

## **Efficacy of Dalcroze Eurhythmics in the Psychological Health, Affectivity, Social Relationships, and State of Flow in Older Adults.**

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**ABSTRACT:** Research studies suggest that music making has positive effects in cognitive, affective, and social domains among samples of older adults. From a positive psychology standpoint, the objective of this study was to evaluate the efficacy of a Dalcroze Eurhythmics (DE)-based intervention in a sample of older adults ( $N = 11$ ) on the variables related to psychological health, social relationships, affectivity, and state of flow through the use of the WHOQOL-BREF, PANAS, and SFSS-2. During the intervention, the participants expressed music through bodily movements, and responded physically to musical stimuli. The mean values of specific indicators of the four variables studied registered positive differences post-test. The indicators related to excitement, enthusiasm, and irritability registered significant values after the intervention. The variable related to positive affectivity, and that related to flow correlated significantly. Conclusion: The DE intervention had positive effects in the variables studied in this sample of older adults. Longer longitudinal studies are needed in this field.

**KEYWORDS** Eurhythmics, psychological health, social relationships, affectivity, flow

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### **I. INTRODUCTION**

The World Report of Ageing and Health of the World Health Organization assumes that ageing is a valuable, dynamic, and challenging process which implies subtle shifts in the physical, cognitive, emotional, and social capacities of the individual, where resilience plays an important role in it [1]. This report defines healthy ageing as “the process of developing and maintaining functional ability that enables well-being in older age” (pp.41). According to this definition, the individual maintains the necessary physical and mental capacities to interact independently with his environment, both physically and socially. By 2050 the global population of 60 years and older is expected to double to nearly 2 billion [1]; therefore, health care systems face the challenge to find new frameworks of action on ageing worldwide.

Older adults face health problems related to different domains: (1) physical: the decline of musculoskeletal function, movement, falls, vision, and hearing among others; (2) cognitive: deterioration in memory and attention closely related to the years of education; (3) emotional and social: loss of significant people besides the loss of their own capacities of functionality, increasing states of depression, anxiety, and loneliness.

Among the sustainable non-pharmacological interventions available to older adults, urged by the WHO report mentioned above, are those related to artistic activities which provide the individuals opportunities to grow resilience in order to face the changes in all the domains of life proper to their age. According to Cantú and Álvarez [2], the individual finds new paths to resilience through artistic activities, because negative emotions are conceptualized into positive ones. For these reasons, the cognitive and emotional effects of art in general are relevant in therapeutic and preventive settings. When considered within a holistic approach, art addresses the physical, cognitive, social, and emotional domains.

#### **1.1. Benefits of artistic activities**

Research studies in relation to the benefits of artistic activities by older adults, suggest that art in general has positive cognitive effects in sustained and divided attention, memory, perception, executive functions such as brain plasticity, problem solving, and planning [3][4][5][6]. In the case of healthy subjects, the positive effects of choral singing in cognitive, psychological, and social domains have been registered in different parts of the world. [7][8][9] Correspondingly, positive cognitive and emotional effects have been also found in samples with Alzheimer [10].

Besides its positive benefits in the cognitive, emotional, and social domains of the lives of older adults, music making has positive effects in the self-perception of wellbeing during the highly satisfying experience of making music individually or in groups [11]. A very unique joyful experience mainly present in the form of games is the state of flow which has been studied in several areas of music making and within a variety of contexts and populations. This phenomenon is self-fulfilling and is obtained as a result of the execution of a specific activity, even though there is no external benefit obtained for doing it [12].

In the area of music-making, there are studies which suggest that flow may be experienced by different populations and in different contexts such as children in a music classroom [13][14], professional musicians [15][16][17][18], and amateurs [19].

Since the state of flow is mainly present in the form of games, Csikszentmihalyi, describes the qualities which make games or play enjoyable. Those qualities are: the ability to concentrate on a limited stimulus field, the use of individual skills to meet clear demands of the task, the forgetfulness of one's separate identity by becoming one with the activity, and the feeling of control over the environment [20].

In order to better explain the state of flow [21], it has been divided into nine components which may vary in intensity during a specific context and together constitute the state of flow. Those components are: (1) union between the action and consciousness of execution, (2) agreement of the abilities of the person with the challenges of the activity, (3) clear and definite goals, (4) immediate and clear feedback, (5) concentration, (6) sense of control, (7) loss of self-consciousness, (8) distortion of time perception, (9) autotelic or gratifying experience [22].

Since flow experiences happen in a positive context according to the original concept of Csikszentmihalyi, these experiences contribute to the self-perception of well-being [23]. Furthermore, flow experiences seem to occur only when the person is actively engaged in a clear physical, emotional, or intellectual interaction with the environment [20].

This engagement with the environment at different levels, happens within the practice of Dalcroze Eurhythmics. From a holistic standpoint this music teaching approach is based on rhythmic training through body movements [24] and is divided into four areas: (a) rhythmic (eurhythmics), (b) solfège rhythmic, (c) improvisation, and (d) *plastique animée* (this area of study works on the body representations of the essence of a piece of music).

## **1.2. Dalcroze Eurhythmics in Gerontology**

Dalcroze Eurhythmics is widely used in Gerontology and was created by the Swiss music pedagogue and composer Emile Jaques-Dalcroze (1865-1950) who is considered the father of active music teaching approaches. After the selection of a subject or theme for the session, the practitioner designs the activities in a carefully sequenced manner. In order to achieve proficiency in a specific skill: rhythmic, melodic, formal, expressive, the practitioner directs a series of exercises which are executed by the participants. Those exercises are preceded by an introductory phase, and are performed individually and in group [25]. The main characteristic of DE is the integration of body movements to music education; therefore, the perception of sensory information increases, thus creating musical perceptions. After the individual perceives these information, the mind organizes it through reflection and analysis [26]. This process requires the mind and body to be maintained in a state of attentiveness towards the interaction of musical elements [27]; attention is directed to a precise musical element thus, enhancing the performance with a specific body part [28].

The reflection-in-action process that happens during the DE sessions, occurs within seconds whilst the participants attempt to improve their performance according to the demands of the music and the instructions given by the practitioner [29]. Besides the cognitive dimension involved in the bodily execution of music, the activation of positive and negative affectivity through expressive motor representations throughout the sessions, the participants listen, feel, and express the music (either recorded or improvised by the practitioner at the piano) with their body movements, developing their innate musicality [30].

By feeling the body as a musical instrument, the person feels and transmits musicality through the stimulation of motor skills [31]. Furthermore, the individual is invited to experience an emotional catharsis by liberating himself emotionally through greater cognitive complexity of his emotions acquired by music and movement [32].

Among the countries which practice Dalcroze Eurhythmics in Gerontology are the United States [33], Australia [34], Canada [35], and Mexico [36]. In Western Europe, even though it is practiced throughout, Switzerland is the only country in the world where a program for seniors is well established. The Institut Jaques-Dalcroze in Geneva provides services to a population of close to one thousand elderly persons regularly attending Eurhythmics sessions in one of its three programs [37].

Academic research in Dalcroze Eurhythmics practice has been motivated by its gerontological applications and its relation to the improvement of physical and emotional health, and social relationships in the population of older adults. DE was created as a teaching approach through music and into music [38]. In this context, the purpose of DE is to improve the life of older adults in their cognitive, emotional, physical, and social domains

through active music-making from a holistic standpoint. Therefore, the music teaching-learning process has a dual purpose: educational and therapeutic [39].

In Switzerland the study of Kressig, Allai & Beauchet[40], the stride time was chosen to be the main outcome of gait parameter being associated to falls. The Dalcroze group who had been taking weekly Eurhythmics classes for forty years did not show a significant variability in the same dual task being studied compared to the measurements of the control group. Similarly Trombetti, et al[41] after a 12 month-intervention program of Dalcroze Eurhythmics found that there was a reduction in stride length variability under dual task conditions, fewer falls, and a lower risk of falling in the first intervention group which received sessions for twelve months compared to the results of the second intervention group which started the intervention six months later. In parallel, in the first experimental group, the functional and independence capacities were maintained, the anxiety levels of the subjects lowered, and their social relationships improved.

In 2014 the study by Hars et al[42] continued that of Trombetti et al[41]. This work was a longitudinal four-year study of a sample of fifty two older adults divided in two groups. The outcomes suggest that the experimental group had more ease at walking and balance than the control group. In Mexico the study by Treviño and Álvarez[36] suggests that Dalcroze Eurhythmics was a very enjoyable activity for the subjects and their experience was highly satisfying. Furthermore, this activity demonstrated to be effective in fostering a flow experience and being beneficial in emotional and intellectual areas for this age group[43][44]. Within this context, the research question of this study was: what is the effect of a DalcrozeEurhythmics-based intervention on variables of psychological health, personal relationships, affectivity, and state of flow in a sample of North American older adults?

## II. METHODOLOGY

This study has an exploratory design with an intervention of eight sessions of Dalcroze Eurhythmics (one hour long each) twice a week during four weeks with measures pre and post. The participants ( $N = 11$ ) were recruited from a community in Austin, Texas. The sample was formed by women ( $N = 9$ ) and men ( $N = 2$ ) with a mean age ( $M = 79.3$ ). The inclusion criteria were: (a) ability to walk with no external aid, (b) average cognitive decline according to age, (c) willingness to participate in the study. One of the limitations of this study was the accessibility of the sample. Given the inclusion criteria, it was difficult to gather a group ( $N = 11$ ) who could attend the eight sessions with no interruption. Because of the same limitations it was not possible to have a control group.

### 2.1 Materials and measures

During the intervention the following materials were used: an acoustic piano, a chair and a bean bag per each participant, tennis balls, and a hand drum. During the sessions, the practitioner used lived improvised vocal and piano music in tonal language with regular phrasing of four or six measures per phrase. The meters used were simple in 2/4, 3/4, and 4/4, and a compound meter of 6/8. The composed recorded music varied among: (a) Big Band music by Benny Goodman, and Glenn Miller, (b) “New York” sung by Frank Sinatra, (c) “As time goes by” in a version by the Boston Pops, (d) songs by The Beatles, (e) movie themes such as “Edelweiss” from the movie “The Sound of Music”, themes from the movie “Snow White” by Walt Disney, (f) Latinamerican music such as: “CachitoMío” by Consuelo Velázquez, among others.

The measurement instruments used were (a) the subscales of the domains of psychological health and personal relationships of the WHOQOL-BREF (reduced version of the World Health Organization Quality of Life Scale) with a total of 10 items based a 5 point Likert-type scale [45]. The ranges vary from the following depending on the type of question: (1) not at all, or very poor, or very dissatisfied, or never; (2) Not much, or poor, or dissatisfied, or a little, or seldom; (3) Moderately, or neither good nor poor, or neither satisfied nor dissatisfied, or quite often; (4) A great deal, or good, or satisfied, or very much, or mostly, or very often; (5) Completely, or very good, or very satisfied, or an extreme amount, or extremely, or completely, or always. (b) PANAS (Positive and Negative Affectivity Scale) with a total of 20 items; 10 items for positive affectivity and 10 items for negative affectivity based on a 5 point Likert-type scale describing the experience of positive or negative emotions in the past two weeks considering the date of application (Watson, Clark & Tellegen 1988). The range of the responses varies from: (1) very slightly or not at all, (2) a little, (3) moderately, (4) quite a bit, (5) extremely (c) the Short Dispositional Flow State Scale (SDFSS-2) was completed prior to the intervention, and the Short Flow State Scale (SFSS-2). Both the SDFSS-2 and the SFSS-2 are composed of 9 positively keyed items which are evaluated along a 5-point Likert-type scale (Jackson & Eklund 2010). Each item relates to the thoughts and feelings the subject might experience during the participation on a specific activity. The SDFSS-2 directed the thoughts to an activity the subjects experienced before and measured their disposition to experience flow. In contrast, the SFSS-2 directed the thoughts to the activity of the intervention which in this case was Dalcroze Eurhythmics. The items ranged from: (1) never, (2) rarely, (3) sometimes, (4) frequently, (5)

allways. Each item represents one of the nine components of the state of flow mentioned previously. The sum of these items yields a total score where higher scores represent a greater degree of the presence of flow.

The intervention phase consisted of eight one-hour-long sessions of Dalcroze Eurhythmics twice a week during four weeks. Consent forms were provided according to the ethical and privacy standards of the Universidad Autónoma de Nuevo León. These scales mentioned above were administered before and after the intervention.

The structure of each session was as follows: (1) introduction where the participants stretched arms, legs, neck, and back in a relaxed and free manner following improvised music at the piano with and without a steady pulse; (2) movement sequence with a given pulse where the participants being seated touched different parts of their bodies in groups of 2 to 6 beats for each body part with variations of tempo (speed) after the demonstration given by the practitioner; (3) exercises where the subjects walked beat patterns at different tempi and changed direction with the beginning of phrases, or stopped with a specific aural signal such as sound or a rest; (4) auditory discrimination where the seated participants performed a specific body movement after listening to a precise aural stimulus. If the stimulus was a rhythmic pattern, they repeated it clapping or using rhythm sticks.

The activities for the rest of the session varied among these: (a) passing the ball in a circle where the participants being seated passed a ball at the beginning of each measure (of 3 or 4 beats), or passed a ball following the pulse according to the tempo of the music; furthermore, they were required to change the direction of the ball around the circle at a given signal; (b) free movement improvisation where the subjects moved freely while they listened to a given musical excerpt; (c) dance where the participants created group-dance movements to display the form of a piece of music; (d) call and response games where the participants seated in pairs took turns to exchange movement gestures following a specific music element given by the practitioner; (e) song singing where the subjects learned traditional Mexican folk songs. While they sang, they indicated the pulse or a specific rhythmic cell touching a part of their bodies.

After the results of the Kolmogorov-Smirnov test which registered the data was not normally distributed ( $p = .000$ ) a Wilcoxon test was conducted with SPSS 24 to test the null hypothesis there is no significant difference in the variables studied in the experimental group after the intervention of Dalcroze Eurhythmics (DE). Considering the research question, the independent variable of this study is DE and the four dependent variables are: (a) psychological health with seven indicators (b) social relationships with three indicators, (c) positive and negative affectivity with twenty indicators (d) state of flow with nine indicators.

### III. RESULTS

The results of the descriptive analysis of the variable related to psychological health ( $\alpha = .610$ ) are as follows:

**Table 1.** Descriptive Statistics. Variable psychological health.

Indicator	Pre			Post		
	M	Mdn	SD	M	Mdn	SD
Rating of quality of life	3.82	4.00	.751	3.73	4.00	.786
Lifeenjoyment	3.91	4.00	.539	4.00	4.00	.632
Meaning of life	3.82	4.000	.874	3.91	4.00	.701
Concentrationcapacity	3.82	4.00	.982	3.82	4.00	.874
Acceptance of physicalappearance	3.27	3.00	1.27	3.73	4.00	.786
Self-satisfaction	4.00	4.00	.775	4.00	4.00	.632
Negativefeelings	2.64	3.00	.674	2.55	2.00	.934

According to the descriptive statistics analysis of the sub-scale of psychological health of the WHOQOL-BREF, the indicator which had the highest initial mean value was that related to self-satisfaction ( $M = 4.00$ ,  $Mdn = 4.00$ ,  $SD = .775$ ). Moreover, the indicator related to the frequency of negative thoughts ( $M = 2.64$ ;  $Mdn = 3.00$ ,  $SD = .674$ ) was the one which had the lowest initial value. The components which had positive difference in their mean values after the intervention are those related to: (1) life enjoyment ( $M = 3.91$ ,  $Mdn = 4.00$ ;  $SD = .539$ ;  $M = 4.00$ ,  $Mdn = 4.00$ ,  $SD = .632$ ), (2) meaning of life ( $M = 3.82$ ,  $Mdn = 4.00$ ,  $SD = .874$ ;  $M = 3.91$ ,  $Mdn = 4.00$ ,  $SD = .701$ ), (3) acceptance of physical appearance ( $M = 3.27$ ,  $Mdn = 3.00$ ,  $SD = 1.27$ ;  $M = 3.73$ ,  $Mdn = 4.00$ ,  $SD = .786$ ) and (4) frequency of negative thoughts ( $M = 2.64$ ,  $Mdn = 3.00$ ,  $SD = .674$ ;  $M = 2.55$ ,  $Mdn = 2.00$ ,  $SD = .934$ ) which in this case is interpreted as a positive difference because the subjects had fewer frequency of negative thoughts.

The indicators which did not register any difference at post-test were those related to concentration ( $M = 3.82$ ,  $Mdn = 4.00$ ), and self-satisfaction ( $M = 4.00$ ,  $Mdn = 4.00$ ). On the contrary, the only indicator which had a negative difference in its mean value post intervention was that related to: (1) self-perception of quality of life ( $M = 3.82$ ,  $Mdn = 4.00$ ,  $SD = .751$ ;  $M = 3.73$ ,  $Mdn = 4.00$ ,  $SD = .786$ ); however, no indicator had statistically significant difference according to the Wilcoxon test.

The results of the descriptive analysis of the variable related to personal relationships are as follows:

**Table 2.** Descriptive statistics. Variable of personal relationships.

Indicator	Pre			Post		
	M	Mdn	SD	M	Mdn	SD
Satisfactionwith personal relationships	4.09	4.00	.831	4.18	4.00	.757
Satisfactionwith sexual life	2.55	3.00	.934	2.64	3.00	1.12
Satisfactionwithsupportfromfriends	3.36	3.00	.809	3.91	4.00	.701

According to the descriptive statistics analysis of the sub-scale of personal relationships of the WHOQOL-BREF, the indicator which had the lowest initial mean value was that related to satisfaction with sexual life ( $M = 2.55$ ,  $Mdn = 3.00$ ,  $SD = .934$ ) and that related to satisfaction with personal relationships was the one which had the highest initial mean value ( $M = 4.09$ ,  $Mdn = 4.00$ ,  $SD = .831$ ). The three indicators of the variable of personal relationships had positive differences in their mean values at post-test: (1) satisfaction with personal relationships ( $M = 4.09$ ,  $Mdn = 4.00$ ,  $SD = .831$ ;  $M = 4.18$ ,  $Mdn = 4.00$ ,  $SD = .757$ ), (2) satisfaction with sexual life ( $M = 2.55$ ,  $Mdn = 3.00$ ,  $SD = .934$ ;  $M = 2.64$ ,  $Mdn = 3.00$ ,  $SD = 1.12$ ), and (3) satisfaction with the support obtained from friends ( $M = 3.36$ ,  $Mdn = 3.00$ ,  $SD = .809$ ;  $M = 3.91$ ,  $Mdn = 4.00$ ,  $SD = .701$ ). However, none of them was statistically significant according to the Wilcoxon test. The results of the descriptive analysis of the variable related to positive affectivity are as follows:

**Table 3.** Descriptive statistics. Variable positive affectivity.

Indicator	Pre			Post		
	M	Mdn	SD	M	Mdn	SD
Interested	4.09	4.00	.831	4.00	4.00	.775
Alert	2.82	3.00	.874	2.09	2.00	.831
Excited	2.82	3.00	.982	3.55	3.00	.934
Strong	3.55	3.00	1.03	3.55	4.00	1.21
Enthusiastic	3.36	3.00	1.12	4.00	4.00	.894
Proud	3.55	4.00	1.12	3.73	4.00	.786
Inspired	3.9	3.00	1.04	3.18	4.00	1.32
Determined	4.36	5.00	.809	4.27	4.00	.905
Attentive	4.00	4.00	1.00	4.00	4.00	1.18
Active	4.09	4.00	.831	4.45	4.00	.522

The value of the validity test of the PANAS for this sample is ( $\alpha = .765$ ). The indicator which had the highest mean initial value was that related to determination ( $M = 4.36$ ,  $Mdn = 5.00$ ,  $SD = .809$ ). Alongside, the indicator which had the lowest initial mean value was that related to jittery ( $M = 1.09$ ,  $Mdn = 1.00$ ,  $SD = .302$ ). After the descriptive analysis, the indicators related to positive affect which had positive differences in their mean values after the intervention are those related to: (1) excitement ( $M = 2.82$ ,  $Mdn = 3.00$ ,  $SD = .982$ ;  $M = 3.55$ ,  $Mdn = 3.00$ ,  $SD = .934$ ), (2) enthusiasm ( $M = 3.36$ ,  $Mdn = 3.00$ ,  $SD = 1.12$ ;  $M = 4.00$ ,  $Mdn = 4.00$ ,  $SD = .894$ ), (3) pride ( $M = 3.55$ ,  $Mdn = 4.00$ ,  $SD = 1.12$ ;  $M = 3.73$ ,  $Mdn = 4.00$ ,  $SD = .786$ ), (4) inspiration ( $M = 3.09$ ,  $Mdn = 3.00$ ,  $SD = 1.04$ ;  $M = 3.18$ ,  $Mdn = 4.00$ ,  $SD = 1.32$ ), (5) activity ( $M = 4.09$ ,  $Mdn = 4.00$ ,  $SD = .831$ ;  $M = 4.45$ ,  $Mdn = 4.00$ ,  $SD = .522$ ). Those related to strength ( $M = 3.55$ ,  $Mdn = 3.00$ ,  $SD = 1.03$ ;  $M = 3.55$ ,  $Mdn = 4.00$ ,  $SD = 1.21$ ), and attentiveness ( $M = 4.00$ ,  $Mdn = 4.00$ ) had no difference in the measure post. On the contrary the values of the indicators related to (1) interest ( $M = 4.09$ ,  $Mdn = 4.00$ ,  $SD = .831$ ;  $M = 4.00$ ,  $Mdn = 4.00$ ,  $SD = .775$ ), (2) alertness ( $M = 2.82$ ,  $Mdn = 3.00$ ,  $SD = .874$ ;  $M = 2.09$ ,  $Mdn = 2.00$ ,  $SD = .831$ ) and, (3) determination ( $M = 4.36$ ,  $Mdn = 5.00$ ,  $SD = .809$ ;  $M = 4.27$ ,  $Mdn = 4.00$ ,  $SD = .905$ ) registered a negative difference after the intervention. The results of the descriptive analysis of the variable related to negative affectivity are as follows

**Table 4.** Descriptive statistics. Variable negative affectivity.

Indicator	M	Mdn	SD	M	Mdn	SD
Upset	2.00	2.00	1.00	2.45	2.00	2.91
Guilty	1.36	1.00	.809	1.36	1.00	.809
Afraid	1.64	1.00	1.02	1.91	1.00	1.30
Hostile	1.09	1.00	.302	1.36	1.00	.674
Irritable	2.18	2.00	.879	1.64	2.00	.505
Distressed	4.00	4.00	1.00	4.18	4.00	1.16
Ashamed	1.36	1.00	.924	1.18	1.0	.405
Nervous	2.00	2.00	.775	1.64	2.00	.505
Jittery	1.09	1.00	.302	1.09	1.00	.302
Scared	1.45	1.00	.688	1.55	1.00	.934

The indicators related to negative affect that had positive differences in their mean values after the intervention are those related to: (1) being upset ( $M = 2.00$ ,  $Mdn = 2.00$ ,  $SD = 1.00$ ;  $M = 2.45$ ,  $Mdn = 2.00$ ,  $SD =$

2.91), (2) fear ( $M = 1.64, Mdn = 1.00, SD = 1.02; M = 1.91, Mdn = 1.00, SD = 1.30$ ), (3) hostility ( $M = 1.09, Mdn = 1.00, SD = .302; M = 1.36, Mdn = 1.00, SD = .674$ ), (4) distress ( $M = 4.00, Mdn = 4.00, SD = 1.00; M = 4.18, Mdn = 4.00, SD = 1.16$ ), (5) being scared ( $M = 1.45, Mdn = 1.00, SD = .688; M = 1.55, Mdn = 1.00, SD = .934$ ). However, these results are interpreted as negative differences because the subjects had an increase of a specific negative emotion during the two weeks before the test. Those related to guilt ( $M = 1.36, Mdn = 1.00, SD = .809$ ), and jittery ( $M = 1.09, Mdn = 1.00, SD = .302$ ) had no difference at the measure post. In contrast, the values of the indicators related to (1) irritability ( $M = 2.18, Mdn = 2.00, SD = .874; M = 1.64, Mdn = 2.00, SD = .505$ ), (2) shame ( $M = 1.36, Mdn = 1.00, SD = .924; M = 1.18, Mdn = 1.00, SD = .405$ ), and nervousness ( $M = 2.00, Mdn = 2.0, SD = .775; M = 1.64, Mdn = 2.00, SD = .505$ ) had a negative difference after the intervention, which is interpreted as positive difference since the subjects experienced fewer of these negative emotions in the measure post-test compared to that at pre-test. The results of the Wilcoxon test for positive and negative affectivity are as follows:

**Table 5.** Wilcoxon test. Variable affectivity

<i>Indicator</i>	<i>p value</i>
Excitement	.054
Enthusiasm	.008
Irritability	.014

The only indicators which had statistically significant difference after the intervention according to the results of the Wilcoxon test were those related to (1) excitement ( $p = .054$ ), (2) enthusiasm ( $p = .008$ ), and (3) irritability ( $p = .014$ ). The results of the descriptive analysis of the variable related to state of flow are as follows:

**Table 6.** Descriptive statistics. Variable state of flow..

<i>Indicator</i>	<i>M</i>	<i>Mdn</i>	<i>SD</i>	<i>M</i>	<i>Mdn</i>	<i>SD</i>
Balance challenge/ability	4.00	4.00	1.00	3.91	4.00	1.13
Spontaneity	3.73	4.00	.647	3.45	4.00	1.12
Clear goals	3.73	4.00	1.00	4.00	4.00	1.00
Immediate/clearfeedback	3.73	4.00	1.10	3.91	4.00	.944
Concentration	3.91	4.00	1.04	3.73	4.00	.905
Control	3.64	4.00	.674	3.45	3.00	1.03
Loss of self-consciousness	3.45	3.00	1.12	3.27	3.00	1.27
Transformation of time	2.73	3.00	1.00	2.82	3.00	.982
Autotelicexperience	4.55	5.00	.688	4.18	4.00	.751

The Short Dispositional Flow State Scale-2 had a validity of Cronbach Alfa ( $\alpha = .888$ ) for this sample. The indicator which had the lowest initial mean value was that related to transformation of time ( $M = 2.73, Mdn = 3.00, SD = 1.00$ ). In contrast, the indicator related to gratifying experience was the one which had the highest initial value ( $M = 4.55, Mdn = 5.00, SD = .688$ ). The mean values of the indicators which had a positive difference after the intervention according to the descriptive statistics analysis are those related to (1) clear goals ( $M = 3.73, Mdn = 4.00, SD = 1.00; M = 4.00, Mdn = 4.00, SD = 1.00$ ), (2) clear and immediate feedback ( $M = 3.73, Mdn = 4.00, SD = 1.10; M = 3.91, Mdn = 4.00, SD = .944$ ), and (3) transformation of time ( $M = 2.73, Mdn = 3.00, SD = 1.00; M = 2.82, Mdn = 3.00, SD = .982$ ). Those mean values post for the indicators related to (1) balance between challenge and skill ( $M = 4.00, Mdn = 4.00, SD = 1.00; M = 3.91, Mdn = 4.00, SD = 1.13$ ), (2) spontaneity ( $M = 3.73, Mdn = 4.00, SD = .647; M = 3.45, Mdn = 4.00, SD = 1.12$ ), (3) concentration ( $M = 3.91, Mdn = 4.00, SD = 1.04; M = 3.73, Mdn = 4.00, SD = .905$ ), (4) control ( $M = 3.64, Mdn = 4.00, SD = .674; M = 3.45, Mdn = 3.00, SD = 1.03$ ), (5) loss of self-consciousness ( $M = 3.45; Mdn = 3.00, SD = 1.12; M = 3.27, Mdn = 3.00, SD = 1.27$ ), (6) gratifying experience ( $M = 4.55, Mdn = 5.00, SD = .688; M = 4.18, Mdn = 4.00, SD = .751$ ) had a negative difference. Nevertheless, none of the indicators had statistically significant difference according to the Wilcoxon test.

The results of the correlation analysis by Spearman were statistically significant in between the state of flow and positive affectivity ( $p = .05$ ). Similar analysis was conducted between all the possible combinations of the variables being studied; nevertheless, there was no significance in the  $p$  values.

#### IV. DISCUSSION

As mentioned earlier, music-making within a positive context is a joyful and playful activity. An important aspect of DE interventions is the learning process that subjects experience during each session and through time. In fact, for Jaques-Dalcroze, joy was a characteristic element for his pedagogical approach[31] and thought embodied learning as a process or personal, social, and musical discovery and as a tool for analysis[38]. Since the musical growth is not the main focus of DE in gerontology contexts, the practitioner gives more emphasis to the ludic aspect of the technique and as a consequence, the subjects grow in the emotional and social domains of their lives; nevertheless, musical growth is implicit in the technique itself, even

though in this context, neither perfection nor precision in the bodily or vocal execution is neither expected nor demanded by the practitioner.

After analyzing the results of the tests pre and post intervention, it is interesting to notice the positive and negative differences among values of the variables studied and how they relate to each other. In regard to the variable of psychological health, the initial mean values of all the indicators were above 3.27 which is considered medium in a 1 to 5 Likert-type scale. Even though the overall rating of quality of life had a negative difference in the measure post, the subjects perceived to have a better enjoyment and meaning of their lives as well as a higher acceptance of their physical appearance after the intervention. Similar results have been found by Hallam & Creech (2016) in their qualitative study in relation to the positive benefits of active music-making in domains of quality of life. Their results suggest positive differences in the indicators related to sense of purpose, positive feelings, protection against stress and depression; however, their research was undertaken over nine months in contrast to ours, which lasted only one month.

In our study the initial concentration level was high ( $M = 3.91$ ,  $Mdn = 4.00$ ,  $SD = 1.04$ ) and had a slight negative difference after the intervention ( $M = 3.73$ ,  $Mdn = 4.00$ ,  $SD = .905$ ). A possible explanation of this result is that given the novelty of the activity and the process of discovery and self-awareness the subjects experienced, it was not possible for them to raise their concentration level on the task in a four-week intervention. In order to develop higher levels of concentration, more familiarity with the activities and more sessions are needed. In contrast, the results of the research by Hallam and Creech (2016) mentioned before undertaken in a nine-month period, did find positive differences in the concentration levels of the experimental groups at the end of the study. Our intervention was performed within a positive and non-competitive environment. These aspects are essential to DE sessions in Gerontology in order to create an atmosphere of acceptance, freedom, and joy. The indicator of self-acceptance had no difference post-test which in this case is interpreted positively since the entire activity was completely new to the subjects and presented challenges in every domain studied: cognitive, emotional, and social. In addition, there were also challenging situations in the physical domain; however, this was not the focus of the study.

The study by Habron, Butterly, Gordon, & Roebuck (2014) in relation to the benefits of active music composition for older adults, suggests that group compositional practices in gerontology contexts offered the individuals an opportunity to create or compose self-identities, have a meaningful social interaction and engagement with the group, and a sense of well-being. This aspect is reflected in the results of this study in the indicators of the variable related to personal relationships. The mean values of the three indicators had a positive difference after the intervention. These values are in agreement with the decrease in the indicators of negative affectivity related to nervousness, shame, and irritability. The subjects felt comfortable among themselves enjoying an activity which brought them together, regardless of how they looked and how well they did: the joy of music-making in a non-judgmental and relaxed atmosphere. Therefore, they were least scared at the end of the intervention. As mentioned before, during DE sessions, the subjects experience a process of self-reflection and become more aware of themselves as individuals and as social beings through the interaction with their peers. A possible reason why the self-acceptance indicator did not registered any difference post-test was that even though they experienced new challenges during the sessions, they were able to accept their limitations at the end. This means, they became aware of their own limitations in one or various domains which made them perceive to have a lower rate of their overall perception of quality of life.

The self-awareness of their limitations and self-reflection process possible explains the negative differences in the mean values of six of the nine indicators of the SFSS-2. Subjects discovered that even though they knew exactly what to do and their goals were clear, they received immediate feedback of their limitations making them conscious of the fact that their abilities did not necessarily match the demands of the exercises. Therefore, their sense of control over the task decreased. Also, since DE is a collective experience, they became aware of the limitations of their peers as well. Nevertheless, they lost sense of time and had a gratifying experience [46]. This results are similar to those obtained in the exploratory study by Treviño & Álvarez (2016) where subjects had an experience of flow and enjoyment of physical activity after a DE intervention. The indicator related to gratifying experience registered a negative difference in the present study in the measure post-test, though; however, the initial and end values were  $> 4$ . The positive effect of the intervention is also reflected in the significant correlation between the variable related to state of flow and that of positive affectivity ( $p = .05$ ). In addition, the indicators of excitement and enthusiasm were statistically significant according to the Wilcoxon test. These results are in accordance to the intrinsic nature of DE which fosters free improvisational bodily and vocal practices that enable the individuals to experience a catharsis or liberating experience, as mentioned before in the study by Cantú & Álvarez (2011) where similar results were obtained. Similarly, in the research of Mathieu (2013a) where the focus was the somatic aspect of DE as a way of freeing emotions through body improvisation, the subjects reported to experience the engagement of the body as a means of self-expression. In our study, the subjects enjoyed the activity even though they were aware of certain limitations. For this reason, they were less irritable at the end of the intervention: this indicator of negative affectivity also registered statistical significance at Wilcoxon.

## V. CONCLUSION

In conclusion, this intervention of DE which has the characteristics recommended by the Report of Ageing and Health by the World Health Organization (2015) for being ecological and non-pharmacological, had positive effects on the variables studied on this sample of older adults. This report encourages the implementation of interventions suited to maintain the functional and intrinsic abilities of older adults in their late stage of life. As it was discussed before, the participants had an overall positive experience and enjoyed making music together.

Their personal relationships were better at the end of the intervention, and they became aware of their own limitations through a process of self-discovery through the joy of learning and making music. Music making in the form of Dalcroze Eurhythmics addresses the four dimensions of the human being: (a) physical, (b) affective, (c) cognitive, (d) social; therefore, it is situated among the possible options of interventions according to the parameters established by the World Health Organization. This study is part of a larger doctoral interdisciplinary research about the effect of DE on psychological and physical variables on samples of older adults with different sociodemographic characteristics. Because of the nature of the activity, longer longitudinal studies are needed to measure the effects of DE interventions in different domains in the lives of this population over longer periods of time.

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