Dance/Movement Therapy Impacts Mood States of Adolescents in a Psychiatric Hospital

Ashley N. Anderson, a, d Heather Kennedy, a, e Peter DeWitt, b, f Erin Anderson, a, g Marianne Z. Wamboldt a, c, h

a Children’s Hospital Colorado, Department of Psychiatry and Behavioral Sciences, 13123 East 16th Avenue, Box B-130, Aurora, CO, USA, 80045

b University of Colorado Anschutz Medical Campus, Colorado School of Public Health, Colorado Biostatistics Consortium, 12477 E. 19th Avenue, Aurora, CO, USA, 80045

c University of Colorado Anschutz Medical Campus, School of Medicine, Department of Psychiatry, 13001 E. 17th Place, Campus Box C290, Room E1354, Aurora, CO 80045.

d ashley.anderson@ucdenver.edu

e heather.kennedy@childrenscolorado.org

f peter.dewitt@ucdenver.edu

g erin.anderson@childrenscolorado.org

h marianne.wamboldt@ucdenver.edu

Correspondence concerning this article should be addressed to Heather Kennedy, Children’s Hospital Colorado, 13123 East 16th Avenue, B-130, Aurora, CO, USA, 80045.

Email: heather.kennedy@childrenscolorado.org

Abstract

Although dance/movement therapy (DMT) is often used in conjunction with traditional therapies for treating children with psychiatric disorders, the evidence base for this therapy is currently small. The goal of this retrospective research is to examine whether DMT, embedded within larger psychiatric therapeutic programs, affects changes in mood states of adolescents suffering from a variety of psychiatric illnesses. Participants include 402 predominately white, non-Hispanic patients (14 - 21 years old, with a mean age of 14.56 ± 1.70 years) who completed 671 mood measures between August 2010 and December 2011. Participants completed the Fast Assessment of Children’s Emotions before and after a group DMT session. When controlling for pre-mood scores, there was a significant change in all mood states and a significant odds of a change in total mood score, per unit increase in pre-total mood score, after one DMT session (odds ratio = 1.84; p ≤ .01). There was no significant association between patient characteristics and changes in individual or total mood scores, indicating that DMT may be useful for a wide range of patients. The results from this formative study will help researchers develop prospective studies focusing on therapeutic effects of DMT for a wide range of patients.

*Keywords:* Dance Therapy, Adolescents, Mental Disorders, Retrospective Study, Mood Changes

Dance/Movement Therapy Impacts Mood States of Adolescents in a Psychiatric Hospital

Through the efforts of Marian Chase, dance/movement therapy (DMT) was established in the 1940s, after psychiatric patients reported its therapeutic benefits. Shortly after, in 1965, a group of dance/movement therapists founded the American Dance Therapy Association, in order to continue Ms. Chase’s work of utilizing movement for physical, emotional, and cognitive integration of the human experience ([American Dance Therapy Association, 2009](#_ENREF_1); [Schmais & White, 1986](#_ENREF_32)). Since establishment, DMT has grown to include collaboration between dance/movement therapists, psychologists, and psychiatrists, in order to meet the needs of a wide range of patients.

Beyond serving as a non-confrontational means for expression, DMT has two main overarching goals for therapy sessions. First, it is important for patients to have a mind-body connection by identifying present emotions and sensations, connecting them to a particular part of the body, and sharing that experience. This process best happens through creating a safe structure within the therapy group and allowing patients to explore inner emotions through their physical body ([Sheets-Johnstone, 2010](#_ENREF_33)). Second, it is therapeutically beneficial for patients to create something novel. This can lead to a sense of empowerment and potentially motivate patients to accomplish treatment goals. This creative process encourages individuals to transform inner experiences into external realities, thereby promoting awareness and more flexible coping strategies ([Cropley, 1990](#_ENREF_9); [King & Pope, 1999](#_ENREF_21)). Furthermore, by utilizing the healthy, creative aspects of an individual’s personality, DMT not only provides the opportunity to stimulate creativity within a therapy session, but also within other aspects of the participant’s life ([Sandel, Chaiklin, & Lohn, 1993](#_ENREF_30)). In summary, the two main goals of a DMT session are to provide an integrative mind-body experience and to stimulate creativity.

A shared belief among individuals associated with DMT is that participants can use dance/movement to express themselves in ways that words cannot ([Levy, 2005](#_ENREF_25)). DMT provides an external outlet for participants to express internal experiences and to then have these experiences witnessed by others. The kinesthetic components of DMT introduce participants to a non-verbal, yet expressive language to describe challenges they face ([Sheets-Johnstone, 2010](#_ENREF_33)). Additionally, DMT may allow individuals to evoke, connect, and express powerful emotions more immediately than traditional therapeutic interventions, due to its use of body felt experience ([Brooks & Stark, 1989](#_ENREF_7); [Kuettel, 1982](#_ENREF_24)). Through observing movement, the dance/movement therapist can assess a participant’s physical and psychological strengths and limitations, using this information to shape the direction of the therapy session.

**Current Research**

Current research examines the impact of DMT on health-related outcomes for a variety of different populations. For cancer patients, DMT improves quality of life in adults ([Bradt, Goodill, & Dileo, 2011](#_ENREF_6); [Sandel et al., 2005](#_ENREF_31)) and addresses psychological needs in children ([Cohen & Walco, 1999](#_ENREF_8)). Adults suffering with fibromyalgia experience improved disease coping after a series of DMT sessions ([Bojner Horwitz, 2004](#_ENREF_5)). Among adults with psychological diagnoses, DMT may improve quality of life ([S. Koch, Kunz, Lykou, & Cruz, 2014](#_ENREF_22)) and increase self-awareness ([Barton, 2011](#_ENREF_3)). More specifically, DMT is useful for adults with psychiatric disorders of anxiety, tension, depression, and low self-esteem ([Heber, 1993](#_ENREF_16); [S. C. Koch, Morlinghaus, & Fuchs, 2007](#_ENREF_23)). For individuals with schizophrenia, ten weeks of DMT in conjunction with standard care significantly reduces negative symptoms, as measured by the Positive and Negative Syndrome Scale. Unfortunately, due to the small sample size (N=45) of this study, more research is necessary to further determine the therapeutic benefits of DMT for participants with schizophrenia ([Ren & Xia, 2013](#_ENREF_29)). The amount of research available regarding adults and psychiatric disorders remains relatively small, but analogous work regarding children is even more scant.

Extending beyond adults, pediatric populations also benefit from the therapeutic effects of DMT. DMT is believed to be an effective treatment modality for children suffering with various forms of trauma ([D. A. Harris, 2007](#_ENREF_13); [Pierce, 2014](#_ENREF_27)), maltreatment ([Betty, 2013](#_ENREF_4)), and abuse ([Goodill, 1987](#_ENREF_11)). Additionally, children with psychiatric disorders, including depression ([Jeong et al., 2005](#_ENREF_18)), conduct disorder ([Erfer & Ziv, 2006](#_ENREF_10)), attention deficit hyperactivity disorder ([Grönlund, Renck, & Weibull, 2005](#_ENREF_12)), and autism ([Hartshorn et al., 2001](#_ENREF_15)), positively benefit from DMT. Among 16 year old adolescent females, 12 weeks of DMT increased plasma serotonin and decreased dopamine levels, while improving somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychotic symptoms ([Jeong et al., 2005](#_ENREF_18)). Some hypothesize that the cohesion and sense of safety evoked during a DMT session allows participants to more effectively meet treatment goals ([Erfer & Ziv, 2006](#_ENREF_10)). Research regarding DMT and its effects on children are promising, but more research is necessary to understand the impact of this modality in both inpatient and outpatient pediatric psychiatry settings.

**A Dance/Movement Therapy Session**

A group DMT session typically lasts between 60 and 75 minutes, following the structure developed by Marian Chase. This structure includes a trajectory of warm-up, exploration, and closure. During warm-up, the therapist assesses the group for movement expression, interpersonal dynamics, and group themes, such as anger or anxiety. The therapist uses the information collected during the warm-up to tailor the exploration phase for the current group of participants.

The needs and motivational levels of adolescents within a DMT session vary among therapy groups. Therefore, during the exploration phase it is important to maintain a balance between participation and sense of safety. To encourage movement expression and provide an outlet for emotions, the dance/movement therapist may use props such as body socks, stretch bands, ribbons, or scarves. The dance/movement therapist assists participants in tracking and validating their experiences and emotions throughout the session, in order to elicit a feeling of safety within the group. The sense of safety that develops encourages individuals to take personal risks in sharing movement and emotions.

Although movement often expresses what words cannot, verbalizing experiences is an important integrative exercise that deepens an individual’s awareness of body, emotions, and experiences. During closure, the dance/movement therapist asks individuals to share observations about themselves or the group and validates the adolescents’ experiences. Oftentimes patients report a change in mood, during which time the dance/movement therapist asks how this shift in mood occurred and how individuals may apply the techniques used in the DMT group to their everyday lives.

**Objectives**

The objective of this retrospective research was to examine whether DMT embedded within larger psychiatric therapeutic programs elicited immediate mood changes in adolescents with a variety of psychiatric illnesses. Additionally, we wanted to examine whether DMT was particularly useful for any specific patient population. This research examined the relationship between reported mood changes and patient characteristics—age, gender, ethnicity, primary diagnoses, insurance status, psychiatric medications, length of stay, and treatment unit—for adolescent patients with psychiatric diagnoses who participated in group DMT sessions at a large Children’s Hospital.

**Method**

This study received institutional approval from the Colorado Multiple Institutional Review Board as a retrospective, de-identified chart review study. Initial data was collected as part of program evaluation.

**Participants**

Participants consisted of 402 patients (ages 14 to 21 years) from the following three units in a large Children’s Hospital: Adolescent Day Treatment (ADT), Adolescent Inpatient Psychiatric Unit (APU), and the Eating Disorders Unit (EDU). ADT is a day treatment program for adolescents 13 to 18 years old that do not require 24-hour care, but need rigorous evaluation and treatment. Conversely, APU is an inpatient program for adolescents 13 to 18 years old with severe psychiatric symptoms, who may be harmful to themselves or others. Finally, the EDU offers inpatient and partial hospitalization for 9 to 21 year old patients with any form of eating disorder. The number of patients included in this study from the ADT, APU, and EDU are 139, 169, and 94, respectively.

As seen in Table 1, the Eating Disorders Unit had a significantly higher percentage of female patients, who were more likely to be Caucasian and non-Hispanic, than the other two units. Additionally, the length of stay for patients in the EDU was longer than for the other units, and this unit had the longest DMT session of 75 minutes, compared to 60 minute sessions for ADT and APU. In regards to diagnosis, 69.1% of ADT patients have one diagnosis, 81.6% of APU patients have three diagnoses, and 64.9% of EDU patients have two diagnoses. The majority of individuals within the ADT and APU have a mood disorder (86.3% and 91.7%, respectively), while 100% of individuals in the EDU have an eating disorder. See Table 1 for specific diagnoses.

INSERT TABLE 1

**Measures**

**Fast Assessment of Children’s Emotions (FACE)**. This measure assesses a child’s perspective of six different mood states (anger, sadness, energy, confusion, tiredness, and anxiety). Each mood state is depicted with an emoticon picture and accompanying adjectives, and is scored along a three point scale (0: not at all, 1: at little, or 2: a lot). The total mood score (TMS) is a summary of all mood states (with energy reverse scored), such that the range of scores is 0 to 12. Higher scores are associated with potentially more problematic mood states, such as decreased energy or increased anger, sadness, confusion, tiredness, or anxiety. The FACE is based on the Profile of Mood States ([McNair, Lorr, Droppleman, & Educational and Industrial Testing Service, 1971](#_ENREF_26)) and was developed for two main purposes: (1) to be a tool that children and adolescents can easily understand and use; (2) to be significantly shorter so that it may be utilized in a clinical setting. The FACE shows reasonable psychometric properties with a Chronbach’s alpha of .75 and reasonable convergent and divergent validity ([Kennedy, Unnithan, & Wamboldt, 2014](#_ENREF_20)). In this study, the FACE was administered both before and after a dance/movement therapy session.

**Procedure**

All DMT sessions lasted 60 to 75 minutes and were held in a studio space with groups of patients from a single unit. Before and immediately after a DMT group, the dance/movement therapist distributed the FACE measure to all participants, as part of program evaluation. The dance/movement therapist recorded the patient’s medical record number (MRN) on top of each FACE, a patient identifier removed before data analysis. After collecting FACE data, MRNs of individuals that completed the measure were sent to a Clinical Information Resource Specialist in the Clinical Informatics Department. Using MRNs and the electronic medical record system, this specialist pulled patient characteristics—date of birth, gender, race, ethnicity, primary diagnoses (up to three), medications (up to two), insurance status, and length of stay—for all admissions between August 2010 to December 2011.

Next, patient characteristics were linked to the FACE data. Since a patient may have multiple admissions between August 2010 and December 2011, it was necessary to determine which admission date correlated to the FACE completion date. From the dataset, we eliminated admission dates that did not coincide with the FACE completion date. All data was entered into REDCap (Research Electronic Data Capture), a secure, web-based application designed to support data capture for research studies ([P. A. Harris et al., 2009](#_ENREF_14)).

For analysis, we categorized data from the medical record review into classes and subclasses, based upon relevance to the study. Main categories included diagnoses, medications, insurance status, race, and ethnicity. We created psychiatric diagnostic subclasses based on the Diagnostic and Statistical Manual of Mental Disorders ([American Psychiatric Association, 2000](#_ENREF_2)).

**Data Analysis.** We examined the dataset for missing data. A FACE measure was complete if the participant rated all six emotions both pre and post DMT session. If a FACE was incomplete, we removed the measure and the associated patient information from the dataset. We did not compare the data from individuals with incomplete FACE measures to those with complete FACE measures. In general, participants did not complete FACE measures if they arrived late to DMT, were pulled early from the session due to other clinical needs, or refused to comply with the instructions. From 933 FACE measures, we removed 262 based upon incompleteness. Of the 402 participants, the majority completed only one measure; however, some participants completed two to seven measures, with one participant completing 12 measures. Age, gender, race, ethnicity, primary diagnoses, insurance status, treatment unit, and length of stay contained no missing data for all 402 patients.

The analysis utilized pre and post FACE measure data to model the change in total or individual mood scores and to explore the relationship between changes in mood scores and patient characteristics. To determine the change in TMS, this research used the sum of the absolute differences in the individual mood scales between pre and post surveys.1 Analysis used absolute differences for change in TMS, since DMT can elicit both positive and negative psychological and emotional states. A higher TMS indicates more traditionally problematic mood states; however, evoking these problematic mood states may assist participants in exploring repressed issues. Due to the nature of this metric, modeling the change in TMS as a continuous variable is not reasonable. Thus, we chose to model the odds of a change in TMS as a function of the pre-score and other possible predictors.

Data analysis was done in R version 2.15.3 ([R-core, 2012](#_ENREF_28)). Analysis used Tukey's Honest Significant Difference (HSD) to assess significant differences between any two units. The mixed model ANOVAs with Tukey HSD provided the insight into the differences in the TMS and the individual mood scales. Mixed models were fitted using the lme4 package ([R-core, 2012](#_ENREF_28)) with Tukey HSD multiple comparisons made using the multcomp package ([Hothorn, Bretz, & Westfal, 2012](#_ENREF_17)).

**Results**

Across treatment units, there were significant differences in TMS assessed prior to a DMT session.As previously stated, the total mood score (TMS) is a summary of all mood states (with energy reverse scored), such that the range of scores is 0 to 12. The average pre-TMS for ADT, APU, and EDU, were 3.58, 3.83, and 4.92, respectively. On average, patients in the ADT reported more energy at baseline than did patients in the other units (p < .0001). Patients in the eating disorders unit had a significantly higher pre-TMS, as well as higher levels of self-reported anger, confusion, and anxiety, than patients in other units.

As seen in Table 2, if a child reported "not at all" to a specific mood state prior to DMT, the majority of the time this emotion did not change, with the exception of energy. After DMT, 59.89% of respondents reported an increase in energy. Conversely, if a child reported "a little" of a mood state prior to beginning DMT, often those mood states decreased. For example, 61.11% of those reporting "a little" anger decreased to "not at all" following the DMT session. However, a sizeable percentage of patients reported no change (33.95% - 51.44%) and a small percentage reported an increase in a specific mood. Finally, for those reporting "a lot" of a mood state, the majority of patients reported a decrease in that mood state following DMT, with the exception of energy.

INSERT TABLE 2

Since there were significant differences in the pre-scores of patients across units, it was important to control for pre-score when analyzing changes in total and individual mood states and testing whether there were differences due to the demographic variables. Thus, analyses utilized the odds of a change in mood state, which depended on the per unit increase in pre-score. When interpreting odds ratios, anytime the confidence interval does not include 1.0, the odds ratio is statistically significant. As shown in Table 3, there was a statistically significant association between the pre-TMS and the odds of a change in overall TMS (odds ratio = 1.84; p ≤ .01). This indicates that overall, patients had approximately a 1.8 times greater odds of having a change in their overall mood state after DMT compared to their mood state prior to DMT. Additionally, Table 3 breaks down the odds ratios for a change in specific mood states across units, and across genders. All of the odds ratios for TMS as well as individual mood states were significantly greater than one across units and genders, except for the EDU’s TMS, which showed little difference in the odds of a change in TMS per unit increase in pre-score. Nonetheless, within the EDU patients, there were significant changes in all of the specific moods.

INSERT TABLE 3

When controlling for the pre-mood score and analyzing across units, there was no significant association between changes in TMS and demographic variables **(**age, gender,race, ethnicity, primary diagnoses, insurance status, treatment unit, and length of stay). This indicates that mood scores did not change unequally across the demographic variables. Although there was no significant association between TMS and patient characteristics, there were significant odds of a change in mood state among psychiatric units and gender. Shown in Table 3, for all three psychiatric units, the mood state with the greatest odds of a change was anger. The mood state with the greatest odds of a change for females was also anger, while males had greater odds of a change in both anger and confusion.

**Discussion**

Adolescents presenting to a psychiatric hospital with moderate to severe emotional and behavioral disturbances are often unaware of their internal moods or thoughts and are unable to regulate them. A challenge of the psychiatric inpatient unit is connecting with the child so that his or her troubles are understood, and then teaching the child a variety of coping strategies to safely work through internal struggles. A non-verbal means of communicating is often the first step in helping depressed, anxious, angry, or highly controlled youth identify internal states and express these states in a beneficial manner. One intervention that employs non-verbal communication is dance/movement therapy. Clinicians involved with this intervention state that it is helpful in engaging and reaching youth ([Kennedy, Reed, & Wamboldt, 2014](#_ENREF_19)). However, there is scant research on the effects of DMT for psychiatrically disturbed youth.

When embedded within a larger therapeutic structure such as an inpatient unit, it is challenging to understand what DMT offers therapeutically over and above the other interventions. Our results indicate that a group DMT session impacts adolescent mood states. By helping youth become more aware of their internal states, DMT may serve as a potential coping strategy for modulating particular emotions.

Results showed that most patients reported changes in their mood states from the beginning to the end of the DMT session, especially if they reported “a little” or “a lot” of a mood state at the beginning of the session. In particular, anger and confusion were very likely to decrease after a DMT session. However, 4 to 18% of patients reported an increase in one of the putatively negative emotional states after the session, such as sadness or anger. This change can indicate that the patients may have developed some new insight during the DMT session, which may be therapeutic depending on where s/he is in the treatment process. For example, patients with anorexia may report feeling fine and cannot understand why others are concerned about their weight loss. For these patients, an increased ability to identify with sad or angry emotions may be the precipitant necessary for them to engage in more traditional psychotherapy. These results show that DMT may assist adolescents in identifying internal mood states, as well as providing them with a tool to modify certain moods.

Another important finding is that DMT can be integrated into psychiatric units and can include patients with a wide variety of diagnoses, acuity levels, and demographic differences. Both males and females participating in DMT sessions reported significant shifts in mood states. For females, anger had the greatest odds of a change (13.41), compared to confusion (odds of a change = 4.71) or sadness (odds of a change = 4.63). Similarly, anger had the highest odds of a change (11.04) for males, but confusion (odds of a change = 6.59) and sadness (odds of change = 4.18) also changed at high rates. Indeed, all mood states had significant odds of a change for both boys and girls. Additionally, when examining patients with different diagnoses and levels of acuity, we found that each mood state changed to a statistically significant degree for patients in all units. It is interesting that for patients with eating disorders, anger had 17.05 odds of a change. This indicates that after a DMT session EDU participant’s report of anger was 17 times more likely to change, whereas all of the other mood state’s odds of a change were to a lesser degree. Of patients on the psychiatric inpatient unit, anger and confusion were most likely to change; whereas patients in day treatment reported highest changes in anger and sadness. These results, as well as the fact that we found no statistically significant differences for diagnoses, medications, insurance status, race, or ethnicity, indicate that DMT can be incorporated into a variety of patient settings, and be useful for a wide range of patients.

To our knowledge, this study not only used the largest sample of participants involved in DMT, compared to other published works, but it also examined the population in a systematic fashion. Although a single measure was used, this methodology made it practical to study the effects of group DMT session embedded within a larger treatment setting. Limitations include the lack of randomization and blinding. Additionally, this study only assessed immediate mood change, not change in psychiatric symptoms over time. The results show that DMT can elicit mood changes in adolescents with psychiatric problems, regardless of age, gender, ethnicity, primary diagnosis, insurance status, psychiatric medications, length of stay, and treatment unit.

**Future Direction.** While the results of this study show that DMT can elicit immediate mood state changes, future research is necessary to further reveal DMT’s impact on adolescents with psychiatric conditions. For continued study, several possible future directions could be considered. First, assess the impact of DMT within a larger therapeutic program, utilizing a randomized, controlled protocol, such as offering one unit DMT but not the other unit. This study could research variables other than immediate mood changes, including patient alliance with the treatment team, motivation to change, effective understanding and communication of emotions, and the reduction of seclusions or restraints during emotional regulation. Secondly, assess the outcome of DMT as a stand-alone intervention for outpatients. The results of this study seem to show promise for an effective outpatient DMT intervention, but they do not indicate the dose necessary for ongoing change. By showing that DMT can effectively elicit immediate mood changes for a diverse population of adolescents with psychiatric problems, this research provides guidance for future studies to expand upon the current knowledge base regarding DMT.

**Acknowledgments**

Funding for this project was provided by the University of Colorado Denver’s Undergraduate Research Opportunity Program—Colorado Clinical and Translational Sciences Institute (UROP-CCTSI) and the Children’s Colorado Ponzio Creative Arts Therapy restricted fund.

References

American Dance Therapy Association. (2009). About Dance/Movement Therapy. from <http://www.adta.org/Default.aspx?pageId=378213>

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR* (4th ed.). Washington, DC: American Psychiatric Association.

Barton, E. J. (2011). Movement and mindfulness: A formative evaluation of a dance/movement and yoga therapy program with participants experiencing severe mental illness. *American Journal of Dance Therapy, 33*, 157-181. doi: 10.1007/s10465-011-9121-7

Betty, A. (2013). Taming tidal waves: A dance/movement therapy approach to supporting emotion regulation in maltreated children. *American Journal of Dance Therapy, 35*(1), 39-59. doi: 10.1007/s10465-013-9152-3

Bojner Horwitz, E. (2004). *Dance/movement therapy in fibromyalgia patients: Aspects and consequences of verbal, visual, and hormonal analyses.* (Doctoral dissertation), Uppsala University.

Bradt, J., Goodill, S. W., & Dileo, C. (2011). Dance/movement therapy for improving psychological and physical outcomes in cancer patients. *Cochrane Database Syst Rev*(10), CD007103. doi: 10.1002/14651858.CD007103.pub2

Brooks, D., & Stark, A. (1989). The effect of dance/movement therapy on affect: A pilot study. *American Journal of Dance Therapy, 11*(2), 101-112. doi: 10.1007/BF00843774

Cohen, S. O., & Walco, G. A. (1999). Dance/movement therapy for children and adolescents with cancer. *Cancer Practice, 7*(1), 34-42. doi: 10.1046/j.1523-5394.1999.07105.x

Cropley, A. J. (1990). Creativity and mental health in everyday life. *Creativity Research Journal, 3*(3), 167-178. doi: 10.1080/10400419009534351

Erfer, T., & Ziv, A. (2006). Moving toward cohesion: Group dance/movement therapy with children in psychiatry. *The Arts in Psychotherapy, 33*(3), 238-246. doi: 10.1016/j.aip.2006.01.001

Goodill, S. W. (1987). Dance/movement therapy with abused children. *The Arts in Psychotherapy, 14*(1), 59-68. doi: 10.1016/0197-4556(87)90035-9

Grönlund, E., Renck, B., & Weibull, J. (2005). Dance/movement therapy as an alternative treatment for young boys diagnosed as ADHD: A pilot study. *American Journal of Dance Therapy, 27*(2), 63-85. doi: 10.1007/s10465-005-9000-1

Harris, D. A. (2007). Pathways to embodied empathy and reconciliation after atrocity: Former boy soldiers in a dance/movement therapy group in Sierra Leone. *Intervention, 5*(3), 203-231.

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform, 42*(2), 377-381.

Hartshorn, K., Olds, L., Field, T., Delage, J., Cullen, C., & Escalona, A. (2001). Creative movement therapy benefits children with autism. *Early Child Development and Care, 166*(1), 1-5. doi: 10.1080/0300443011660101

Heber, L. (1993). Dance movement: A therapeutic program for psychiatric clients. *Perspectives in Psychiatric Care, 29*(2), 22-29. doi: 10.1111/j.1744-6163.1993.tb00408.x

Hothorn, T., Bretz, F., & Westfal, P. (2012). multcomp: Simultaneous interence in general parametric models (Version R package version 1.2-12).

Jeong, Y. J., Hong, S. C., Lee, M. S., Park, M. C., Kim, Y. K., & Suh, C. M. (2005). Dance movement therapy improves emotional responses and modulates neurohormones in adolescents with mild depression. *Int J Neurosci, 115*(12), 1711-1720. doi: 10.1080/00207450590958574

Kennedy, H., Reed, K., & Wamboldt, M. Z. (2014). Staff perceptions of complementary and alternative therapy integration into a child and adolescent psychiatry program. *The Arts in Psychotherapy, 41*(1), 21-26. doi: <http://dx.doi.org/10.1016/j.aip.2013.10.007>

Kennedy, H., Unnithan, R., & Wamboldt, M. Z. (2014). *Development and validation of the fast assessment of children's emotions*. Manuscript in preparation, Department of Psychiatry, School of Medicine, University of Colorado Denver Anschutz Medical Campus.

King, B. J., & Pope, B. (1999). Creativity as a factor in psychological assessment and healthy psychological functioning. *Journal of Personality Assessment, 72*(2), 200-207. doi: 10.1207/s15327752jp720204

Koch, S., Kunz, T., Lykou, S., & Cruz, R. (2014). Effects of dance movement therapy and dance on health-related psychological outcomes: A meta-analysis. *The Arts in Psychotherapy, 41*(1), 46-64. doi: <http://dx.doi.org/10.1016/j.aip.2013.10.004>

Koch, S. C., Morlinghaus, K., & Fuchs, T. (2007). The joy dance: Specific effects of a single dance intervention on psychiatric patients with depression. *The Arts in Psychotherapy, 34*, 340-349. doi: 10.1016/j.aip.2007.07.001

Kuettel, T. J. (1982). Affective change in dance therapy. *American Journal of Dance Therapy, 5*, 56-64. doi: 10.1007/BF02579541

Levy, F. J. (2005). *Dance movement therapy: A healing art* (2 ed.). Reston: National Dance Association: American Alliance for Health, Physical Education, Recreation, and Dance.

McNair, D. M., Lorr, M., Droppleman, L. F., & Educational and Industrial Testing Service. (1971). *Profile of mood states (POMS)*. San Diego, California: Educational and Industrial Testing Service.

Pierce, L. (2014). The integrative power of dance/movement therapy: Implications for the treatment of dissociation and developmental trauma. *The Arts in Psychotherapy, 41*(1), 7-15. doi: <http://dx.doi.org/10.1016/j.aip.2013.10.002>

R-core. (2012). nlme: Linear and nonlinear mixed effects models (Version R package version 3.1-104).

Ren, J., & Xia, J. (2013). Dance therapy for schizophrenia. *Cochrane Database Syst Rev, 10*, CD006868. doi: 10.1002/14651858.CD006868.pub3

Sandel, S. L., Chaiklin, S., & Lohn, A. (Eds.). (1993). *Foundations of dance/movement therapy: The life and work of Marian Chace*. Columbia: The Marian Chace Memorial Fund of the American Dance Therapy Association.

Sandel, S. L., Judge, J. O., Landry, N., Faria, L., Ouellette, R., & Majczak, M. (2005). Dance and movement program improves quality-of-life measures in breast cancer survivors. *Cancer Nursing, 28*(4), 301-309. doi: 10.1097/00002820-200507000-00011

Schmais, C., & White, E. Q. (1986). Introduction to dance therapy. *American Journal of Dance Therapy, 9*, 23-30. doi: 10.1007/BF02274236

Sheets-Johnstone, M. (2010). Why is movement therapeutic? *American Journal of Dance Therapy, 32*(1), 2-15. doi: 10.1007/s10465-009-9082-2

Footnotes

1 Change in TMS = | post anger – pre anger | + | post confusion – pre confusion | + | post sadness – pre sadness | + | post energy – pre energy | + | post anxiety – pre anxiety | + | post tiredness – pre tiredness |

Table 1

*Patient Demographics for the ADT, APU, and EDU*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **ADT**  *N* = 139 | **APU**  *N* = 169 | **EDU**  *N* = 94 | **p-value** |
| Age (years) | 14.8a ± 1.4 | 12.4a ± 1.4 | 14.6a ± 2.3 | 0.067 |
| Length of Stay (days) | 17.4b ± 10.7 | 20.5ab ± 33.2 | 26.8b ± 14.1 | 0.012 |
| Gender |  |  |  | <0.0001 |
| Female | 52.5%b | 56.2%b | 90.4%a |
| Race1 |  |  |  | 0.0230 |
| Hispanic or Latino | 10.8% | 16.0% | 4.3% |
| Not Hispanic or Latino | 84.9% | 76.9% | 85.1% |
| Unknown | 4.3% | 7.1% | 10.6% |
| Ethnicity1 |  |  |  | 0.0007 |
| Black/African American | 5.0% | 10.1% | 1.1% |
| White | 73.4% | 67.5% | 80.9% |
| Other | 21.6% | 22.4% | 18.0% |
| Diagnosis | | | | |
| Anxiety Disorder | 23.0%b | 42.0%a | 30.9%b | 0.0018 |
| Attention and Behavior | 7.2%ab | 13.6%a | 2.1%b | 0.0049 |
| Eating Disorder | 0.7%b | 4.1%b | 100.0%a | <0.0001 |
| Mood Disorder | 86.3%a | 91.7%a | 33.0%a | <0.0001 |
| Psychotic Disorder | 5.0%a | 10.1%a | 0.0%b | 0.0037 |
| Self Harm | 1.4%b | 61.5%a | 1.1%b | <0.0001 |
| Other Psychological | 4.3%b | 33.1%a | 38.3%a | <0.0001 |
| Non-Psychological | 7.9%b | 24.9%a | 6.4%b | <0.0001 |

*Note*. ADT = Adolescent Day Treatment; APU = Adolescent Psychiatric Unit; EDU = Eating Disorders Unit; 1 No grouping reported due to multinomial response; Letters denote groupings across rows. Values with the same letter are not significantly different. All groups are done via Tukey HSD at a family error wise rate of .05.

Table 2

*Changes in individual mood score by controlling for pre-score*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Pre-score 0** | |  |  | **Pre-score 1** | |  | |  | **Pre-score 2** | |
|  | *N* | | *%* | | *N* | | *%* | | *N* | | | *%* |
| **Anger**  Decrease  No Change  Increase | -  449  23 | | -  95.13%  4.87% | | 99  55  8 | | 61.11%  33.95%  4.94% | | 22  15  - | | | 59.46%  40.54%  - |
| **Confusion**  Decrease  No Change  Increase | -  378  50 | | -  88.32%  11.68% | | 84  77  13 | | 48.28%  44.25%  7.47% | | 47  22  - | | | 68.12%  31.88%  - |
| **Sadness**  Decrease  No Change  Increase | -  321  36 | | -  89.92%  10.08% | | 108  113  11 | | 46.55%  48.71%  4.74% | | 48  34  - | | | 58.54%  41.46%  - |
| **Energy**  Decrease  No Change  Increase | -  74  106 | | -  41.11%  58.89% | | 20  125  158 | | 6.60%  41.25%  52.15% | | 38  150  - | | | 20.21%  79.79%  - |
| **Anxiety**  Decrease  No Change  Increase | -  263  45 | | -  85.39%  14.61% | | 99  125  19 | | 40.74%  51.44%  7.82% | | 64  56  - | | | 53.33%  46.67%  - |
| **Tiredness**  Decrease  No Change  Increase | -  184  41 | | -  81.78%  18.22% | | 145  117  21 | | 51.24%  41.34%  7.42% | | 94  69  - | | | 57.67%  42.33%  - |

Table 3

*Odds of a change per unit increase in the pre-mood score for each mood by gender and psychiatric unit*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **TMS** | **Anger** | **Confusion** | **Sadness** | **Energy** | **Anxiety** | **Tiredness** |
| **Overall** | 1.84  [1.52, 2.23] | 12.82  [8.51, 19.32] | 5.19  [3.89, 6.94] | 4.47  [3.38, 5.93] | 0.42  [0.34, 0.53] | 2.94  [2.30, 3.77] | 3.23  [2.49, 4.19] |
| **ADT** | 2.05  [1.41, 2.99] | 10.81  [5.10, 22.95] | 4.50  [2.61, 7.76] | 4.94  [2.87, 8.49] | 0.50  [0.33, 0.74] | 3.19  [1.99, 5.12] | 2.91  [1.81, 4.68] |
| **APU** | 1.87  [1.26, 2.78] | 11.57  [4.71, 28.46] | 6.60  [3.34, 13.07] | 3.53  [1.97, 6.34] | 0.57  [0.36, 0.91] | 2.34  [1.39, 3.95] | 2.51  [1.45, 4.33] |
| **EDU** | 1.36  [0.84, 2.18] | 17.05  [5.96, 48.77] | 4.70  [2.44, 9.03] | 4.50  [2.21, 9.18] | 0.12  [0.05, 0.27] | 3.63  [1.90, 6.94] | 5.72  [2.83, 11.57] |
| **Male** | 2.25  [1.46, 3.46] | 11.04  [4.83, 25. 27] | 6.59  [ 3.46, 12.57] | 4.18  [2.37, 7.36] | 0.58  [0.38, 0.88] | 2.41  [1.46, 3.99] | 3.77  [2.28, 6.24] |
| **Female** | 1.69  [1.30, 2.19] | 13.41  [7.58, 23.74] | 4.71  [3.20, 6.92] | 4.63  [3.10, 6.91] | 0.35  [0.25, 0.49] | 3.22  [2.26, 4.57] | 3.94  [2.03, 4.26] |

*Note*. Pre-mood scores of 0 have less than 1:1 odds of a change, whereas pre-mood scores of 1 or 2 had greater than 1:1 odds of a change. All odds reported in the above table are significantly different from 1 (p ≤ .01) with one exception, TMS for EDU (p = .335). All intervals are based upon 95% confidence intervals, in which the parentheses show Lower Limit and Upper Limit.