

EFFECTS OF MUSIC IMPROVISATION ON ACADEMIC PERFORMANCE AND GENERALIZED ANXIETY IN YOUNG ADULTS

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Teenagers experience much anxiety physically and emotionally and these experiences can affect their academic performance. Many children especially in the United States face trouble which can present itself through such acts as school violence and dismal academic performance. While problems facing our teenagers have no single solution, this study aimed at investigating the beneficial effects of improviser-mediated musicality on academic performance and generalized anxiety in teenagers. This study examined whether improviser-mediated musicality leads to academic achievement in adolescents and also whether it improves the health and well-being of teenagers. Methods: A within-subjects method was used. 75 adolescents attending an urban public middle school in central Mississippi participated in this study. Anxiety scores were measured using Spielberger's State-Trait Anxiety Inventory for Children (STAI-C) pre-test and post-test. The mathematics performance scores were measured pre-test and post-test using the fourth edition of the Wide Range Assessment Test (WRAT-4). Results: Repeated-Measures ANOVA results indicated a significant improvement in pre-test and post-test WRAT-4 scores ($F(1,19) = 17.22, p = 0.001, \eta^2 = 0.604$) for the seventh-grade students. The mathematics scores were significantly higher after the improviser-mediated musicality session. The state and trait anxiety scores were significantly lower in post-test attempt. Results of the Pearson's r also suggested that the pre-test and post-test State subscale scores for the entire sample were not correlated ($r(20) = .174, p = .561$) suggesting that there might have been a change in the level of situational anxiety over time. There was a significant reduction in post-test State subscale scores compared to the baseline data.

KEYWORDS

Music, test, anxiety, scores, academic performance.

INTRODUCTION

Human beings have used music to decrease anxiety and discomfort for thousands of years (Mattei & Rodriguez, 2013). However, the use of music in practical settings as an adjunct therapeutic treatment only began to take hold in the 18th century (Arveiller, 1980). Music therapy, which involves the controlled use of music, its elements, and its influences to produce changes in physiology, behavior, thoughts, and emotions, is particularly a new adjuvant therapeutic tool in medical practice that began in the middle of the 20th century. This a promising clinical and evidence-based intervention that has been used to alleviate psychological, physiological, and emotional symptomatology during the treatment of many forms of illness and disabilities (see Bradt & Dileo, 2009; Guzetta, 1989; Hamel, 2001; Hanser & Mandel, 2005; Munro & Mount, 1978). If individuals are engaged in a structured receptive (listening or relaxing to music) or active (producing music, singing lyrics, or writing songs) music therapy program with clear aims and specific goals, a positive treatment outcome can be attained and the beneficial effects of music can be realized (Ruud, 1998; Sacks, 2006). In early childhood, there seem to be beneficial effects of music on the development of perceptual skills that affect language learning which subsequently impacts literacy. Opportunities to coordinate rhythmically by playing a musical instrument or listening to musical lyrics appear to be related to academic achievement and literacy skills acquisition. Moreover, learning to play a

musical instrument has been shown to improve fine motor skills. Listening to music also seems to enhance spatial reasoning skills, one aspect of general intelligence that is related to some of the abilities required in mathematics (Rauscher, 2002; Gruhn & Rauscher, 2008; Caterall & Rauscher, 2008; Sacks, 2007; Akombo, 2013). Findings from research with adults have revealed other beneficial music effects. Playing the piano exercises the heart as much as a brisk walk (Parr, 1985) and there are lower mortality rates in those who make music or sing in a choir (Bygren, Konlaan, & Johansson, 1996). In addition, music making has been linked to perceived good health, improved quality of life, and enhanced psychological well-being (Spencer, 1997; Vanderark, Newman, & Bell, 1983; Wise, Hartmann, & Fisher, 1992; Akombo, 2013).

Music-based interventions, as commonly practiced in non-clinical settings and as considered in this research, are secularized forms of music therapy, which may include receptive music listening or active music playing programs (Aldridge, 2000b; Snyder, & Chlan, 1999). Every music session engages the participant in a musical experience such as re-creating or improvising music. In sessions that involve re-creating music, the client sings or plays already composed music. This kind of music experience may include learning how to produce vocal or instrumental sounds, imitating musical phrases, using musical notation, participating in sing-alongs, practicing, taking music lessons, performing a piece from memory, working out the musical interpretation of a composition, or participating in a musical show. In sessions that involve improvising, the participants create their own music extemporaneously while singing or playing whatever arises in the moment. Improvisation offers participants the opportunity to freely experiment with instruments and sounds. Thus, individuals take part in spontaneously creating music with others usually in a secure and supportive environment. In a dynamic sense, the session becomes more personal and intense as it progresses from receptive listening to active improvisation. In improviser-mediated musicality, chords, keys, scales, and rhythmical changes are of great importance throughout the music session. The improvisation is always new and different and expresses the feelings of the participants at the time (Tervo, 2001). Therefore, the purpose of the present study was to examine the effects of improviser-mediated musicality on anxiety and mathematics ability in African American adolescents in a middle school located in the southern region of the United States.

METHODS

A within-subjects method was used. ($N=75$) adolescents attending an urban public middle school in Mississippi participated in this study. Two research questions guided this study:

- What effect does improviser-mediated musicality have on generalized anxiety in adolescents?
- What effect does improviser-mediated musicality have on academic performance?

Following the research question, three hypotheses were established to guide the research as follows:

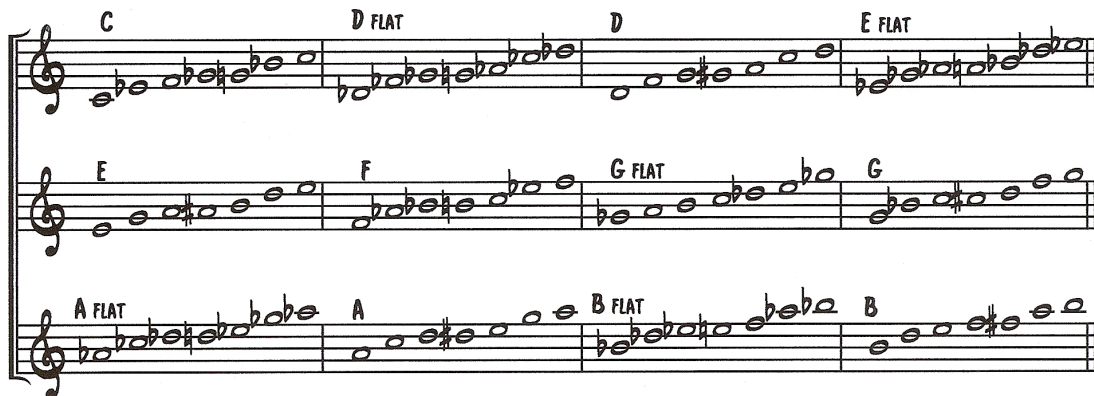
- If adolescents participate in improviser-mediated musicality, then they will have low levels of state anxiety.
- If adolescents participate in improviser-mediated musicality, then they will have low levels of trait anxiety.

- If adolescents participate in improviser-mediated musicality, then they will perform better on the Wide Range Assessment Test (WRAT-4) standardized test in math.

In order to test these hypotheses, twenty-three ($N=75$) African American (45 males and 30 females in grades 6-8) were enrolled in this study. An explanation of the study was presented to all students, their teachers, and parents. The researcher requested permission from the School Superintendent to announce the research to the parents and students. If the students agreed to participate in the study, a signed consent form was obtained from the parent while assent was obtained from the participants. The study was approved as required by the Institutional Review Board of Jackson State University.

During the data collection sessions, participants were offered the opportunity to engage in one 30-minute session of improviser-mediated musicality in the band classroom setting where they met as a group once a week for 9 weeks. On the first day, the researcher administered a demographic questionnaire which gave salient information about the population studied. This was followed by both subscales (State and Trait) of the State-Trait Anxiety Inventory for Children (STAI-C). Then Wide Range Assessment Test (WRAT-4) standardized test in math was administered by the researcher. Then Wide Range Assessment Test (WRAT-4) has been widely used as a norm-referenced measure of basic academic performance (Wilkinson & Robertson, 2006). Standardized on a representative national sample of over 3,000 individuals ranging in age from 5 to 94 years, the (WRAT-4) has retest reliability coefficients range from .78 to .89 for an age-based sample and from .86 to .90 for a grade-based sample.

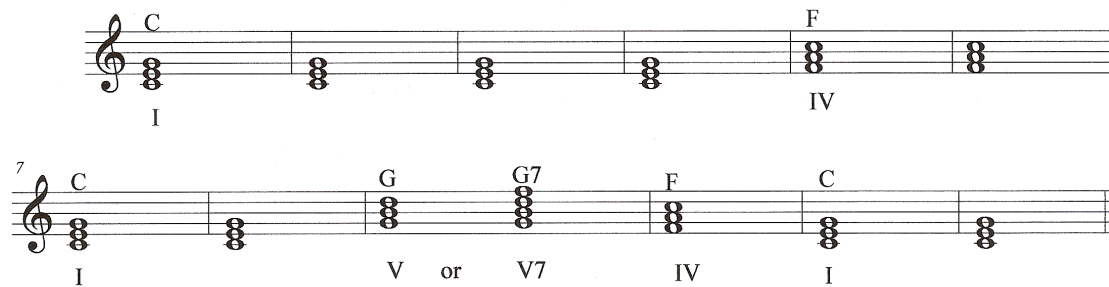
On this first day, individuals did not engage in improviser-mediated musicality. Trait subscale of the STAI-C was given at the start and at the end of each improviser-mediated musicality session on Week 1 and week 9. State subscale of the STAI-C was given at the start and at the end of each improviser-mediated musicality session from Week 1 throughout the study. During the 30-minute music sessions, participants improvised melodies based on the Twelve Blues Scales (See Figure 1).



On week 9, the State subscale was administered by the researcher who then gave each participant the Wide Range Assessment Test (WRAT-4) standardized test in math assessment to complete followed by the entire STAI-C to obtain a post-test State subscale score as well as a post-test Trait score. Individuals did not engage in improviser-mediated musicality on week 9. The researcher hypothesized that actively engaging in improviser-mediated musicality would significantly reduce anxiety levels and noticeably

improve mathematics skills as measured by post-test STAI-C and Wide Range Assessment Test (WRAT-4) standardized test in math scores.

This research was conducted across several sessions at an urban middle school in Central Mississippi. Data was based on the number of correct hand signal responses. The participants were then asked to improvise melodies and rhythms based on the 12-bar blues chord progression (See Figure 2).



RESULTS

Anxiety scores were measured using Spielberger’s State-Trait Anxiety Inventory for Children (STAI-C) pre-test and post-test. The math performance scores were measured pre-test and post-test using the fourth edition of the Wide Range Assessment Test (WRAT-4). Repeated-Measures ANOVA results indicated a significant improvement in pre-test and post-test WRAT-4 scores ($F(1,19) = 17.22, p = 0.001, \eta^2 = 0.604$) for the seventh-grade students. The mathematics scores were significantly higher after the improviser-mediated musicality session. The state and trait anxiety scores were significantly lower in post-test attempt. Results of the Pearson’s r also suggested that the pre-test and post-test State subscale scores for the entire sample were not correlated ($r(20) = .174, p = .561$) suggesting that there might have been a change in the level of situational anxiety over time. There was a significant reduction in post-test State subscale scores compared to the baseline data.

In addition, a Pearson’s product-moment correlation coefficient (Pearson’s r) was calculated for the association between participants’ ($N = 75$) State and Trait subscale scores on the STAI-C. No significant correlation was found ($r(21) = .283, p = .199$) between the pre-test and post-test State subscale scores obtained on Days 2 and 8, respectively. Results suggested that there was no relationship between participants’ State anxiety levels at the start and at the end of our research. Also, a Pearson’s r was calculated to determine whether there was an association between the pre-and post-test Trait subscale scores obtained on Days 2 and 8, respectively. However, no significant correlation was found ($r(21) = .007, p = .490$) between adolescents’ Trait anxiety levels obtained at the start and at the end of this study.

DISCUSSION

The objective of this study was to investigate the effects of improviser-mediated musicality on generalized anxiety and academic performance in adolescents. The study supported the hypothesis that there would be higher scores in mathematics after jazz music improvisation. These results are similar to other studies

which have suggested that music interventions in school have increased reading scores (Rauscher, 2002; Southgate & Roscigno 2009; Akombo, 2013). Listening to music also seems to enhance spatial reasoning skills, one aspect of general intelligence that is related to some of the abilities required in mathematics (Rauscher, 2002; Rauscher et al., 1997). Improvisation offers participants the opportunity to freely experiment with instruments and sounds. Thus, individuals take part in spontaneously creating music with others usually in a secure and supportive environment. In a dynamic sense, the session becomes more personal and intense as it progresses from receptive listening to active improvisation. In improviser-mediated musicality, chords, keys, scales, and rhythmical changes are of great importance throughout the music session. The improvisation is always new and different and expresses the feelings of the participants at the time (Tervo, 2001). The state and trait anxiety scores were significantly lower in post-test attempt thereby strongly supporting of the hypothesis that the state and trait anxieties would be lower. The results of this study were consistent with Akombo (2013) who reported a decrease in anxiety levels after an African drumming intervention. On the contrary, the results of the Pearson's r suggested that the pre-test and post-test State subscale scores for the entire sample were not correlated which suggests that there was a change in the level of situational anxiety over time. In addition, no significant correlation was found between adolescents' Trait anxiety levels obtained at the start and at the end of this study. The result also showed that students were able to identify the primary chords in the 12-bar blues form. With each session, the subjects demonstrated greater confidence in their improvisations. In spite of the fact that different methods and measurements were used in this study, these results still indicate that improviser-mediated musicality has the potential to decrease anxiety in adolescents as well as have a significant effect on their cognitive skills in mathematics.

These findings provided evidence to support the hypotheses tested and indicated that adolescents who engaged in an active music-based intervention involving improviser-mediated musicality for 30 minutes per session scored significantly different on pre- and post-test State as well as pre- and post-test Trait anxiety subscale measures. However, there was insufficient evidence to provide support for our hypothesis pertaining to academic performance. Perhaps, directions for future research can include using another type of mathematics skills test and more age-appropriate music. In addition, it may be important for research to establish more consistent results in the effects of improviser-mediated musicality across the curriculum and on the overall quality of life index of adolescents by measuring other variables besides generalized anxieties.

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