would you rather have?

$1000 in 12 years

$500 now

Which would you rather have?

$1000 in 25 years

$500 now

Which would you rather have?

$1000 in 5 years

$500 now

Which would you rather have?

$500 now

$1000 in 2 weeks

Which would you rather have?

$500 now

$1000 in 3 days

Which would you rather have?

$1000 in 12 hours

$500 now
Which would you rather have?

- $500 now
- $1000 in 3 hours

Thank you for completing this portion of the questionnaire. Please continue!

**Positive and Negative Affect Schedule – SF**

This scale consists of a number of words and phrases that describe different feelings or emotions. Read each item and then select to what extent you have felt this way during the past month, including today.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guilty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you for completing this portion of the questionnaire! Please continue.

**Beck Anxiety Inventory (BAI)**

This scale consists of a number of words and phrases that describe different feelings or emotions. Read each item and
then select to what extent you have felt this way during the past month, including today. If several statements in the group seem to apply equally well, mark the highest statement for that group.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Mildly, but it didn't bother me much</th>
<th>Moderately - it wasn't pleasant at times</th>
<th>Severely - it bothered me a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbness or tingling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling hot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wobbliness in legs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unable to relax</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of worst happening</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizzy or lightheaded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart pounding / racing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsteady</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrified or afraid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nervous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling of choking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands trembling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Beck Depression Inventory (BDI)

Thank you for completing this portion of the questionnaire!
Please continue.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Not at all</th>
<th>didn't bother me much</th>
<th>wasn't pleasant at times</th>
<th>bothered me a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaky/unsteady</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of losing control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty in breathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of dying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scared</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigestion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faint/lightheaded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face flushed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot/cold sweats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you for completing this portion of the questionnaire!
Please continue.

Beck Depression Inventory (BDI)

This scale consists of a number of words and phrases that describe different feelings or emotions. Read each item and then select to what extent you have felt this way during the past month, including today. If several statements in the group
seem to apply equally well, mark the highest statement for that group.

Sadness:
- I do not feel sad.
- I feel sad much of the time.
- I am sad all the time.
- I am so sad or unhappy that I can't stand it.

Pessimism:
- I am not discouraged about my future.
- I feel more discouraged about my future than I used to be.
- I do not expect things to work out for me.
- I feel my future is hopeless and will only get worse.

Past Failure:
- I do not feel like a failure.
- I have failed more than I should have.
- As I look back, I see a lot of failures.
- I feel I am a total failure as a person.
Loss of Pleasure:

☐ I get as much pleasure as I ever did from the things I enjoy.
☐ I don’t enjoy things as much as I used to.
☐ I get very little pleasure from the things I used to enjoy.
☐ I can’t get any pleasure from the things I used to enjoy.

Guilty Feelings:

☐ I don’t feel particularly guilty.
☐ I feel guilty over many things I have done or should have done.
☐ I feel quite guilty most of the time.
☐ I feel guilty all of the time.

Punishment Feelings:

☐ I don’t feel I am being punished.
☐ I feel I may be punished.
☐ I expect to be punished.
☐ I feel I am being punished.

Self-Dislike:

☐ I feel the same about myself as ever.
☐ I have lost confidence in myself.
○ I am disappointed in myself.
○ I dislike myself.

Self-Criticalness:

○ I don’t criticize or blame myself more than usual.
○ I am more critical of myself than I used to be.
○ I criticize myself for all of my faults.
○ I blame myself for everything bad that happens.

Suicidal Thoughts or Wishes:

○ I don’t have any thoughts of killing myself.
○ I have thoughts of killing myself, but I would not carry them out.
○ I would like to kill myself.
○ I would kill myself if I had the chance.

Crying:

○ I don’t cry anymore than I used to.
○ I cry more than I used to.
○ I cry over every little thing.
○ I feel like crying, but I can’t.
Agitation:

○ I am no more restless or wound up than usual.
○ I feel more restless or wound up than usual.
○ I am so restless or agitated that it’s hard to stay still.
○ I am so restless or agitated that I have to keep moving or doing something.

Loss of Interest:

○ I have not lost interest in other people or activities.
○ I am less interested in other people or things than before.
○ I have lost most of my interests in other people or things.
○ It’s hard to get interested in anything.

Indecisiveness:

○ I make decisions about as well as ever.
○ I find it more difficult to make decisions than usual.
○ I have much greater difficulty in making decisions than I used to.
○ I have trouble making any decisions.

Worthlessness:

○ I do not feel I am worthless.
Loss of Energy:

- I don’t consider myself as worthwhile and useful as I used to.
- I feel more worthless as compared to other people.
- I feel utterly worthless.
- I have as much energy as ever.
- I have less energy than I used to have.
- I don’t have enough energy to do very much.
- I don’t have enough energy to do anything.

Changes in Sleeping Pattern:

- I have not experienced any change in my sleeping pattern.
- I sleep somewhat more than usual.
- I sleep somewhat less than usual.
- I sleep a lot more than usual.
- I sleep a lot less than usual.
- I sleep most of the day.
- I wake up 1-2 hours early and can’t get back to sleep.

Irritability:

- I am no more irritable than usual.
- I am more irritable than usual.
Changes in Appetite:

- I have not experienced any change in my appetite.
- My appetite is somewhat less than usual.
- My appetite is somewhat greater than usual.
- My appetite is much less than before.
- My appetite is much greater than usual.
- I have no appetite at all.
- I crave food all the time.

Concentration Difficulty:

- I can concentrate as well as ever.
- I can't concentrate as well as usual.
- It's hard to keep my mind on anything for very long.
- I find I can't concentrate on anything.

Tiredness or Fatigue:

- I am no more tired or fatigued than usual.
- I get more tired or fatigued more easily than usual.
- I am too tired or fatigued to do a lot of the things I used to do.
I am too tired or fatigued to do most the things I used to do.

Loss of Interest in Sex:

- I have not noticed any recent change in my interest in sex.
- I am less interested in sex than I used to be.
- I am much less interested in sex now.
- I have lost interest in sex completely.

Thank you for completing this portion of the questionnaire! Please continue.

Inclusion of Community in Self Scale

Which picture best describes your relationship with your
Thank you for completing this portion of the questionnaire! Please continue.

**UCLA Loneliness Scale**

Following are a number of statements that reflect various ways in which we view ourselves. Indicate how often you feel the way described in each of the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel in tune with the people around me.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I lack companionship.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>There is no one I can turn to.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Statement</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>I do not feel alone.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel part of a group of friends.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a lot in common with the people around me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am no longer close to anyone.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My interests and ideas are not shared by those around me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am an outgoing person.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people I feel close to.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel left out.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My social relationships are superficial.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No one really knows me well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel isolated from others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can find companionship when I want it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people who really understand me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you for completing this portion of the questionnaire! Please continue.

### Social Connectedness Scale

Following are a number of statements that reflect various ways in which we view ourselves. Rate the degree to which you agree or disagree with each statement. There is no right or wrong answer. Do not spend too much time with any one statement and do not leave any unanswered.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Mildly Disagree</th>
<th>Mildly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am unhappy being so withdrawn.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>People are around me but not with me.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>There are people I can talk to.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>There are people I can turn to.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel comfortable in the presence of strangers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Statement</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Mildly Disagree</td>
<td>Mildly Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-----------------</td>
<td>-------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>I am in tune with the world</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Even among my friends, there is no sense of brother/sisterhood</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I fit in well in new situations</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel close to people</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel disconnected from the world around me</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Even around people I know, I don’t feel that I really belong</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I see people as friendly and approachable</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel like an outsider</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel understood by the people I know</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel distant from people</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I am able to relate to my peers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I have little sense of togetherness with my peers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Barsch Learning Style Inventory

Thank you for completing this portion of the questionnaire! Please continue.
each question. Respond to each statement as honestly as you can.

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I can remember best about a subject by listening to a lecture that includes information, explanations and discussions.

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I prefer to see information written on a chalkboard and supplemented by visual aids and assigned readings.

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I like to write things down or to take notes for visual review.

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I prefer to use posters, models, or actual practice and other activities in class.

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I require explanations of diagrams, graphs, or visual directions.

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I enjoy working with my hands or making things.
I am skillful with and enjoy developing and making graphs and charts.

I can tell if sounds match when presented with pairs of sounds.

I can remember best by writing things down.

I can easily understand and follow directions on a map.

I do best in academic subjects by listening to lectures and tapes.

I play with coins or keys in my pocket.

I learn to spell better by repeating words out loud than by writing the words on paper.

I can understand a news article better by reading about it in the newspaper than by listening to a report about it on the radio.

I chew gum, smoke or snack while studying.
I think the best way to remember something is to picture it in your head.

I learn the spelling of words by “finger spelling” them.

I would rather listen to a good lecture or speech than read about the same material in a textbook.

I am good at working and solving jigsaw puzzles and mazes.

I grip objects in my hands during learning periods.

I prefer listening to the news on the radio rather than reading the paper.

I prefer obtaining information about an interesting subject by reading about it.

I feel very comfortable touching others, hugging, handshaking, etc.
Thank you for completing this portion of the questionnaire! Please continue.

Summary & Calendar

Thank you so much for your participation. We really appreciate the time you have given to complete these assessments. We look forward to having you join the upcoming dance class, which we will ask you to schedule WITHIN THE NEXT 7 DAYS.

We will ask that for safety purposes, you ensure that you have a clean area to move in. For your movement class, you will need a clean area of approximately 8 by 10 feet. Please make sure that all items are cleaned from your space.

After submitting this questionnaire, you will receive a unique identifying code, which will serve as your participant ID for the study.

We will reach out to you shortly to confirm your eligibility for the study as well as to either sign up for or confirm your class schedule.

I follow oral directions better than written ones.
Introduction

Thank you so much for your participation in the study so far! We hope that you enjoyed your movement class. We will now be asking you a series of follow up questions. Please answer as openly and honestly as possible. There are no right or wrong answers.

Please enter your email address:

On a scale from 1 to 10, how difficult did you find the class?

Not difficult at all

Extremely difficult

Level of Difficulty
On a scale from 1 to 10, how enjoyable did you find the class?

Level of Enjoyment

Exercise Questions

Besides your dance class, did you exercise today?

- Yes
- No

How long was your exercise session today (in minutes)?

Minutes

What was the intensity level of your exercise session?

- Light (<64% maximum heart rate; e.g., taking the dog for a walk, walking up the steps)
- Moderate (64–76% of maximum heart rate; e.g., brisk walking, housework, gardening)
Vigorous (77–95% of maximum heart rate; e.g., running, cycling, swimming, sports)

Please describe your exercise session (e.g., an outdoor yoga session).

What time did you exercise today?

What time is it right now?

Subjective Exercise Experience Questionnaire

We are now interested in learning about how you feel after your movement class. Please choose the number on each item that indicates how you feel RIGHT NOW. Please answer these questions even if you do not consider yourself to be a physically active person.
The following numbers correspond to the following responses:
1 = Not at all
2-6 = Moderately
7 = Very much so

Please indicate how you feel RIGHT NOW.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Moderately</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4 5  6  7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drained</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1  2  3  4 5  6  7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crummy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhausted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discouraged</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1  2  3  4 5  6  7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigued</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrific</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miserable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you for completing this portion of the questionnaire! Please continue.

**Minute Discounting Task**

You will now be presented with a series of decision situations relating to money. These are hypothetical, but please choose your answer as if you will receive the money *in the time frame selected*. Please pay close attention to the amount and time frame of each option, and choose accordingly. There are no right or wrong answers in this task. Please take your time.

Which would you rather have?

- $1000 in 3 weeks
- $500 now

Which would you rather have?

- $1000 in 1 day
- $500 now
Which would you rather have?

$1000 in 2 years
$500 now

Which would you rather have?

$1000 in 4 hours
$500 now

Which would you rather have?

$500 now
$1000 in 4 months

Which would you rather have?

$500 now
$1000 in 8 years

Which would you rather have?

$1000 in 4 days
$500 now

Which would you rather have?

$1000 in 2 hours
$500 now
Which would you rather have?

$1000 in 2 days
$500 now

Which would you rather have?

$500 now
$1000 in 8 months

Which would you rather have?

$1000 in 2 months
$500 now

Which would you rather have?

$1000 in 4 years
$500 now

Which would you rather have?

$1000 in 18 years
$500 now

Which would you rather have?

$1000 in 15 weeks
$500 now
Which would you rather have?

$500 now $1000 in 9 hours

Which would you rather have?

$1000 in 1 hour $500 now

Which would you rather have?

$500 now $1000 in 6 hours

Which would you rather have?

$500 now $1000 in 5 days

Which would you rather have?

$500 now $1000 in 1 week

Which would you rather have?

$1000 in 1 month $500 now
Which would you rather have?

$1000 in 3 months

$500 now

Which would you rather have?

$1000 in 6 months

$500 now

Which would you rather have?

$1000 in 1 year

$500 now

Which would you rather have?

$500 now

$1000 in 3 years

Which would you rather have?

$1000 in 12 years

$500 now

Which would you rather have?

$500 now

$1000 in 25 years
Which would you rather have?

$500 now        $1000 in 5 years

Which would you rather have?

$500 now        $1000 in 2 weeks

Which would you rather have?

$1000 in 3 days  $500 now

Which would you rather have?

$500 now        $1000 in 12 hours

Which would you rather have?

$1000 in 3 hours $500 now

Thank you for completing this portion of the questionnaire. Please continue!
Positive and Negative Affect Schedule – SF

This scale consists of a number of words and phrases that describe different feelings or emotions. Read each item and then select to **what extent you feel this way RIGHT NOW**.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Guilty</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Scared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hostile</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Enthusiastic</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Proud</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irritable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alert</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashamed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Beck Anxiety Inventory (BAI)

This scale consists of a number of words and phrases that describe different feelings or emotions. Read each item and then select to **what extent you feel this way RIGHT NOW**. If several statements in the group seem to apply equally well, mark the highest statement for that group.

<table>
<thead>
<tr>
<th>Numbness or tingling</th>
<th>Not at all</th>
<th>Mildly, but it didn’t bother me much</th>
<th>Moderately — it wasn’t pleasant at times</th>
<th>Severely — it bothered me a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feeling hot</th>
<th>Not at all</th>
<th>Mildly, but it didn’t bother me much</th>
<th>Moderately — it wasn’t pleasant at times</th>
<th>Severely — it bothered me a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wobbliness in legs</th>
<th>Not at all</th>
<th>Mildly, but it didn’t bother me much</th>
<th>Moderately — it wasn’t pleasant at times</th>
<th>Severely — it bothered me a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Thank you for completing this portion of the questionnaire! Please continue.
<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Mildly, but it didn't bother me much</th>
<th>Moderately - it wasn't pleasant at times</th>
<th>Severely - it bothered me a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to relax</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Fear of worst</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>happening</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizzy or lightheaded</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Heart pounding /</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>racing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsteady</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Terrified or afraid</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Nervous</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Feeling of choking</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hands trembling</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Shaky / unsteady</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Fear of losing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty in</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>breathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of dying</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Scared</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Indigestion</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Thank you for completing this portion of the questionnaire! Please continue.

Inclusion of Community in Self Scale

Which picture best describes **how you feel about your relationship with your community RIGHT NOW**?

- A
- B
- C
Thank you for completing this portion of the questionnaire! Please continue.

**Rosenburg Self Esteem Scale**

Below is a list of statements dealing with your general feelings about yourself. Please indicate **how strongly you agree or disagree with each statement RIGHT NOW**.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am satisfied with myself.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I think I am no good at all.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel that I have a number of good qualities.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I am able to do things as well as most other people.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Thank you for completing this portion of the questionnaire! Please continue.

### UCLA Loneliness Scale

Following are a number of statements that reflect various ways in which we view ourselves. Indicate how you feel **RIGHT NOW**.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel I do not have much to be proud of.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I certainly feel useless.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel that I'm a person of worth, at least on an equal plane with others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wish I could have more respect for myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am inclined to feel that I am a failure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I take a positive attitude toward myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>I feel in tune with the people around me.</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
</tr>
<tr>
<td>I lack companionship.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>There is no one I can turn to.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>I do not feel alone.</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
</tr>
<tr>
<td>I feel part of a group of friends.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>I have a lot in common with the people around me.</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
</tr>
<tr>
<td>I am no longer close to anyone.</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
</tr>
<tr>
<td>My interests and ideas are not shared by those around me.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>I am an outgoing person.</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
</tr>
<tr>
<td>There are people I feel close to.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>I feel left out.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>My social relationships are superficial.</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
<td>💡</td>
</tr>
<tr>
<td>No one really knows me well.</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
<td>🌟</td>
</tr>
<tr>
<td>Statement</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>I feel isolated from others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can find companionship when I want it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people who really understand me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am unhappy being so withdrawn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People are around me but not with me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people I can talk to.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people I can turn to.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you for completing this portion of the questionnaire! Please continue.

**Social Connectedness Scale**

Following are a number of statements that reflect various ways in which we view ourselves. Indicate how you feel **RIGHT NOW**.
<table>
<thead>
<tr>
<th>I feel comfortable in the presence of strangers</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Mildly Disagree</th>
<th>Mildly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am in tune with the world</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Even among my friends, there is no sense of brother/sisterhood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I fit in well in new situations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel close to people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel disconnected from the world around me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Even around people I know, I don't feel that I really belong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I see people as friendly and approachable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel like an outsider</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel understood by the people I know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel distant from people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I am able to relate to my peers

I have little sense of togetherness with my peers

I find myself actively involved in people's lives

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Mildly Disagree</th>
<th>Mildly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I catch myself losing a sense of connectedness with society

I am able to connect with other people

I see myself as a loner

I don't feel related to most people

My friends feel like family

I don't feel I participate with anyone or any group

Thank you for completing this portion of the questionnaire! Please continue.
Beck Depression Inventory (BDI)

This scale consists of a number of words and phrases that describe different feelings or emotions. Read each item and then select to **what extent you feel this way RIGHT NOW**. If several statements in the group seem to apply equally well, mark the highest statement for that group.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Mildly</th>
<th>Moderately</th>
<th>Severely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sadness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pessimism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of pleasure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guilty feelings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punishment feelings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-dislike</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-criticalness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicidal thoughts or wishes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of interest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you for completing this portion of the questionnaire!
Please continue.

<table>
<thead>
<tr>
<th>Indecisiveness</th>
<th>Not at all</th>
<th>Mildly</th>
<th>Moderately</th>
<th>Severely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worthlessness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in sleeping pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irritability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in appetite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration difficulty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiredness or fatigue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of interest in sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you for completing this portion of the questionnaire!
Please continue.

**Summary**

Thank you so much for your participation. We really appreciate the time you have given to complete this study. Please share with us any additional comments, questions, or concerns about the study.