Effects of Community African Drumming on Generalised Anxiety in Adolescents

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Abstract

The purpose of this study was to test the effects of community music projects (CMPs), such as after-school African drumming circles, on academic performance and generalised anxiety in adolescents. Adolescents from a Junior High (7th, 8th, and 9th graders, age range from 12-14) in the *State of Utah (USA) participated in the study. A one-sample t-test found a significant difference in reading scores (df(4) p=.004). A paired samples t-test found a significant relationship between the maths trait anxiety score pre-intervention and the total state anxiety score pre-test (df(4) p=.033). A paired samples t-test found a significant relationship between the reading trait anxiety score post-intervention and the total state anxiety score post-test (df(4) p=.030). This research demonstrates the effectiveness of community music such as drumming for reducing anxiety and also for improving academic performance in adolescents. CMPs are recommended as a non-invasive intervention modality for adolescents.*

Keywords: African drumming; anxiety; academic performance; community music projects (CMPs)

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Introduction

The purpose of this pilot study was to test both the academic and health benefits of community music projects (CMPs). The study examined whether CMPs, such as after-school drumming circles, can lead to altered levels of both state and trait anxieties and whether these alterations can ultimately improve the academic achievement in maths and reading in adolescents. This pilot study is the first of its kind to investigate specifically the direct effects of African drumming as a CMP variable that could impact both state and trait anxieties in adolescents, and ultimately their academic achievement. Three hypotheses guided this study: (1) CMPs have no effect on pre and post trait anxiety in adolescents; (2) CMPs decrease state anxiety in adolescents; (3) CMPs can increase maths and reading scores in standardised tests of adolescents. The testing of the hypotheses was conducted at 0.05 level of significance ($p<0.05$) for rejection or retention. Consistent with studies on the general effects of music on adolescents, previous investigations have demonstrated the effects of self-selected music such as hip-hop on teenage anxiety levels in predicting altered state and trait anxieties (Arganbright & Lee 2007). No study, however, has addressed community musical experience, specifically African drum circles, a

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musical genre that has continued to spur interest among adolescents in the State of Utah (USA) today.

Community music and academic achievement

Research shows that CMPs can have a positive effect on mathematic and writing achievement in adolescents (Southgate & Roscigno 2009). Additionally, socioeconomic status and ethnicity affect community music participation and overall academic success (Catterall, Chapleau, & Iwanaga 1999; Coleman 1968).

Community music is positively associated with academic achievement especially during the middle and high school years (Deane & Mullen 2013). A CMP is defined as a participation that consists of music lessons taken in or out of school with a heterogeneous group. In reference to the structural organisation of the CMPs, Rimmer observes:

> "[the groups] typically meet for sessions of somewhere between one and three hours, once or twice a week, during which time community musicians work, through the use of a variety of teaching-learning strategies, to facilitate 'hands-on' musical activity" (Rimmer 2009: 72).

Many of these CMPs aim to reach the 'at-risk' youth that easily fall through the cracks. The communities may benefit from these programs by preventing these youths from being out on the streets living lives of crime.

Community music and overall wellness

Many school administrators in the past decade have continued to use community music in addition to the students' overall educational experiences. This decision has been supported by Beczkala (1997) who observed that students' educational experiences can be achieved by employing music educators who use music to bring about these desired changes.

Rimmer (2009) observes that there is a need to develop more effective programs that really demonstrate significant results in mitigating the 'at-risk' youth. Communities need to be exposed to music sessions so they can be as involved as possible.

Children from higher socioeconomic levels participate more in music than children with lower socioeconomic status. In addition to social class as a predictor of community music participation, ethnicity is also a factor (National Endowments for the Arts 2013).

The effects of anxiety on children have become a national concern (Brophy 1986; Neil & Christensen 2009). Anxiety in children can be physically and emotionally debilitating. In today's society, we see strife and anxiety everywhere (Giles 1990). American schools, faced with violence and crime, are looking for ways to mitigate this situation. A wide range of emotional, stress-related problems, such as teenage suicide, teenage pregnancy, delinquency, violence in schools, the physical and sexual abuse of children, and drug use among youth are all of national concern. These social ills are mainly a result of generalised anxiety disorder such as worry and tension (Akombo 2009). Crimes committed by children, even murder in schools, are increasing in the USA due to lack of primary, secondary and tertiary prevention modalities. Primary prevention involves measures focused on improving the general wellbeing of individuals, secondary prevention focuses on intervening with children and youth who are at risk for becoming offenders or victims, and tertiary prevention involves measures directed toward those who have already been involved with crime or victimisation (Van Dijk & de Waard 1991).

When students miss the opportunity to process their negative emotions and experiences from both home and school, these can impact their ability to complete homework and other academic tasks. Lack of completion of these tasks can have an impact on their academic achievement. Students may become ill, drop out of school, and in extreme cases may even commit suicide (Giles 1990; Goodland 1984). It is hypothesised that CMPs can be an effective intervention for these children. Research has shown that drumming along with our own heartbeats alters brainwave patterns (increasing alpha waves) and dramatically reduces anxiety (Akombo 2001, 2006; Hammer 1996; Rimmer 2009; Spintge 2001). For many years, research has shown the beneficial nature of music on physical and emotional states (Rotberg, Schoen, & Zalsman 2008). Recognising these effects can assist school programs to incorporate music in their modalities.

Cultural significance

Many studies have been carried out to test the effect of music in general on the anxieties of school aged children. Music involving drumming has particularly been examined on a cultural level. Using culturally-specific music as an intervention modality can help to alleviate symptoms of anxiety and depression (Wheeler 1985). In another study of a drumming intervention, Doak (2006) found no significant decrease in the anxiety levels. Conversely, Harner (1994) reported a decrease in

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anxiety levels in a study on meditation and drumming. Numerous other studies have found correlations between culturally-specific music and anxiety (Chang, Chen, & Huang 2008; Harner 1994; Thompson & Grocke 2008; Yu, Liu, Li, & Ma 2009).

The education of the community in the benefits of creative arts programs in schools has the potential to increase connectedness within the entire community. After-school programs have the potential to affect the school, the family and the community (Kanter 2001). The CMPs can provide safe havens and avenues for children who might not have otherwise had a chance to succeed. It is hoped that the children who participate in the CMPs will be better members of society, because increased academic achievement is associated with participation in after-school programs. The CMPs also show improved behaviour and a better outlook on the future for those involved in the projects (Kanter 2001; Lister, Tanguay, Snow, & D'Amico 2009). This has been clearly demonstrated by Dillon, in stating "[the participants] receive acknowledgement, affirmation and a sense of belonging from the community" (Dillon 2006: 272). This increased sense of community can also affect interpersonal relationships and group dynamics, which all contribute to a well-rounded education.

Interpersonal relationships might include family and peer relationships. Involvement in music has the potential to improve these relationships (Jones 2007) which can increase the potential of the children to develop and maintain connections within a whole community. A study by Kaplan (1999) found that group cohesiveness was increased with a drumming group. These benefits are attributed to the group playing music together, with a fixed drum beat creating a sense of belonging, emotional and physical connectedness.

Methodology

Anxiety has been defined as a stimulus, as a trait, as a motive, and as a drive (Endler 1983). Spielberger (1966) suggested that much of the conceptual ambiguity in defining the construct of anxiety was due to the lack of a distinction between trait anxiety (A-trait) and state anxiety (A-state). A-trait refers to a more stable predisposition or proneness to state anxiety while A-state is conceptualised as a momentary or situational emotional reaction accompanied by physiological arousal.

This pilot study was carried out at a Utah Public School District on Ogden Utah (USA). The public school in central Utah serves a diverse population which includes African Americans, Latinos, and Asians, who are all defined as low-income and some of whom have limited-English language ability.

Two research questions guided this study:

- What effect does a community music project (CMP) involving African drumming have on generalised anxiety in adolescents?
- What effect does CMP involving African drumming have on academic performance?

The researcher used a within-subjects design in which each participant served as his or her own baseline scores hence providing two sets of score. This design was approved by the Institutional Review Boards of the researcher's institutions. After being approved by the Institutional Review Board of Weber State University, an explanation of the study was presented to all students whose consent forms had been signed by their parents and teachers. If the students agreed to participate in the study, a signed consent form was obtained from the parents since all the students in the study were younger than 18 years. Before the study began, the researcher read the standard consent letter describing the study, potential risks and benefits, protection of confidentiality and the recompense (a CD of the African Drum Music and a raffle for 160 GB Apple iPod) with the students who expressed interest. Each student who expressed a willingness to participate in the study was asked to sign and provide salient demographic information for the data analysis. If the selected child refused to participate in the study at the initial contact or the parent did not grant the consent, the researcher would thank the student and move on to the next student on the list.

The study proceeded only after a consent form had been signed. Seventeen participants were African Americans, eight were Caucasian, and twelve were Hispanic. Nineteen participants were female and eighteen were male. All students had cognitive ability to complete the study. English was the first language for all participants. The data collected included the socio-demographic information such as age, gender, and race. The researcher then coded the information based on the standardised data coding form. Using a semi-structured interview, the researcher used questions that sought to find out whether students enjoyed listening to music, singing, or dancing. The questions also sought to find out whether the students attended other CMPs, or whether or not these ever took place in their home environments and who organised them. Another aspect that was discussed during the semi-structured interview was the students' level of musical knowledge, including formal and non-formal music education. Upon completion of the study, the participants were

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debriefed on their experience of data collection and specifically on difficulties encountered in the process.

On the first day, the students spent half an hour on maths and half an hour on reading tests of the Utah Basic Skills Competency Test (UBSCT). The UBSCT aims to ensure that all students leaving middle school possess a set of basic skills in writing, reading and maths. This test is part of the Utah Performance Assessment System for Students and is one of a series of state and national tests which aims to hold schools accountable for student achievement. Each test required about half hour to complete.

The drumming activity began on the next day. In the first five minutes, the researcher gave an introduction to different countries on the continent of Africa, such as Ghana, Kenya and Mali. Different drum music from a different African country was featured each week. The perspectives of geography, history, music, and dance were presented to the participants to familiarise them with the different drum patterns found in the music of Africa and to make the drumming session educational. Opening with a drum call, the participants were asked to be quiet, listen to the instructions and get ready to start to learn drum patterns in a call and response style. Their participation was required. The researcher then spent the next thirty minutes drumming together with the students. They then took a ten-minute break for water and snacks and returned to the classroom to complete a survey answering the questions on the State Trait Anxiety Inventory (STAI) questionnaire (see Table 1 on steps of the research design in chronological sequence).

The State Trait Anxiety Inventory (STAI) was designed to be self-administered with no time limits, and may be given to either individuals or groups of respondents. The scale consists of twenty statements that evaluate feelings of apprehension, tension, nervousness, and worry. The instructions for the state anxiety items require respondents to report the intensity of their feelings of anxiety, 'right now' or at this moment, by rating themselves on a four-point Likert scale: (1) "Not at all"; (2) "Somewhat"; (3) "Moderately So"; or (4) "Very Much So". In responding to the trait anxiety scale, subjects are instructed to indicate how they generally feel by reporting how often they experience the anxiety-related feelings and conditions described by each item on a 4-point frequency scale: (1) "Almost Never"; (2) "Sometimes"; (3) "Often"; or (4) "Almost Never". The STAI scale is one of the most popular tools used in clinical settings and is available in seven languages (Stouthard, Hoogstraten, & Mellenbergh 1995). Scores increase in response to physical danger and psychological stress. The STAI takes approximately five to ten minutes to complete. An overall score is derived by coding positive statements (e.g., "I feel secure") and then adding all items. Possible scores for each scale are between 20 and 80. A higher score indicates greater anxiety. The STAI has been used extensively and has reported reliability (Cronbach's alpha) ranging from .83 to .92 (Barnes, Harp, & Jung 2002). Cronbach's alpha is an index of reliability associated with the variation accounted for by the true score of the underlying construct (Cronbach 1951). A high value of alpha is often used as evidence that the items measure an underlying construct.

Weeks	Days	Research activity	Duration (minutes)
1	1	Demographic questionnaire	5 mins
		STAI-C (state and trait subscales)	10 mins
		UBSCT Reading test	30 mins
		STAI-C (state and trait subscales)	10 mins
		Break	10 mins
	2	STAI-C (state and trait subscales)	10 mins
		UBSCT Maths test	30 mins
		STAI-C (state and trait subscales)	10 mins
		Break	10 mins
	3	STAI-C (state subscale only)	5 mins
		CMP session	30 mins
		STAI-C (state subscale only)	5 mins
		Break	10 mins
2 (same for weeks 3-7)	4 (same for days 5-9)	STAI-C (state subscale only)	5 mins
		CMP session	30 mins
		Break time	5 mins
		STAI-C (state subscale only)	5 mins
		Break	10 mins
8	10	STAI-C (state and trait subscales)	10 mins
		UBSCT Reading test	30 mins
		STAI-C (state and trait subscales)	10 mins
		Break	10 mins
	11	STAI-C (state and trait subscales)	10 mins
		UBSCT Maths test	30 mins
		STAI-C (state and trait subscales)	10 mins
		Break	10 mins
		Semi-Structured Interviews	60 mins

Table 1: Steps of the research design in chronological order

In evaluating the maths and writing grades, the researcher examined the measures of central tendency in the two tests. The UBSCT grades of the participants from the pre-test session were

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designated as baseline or Entry Point (EP) and the second scores the participants achieved at the end of the eight-week intervention was the post-test or Exit Point (XP). This pilot research study used a repeated-measures design. The research objective was to compare the data for the pre- post-measurement of the maths and reading tests and then compare them with the repeated measures of the state and trait anxiety within subjects. In a within-subjects design, each participant provides more than one response. Since the analysis method in this research required comparison of means, the t-test[1] was most suited since it is the most commonly used method to evaluate the differences in means between groups (Glass & Hopkins 1996).

Results

The statistical analysis used in analysing data was performed in SPSS 16.0. The analyses used were a number of t-tests, correlations, and ANOVA. In the analysis, $p < .05$ was a determinant of statistical significance. A t-test found significant difference in maths scores ($df(4)$ $p=.041$) from before the drumming intervention and after. The mean maths score prior to the drumming intervention was 34.60 ($SD=10.06$). The mean maths score post-intervention was 37.60 ($SD=16.36$). The mean reading score prior to the drumming intervention was 33.60 ($SD=22.15$). The mean reading score post-intervention was 44.60 ($SD=16.86$). A one-sample t-test found a significant difference in reading scores ($df(4)$ $p=.004$). A paired samples t-test found a significant relationship between the maths trait anxiety score pre-intervention and the total state anxiety score pre-test ($df(4)$ $p=.033$). A paired samples t-test found a significant relationship between the reading trait anxiety score post-intervention and the total state anxiety score post-test ($df(4)$ $p=.030$). A t-test found statistical significance when comparing the pre-post state anxiety scores of the baseline and those recorded following the CMP session. A t-test found significance in pre-intervention and post-intervention trait anxiety scores ($df(4)$ $p=.037$). With paired samples correlations significant relationships were found between state anxiety pre-test and post-test in week 3 ($p=.006$), week 5 ($p=.034$), and week 7 ($p=.044$).

[1] The t-test is a comparison between two sets of measures' means which takes into account the differences in group variation and size of the two groups. The assumptions of the t-test must be met in order to provide the most powerful test of the hypothesis.

Discussion

The purpose of the present study was to explore the effects of community music projects (CMPs) involving African drumming on generalised anxiety and academic performance of adolescents. The study supported the hypothesis that there would be no difference between the pre and post trait anxiety, but did not support the hypothesis that state anxiety would decrease. Maths and reading scores did not significantly increase after the music intervention, thus the hypotheses of increased academic performance from music intervention was refuted.

The hypothesis that reading scores would increase after the drumming intervention, was supported. A significant increase in reading scores was found, which would suggest that CMP might have contributed to this increase. These results are similar to other studies which have suggested that music interventions in school have increased reading scores (Kinney 2008; Southgate & Roscigno 2009). Kiger (1989) found significantly higher reading test scores when students listened to music compared to completion in silence. In Kiger's (1989) study the music was played during the reading comprehension test. In the current study, participants were in a drumming group over the course of six weeks and reading scores were measured before and after the music intervention.

The results of the current study are not consistent with Etaugh and Michals (1975) who found no significant increase in reading comprehension after a music intervention. Personality may be a contributing factor when studying the effects of music on reading comprehension (Daoussis & McKelvie 1986; Furham & Strbac 2002). Personality traits were not measured in the current study, and could have been a contributing factor to the results. Other explanations for the increase in reading scores in the current study might include differences in the level of reading abilities in participants and an increased reading ability due to the school curriculum. Overall, contradictions in results from various studies would merit the need for further research in the effects of music on reading comprehension. Specifically the effects from a community music group on reading performance.

The hypothesis that maths scores would improve with a CMP intervention was not supported. Although there were no significant results, some participants' maths scores increased after music intervention whilst for others, scores decreased. The results of this research are consistent with Southgate and Roscigno (2009), who found that maths scores did not improve with music participation in adolescents and a study by Furnham and Strbac (2002) who also found no

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significant difference in mental arithmetic tasks with adolescents when music was present.

However, this study also found improvement in maths scores with children. Schellenberg (2004) found that music lessons increased intelligence quotient (IQ) levels in children. The similarities in these findings with the differences in effects of music on children and adolescents, requires future researchers to look at this issue in more depth. A possible explanation might be that adolescents have a greater variety of external and environmental conditions affecting their academic performance. These influences might include puberty, social pressures, and self-esteem.

The results of the current research are not consistent with Kinney's (2008) finding that maths scores were significantly higher with 8th graders involved in CMPs after a couple of years. Explanations for conflicts in the results might include differences in socioeconomic class and length of music participation. If the music involvement in the current study had been a greater length of time, significant results might have been found. Southgate and Roscigno (2009) found that class and race/ethnic background may have a significant impact on academic achievement. These characteristics were not assessed in the current research. Future research would benefit from looking into these categories to recognise possible relationships between them and academic achievement.

The hypothesis that CMPs would have no effect on trait anxiety scores was supported in the present study. The trait anxiety scores were not significantly different from pre-test of music intervention to post-test of music intervention. This finding would suggest that trait anxiety was not affected by the music intervention. These findings are similar to the findings of Nilsson, Kokinsky, Nilsson, Sidenvall and Enskar (2009) who found that school aged children in postoperative care had no significant changes in their anxiety levels from music intervention. Doak (2006) found no significant decrease in anxiety levels after a drumming intervention. Possible explanations for the lack of change in trait anxiety levels could be that because the trait anxiety tests measure how an individual usually feels, these levels are not expected to change after short periods of music intervention. These trait anxiety levels might only be influenced by longer lengths of time.

The results of this study were consistent with Harner (1994) who reported a decrease in anxiety levels after a meditation and drumming intervention. This study differed from the current study in that Harner (1994) used the trait anxiety test as the baseline and then compared this with the state anxiety test administered during the intervention. The results therefore measured decrease of state anxiety compared to the baseline trait anxiety. The current study compared the trait scores from pre-intervention to post-intervention. The differences in method have probably contributed to the differences in findings between studies. Other studies that found decreases in anxiety after music interventions (Thompson & Grocke 2008; Yu, Liu, Li, & Ma 2009) used different anxiety measurements compared to the current study. Differences in measurements and methods of administering tests possibly contributed to the difference in findings.

The current research supported the hypothesis that music intervention would decrease state anxiety scores. Significant decreases in state anxiety scores over time were found with the CMP. This research was also consistent with other research which found music interventions decreased levels of anxiety (Chang, Chen, & Huang 2008; Harner 1994; Thompson & Grocke 2008; Yu, Liu, Li, & Ma 2008). Although different methods and measurements were used in these studies, these results still indicate that music has the potential to decrease anxiety in individuals. Future research may help to establish more consistent results in the effects of CMPs on state anxiety levels.

Conclusion

The results of this study have implications for music research as well as overall education. CMP demonstrated a significant reduction in state anxiety intensity. The baseline and post-test sessions of both state and trait intensity scores were significantly different. Results were supportive of the use of CMP as an intervention modality, but could not be generalised because the study used only one measuring instrument, one form of standardised test and one genre of music.

A need therefore exists for continued research to determine whether or not CMP is effective as an academic achievement intervention as well as a means of improving overall general health of young people especially if and when their generalised anxieties are reduced by the CMP. Since the researcher did not study the specific effects of other after-school CMPs, perhaps these activities influenced the academic performance and trait anxiety. Future studies related to the use of CMP as an intervention modality should try to control for these extracurricular activities since after school programs can alter anxiety levels in young people and could also have an effect on their academic achievement.

This research, along with previous research, suggests that CMP can be used effectively as a modality for intervention due to its potential to

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improve quality of life and academic achievement in adolescents. This intervention is generally low in cost and is readily available to schools. Any qualified musician and music educator with some form of training in multicultural music education could offer these services to public schools. However, the formal training itself is not prerequisite to providing CMP successfully. Many music educators and musicians already do an effective job in providing these services. There are benefits of having a trained community music practitioner. The training makes it easy to utilise standard pedagogy and teaching techniques that would be easily measured using conventional scientific methods. In any case, with or without specialty training in community music, students should be encouraged to participate in CMPs in a place where other mitigating methods for anxiety and academic performance are unlikely.

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