



## Does participation in Greek traditional dance classes help improve the psychological mood of patients with type 1 diabetes?

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### ABSTRACT

Diabetes is one of the most common chronic disorders in the world and emerges as one of the main public health problems. So, the aim of the present study was to investigate the psychological mood of people diagnosed with type 1 Diabetes and the possible differences between those who participate in organized dance activities of Greek traditional dance and those who have adopted a sedentary lifestyle. The study sample consisted of 162 men and women diagnosed with type 1 diabetes mellitus. 40.1 (65) were men and 59.9% (97) were women. Of the total sample, 54.1% (88 persons) participated in organized Greek traditional dance activities while 45.7% (74 persons) did not participate in any organized physical activity and followed a sedentary lifestyle. The data collection was carried out using the Greek version (Zervas, Ekkekaki, Psychoudaki, & Kakkos, 1993) of the Profile of Mood State (POMS) of McNair, Lorr and Droppleman (1971). Descriptive statistics (Frequencies) with indicators of central tendency and dispersion (mean, standard deviation), the convergent validity was considered the indicator average variance extracted, t-test for independent sample to check for possible differences due to participation or non-participation in organized courses of Greek traditional dance. The present study shows the positive effect of participation in dance activities of individuals with type 1 diabetes on improving overall psychological mood. Furthermore, participants with type 1 diabetes who participated in dance activities showed lower mean scores on the factors of tension, depression, aggression, fatigue and confusion, which negatively affect psychological mood, compared to those who followed a sedentary lifestyle.

**Key words:** dance event; fatigue; depression; stress.

### Introduction

Diabetes is one of the most common chronic disorders in the world and emerges as one of the main public health problems (Hajat & Stein, 2018). According to the International Diabetes Federation (IDF), 463 million adults suffer from diabetes, and it is estimated that by 2030 the number of the population with this pathology will reach 578 million (Makarova, Pogorely, & Guzenko, 2021). There are four types of etiologically distinct diabetes: type 1 diabetes, type 2, gestational diabetes, and other specific types of diabetes (ADA, 2019). Diabetes is a disorder of glucose metabolism, caused by a

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lack of the pancreatic hormone insulin, which results in an increase in blood glucose concentration (hyperglycaemia) and its appearance in the urine. It is a metabolic condition characterized by a disturbance in the rate of secretion of insulin, a hormone secreted by the pancreas whose function is to regulate the amount of glucose in the blood. In type 1 diabetes there is a complete lack of insulin production, whereas in type 2 diabetes there is a dysfunction (since insulin production may be higher or lower than normal). Type 1 diabetes is a chronic disease characterized by deficient insulin production and beta-cell destruction in the pancreas, leading to absolute insulin deficiency, and can be of autoimmune or idiopathic origin (WHO, 2021). This pathology accounts for approximately 5 to 10.0% of all cases of diabetes, is most common in young people, however, it can occur at any age (Goldberg et al., 2021).

Diabetes is often accompanied by serious short-term complications such as hypoglycemia, but also long-term complications such as cardiovascular disease, neuropathy, retinopathy etc. Diabetes care consists mainly of self-care, as patients themselves should regulate their blood glucose levels by constantly monitoring them and balancing their food intake, physical activities and intake of hypoglycemic agents or insulin. The overall goal of treatment is to prevent acute and chronic complications while maintaining a good quality of life.

Several studies have shown that the quality of life of people with type 1 diabetes is reduced compared to people without diabetes (Alonso et al., 2004), with the presence of diabetic complications having a negative impact on their psychology (Wexler et al, 2006). In addition, the prevalence of depression, anxiety and tension may increase morbidity and lead to a worse clinical prognosis and impede treatment (Kilbourne et al, Scientific research links depression in diabetes with hyperglycemia (Taback, 2000), with an increased risk of complications of metabolic disorder (de Groot et al., 2001), and treatment of depression improves glycaemic control (Lustman et al., 1998). Studies show that chronic disease groups such as type 1 diabetes can present with severe psychiatric disorders and the prevalence of psychiatric disorders in diabetic patients can be as high as 84% for mood disorders and 80% for anxiety disorders (Chaudhry et al., 2010). The study by Ana Claudia et al. (2013) evaluated the presence of psychiatric comorbidities in both type 2 diabetes and type 2 diabetes patients. The first group showed higher values for the presence of general anxiety disorder (24%), dysthymia (20%), social phobia (6%), depression (9% for current and 5% for lifelong), panic disorder (5%) and suicide risk (3%). All values were higher than those found in the general population or in patients with type 2 diabetes mellitus. Patients with a high prevalence of psychiatric disorders further compromise their mental health, and more specifically, depression and anxiety can increase morbidity and lead to a worse clinical prognosis.

The prevalence of depression in patients with diabetes is about 2 to 4 times higher than in the general population and can affect up to 30% of diabetics. In their review study Musselman et al. (2003) confirmed the risk of depression in diabetic patients and showed that diabetic women have a higher risk of depression (28%) than men (18%). Another important factor is anxiety in patients with type 1 diabetes, which may be related to glycemic control. The potential for health balance may cause greater anxiety compared to people without the disease (Musselman et al., 2003).

The meta-analysis (Anderson et al., 2001) showed that the odds of depression in patients with type 1 diabetes were twice as high as those of non-diabetic patients. Regarding anxiety disorders, panic disorder, a severe condition characterized by recurrent and unexpected attacks of sudden onset and short duration associated with normal anxiety sensations (palpitations, chest pain, nausea, numbness) seem like the symptoms of hypoglycemia often seen in type 1 diabetes (Gannon et al., 2011). In



addition to the signs and symptoms of anxiety and depression in type 1 diabetes, both physiological changes in the chronic course of the disease: weight gain, pain, hypertension, heart disease, loss of motor skills or blindness, directly affect the emotional state and psychological mood of patients (Gannon et al., 2011). Little is known about the psychological state of people living with type 1 diabetes mellitus. A study of 388 participants, aged  $28 \pm 3$  years, with a diabetes duration of  $17 \pm 3$  years, suggested the great impact of the disease on morale and psychology, as the level of stress affects the patient's glycemic control (Mellerio et al., 2015; Tsiouli et al., 2013).

Exercise helps stabilize blood glucose, reduces the body's need for insulin or other drugs, reduces high blood lipid levels, regulates blood pressure, helps limit the growth of atherosclerotic plaques in blood vessels and keeps body weight under control. In addition, it is beneficial from a psychological point of view, as it contributes positively to combating stress, anxiety and depression, which is usually increased in diabetic patients (Colberg et al., 2016).

The long-term benefits of aerobic exercise in improving quality of life are highlighted in people with type 1 diabetes, although glycemic control levels are well below normal. It has been documented that adolescents with type 1 diabetes manifest a 20% reduction in aerobic capacity, compared to their peers without the disease (Komatsu et al., 2005), while it is unclear in the international literature whether this reduced capacity is attributable to poor oxygenation (Levy et al., 2008), reduced capillary function in muscle (Kivela et al., 2006) or poor metabolic control (Krause et al., 2011). Al Khalifah, Suppère and Haidar (2016) studied the relationship between aerobic exercise and the onset of hypoglycemia recorded at the time of exercise in patients with type 1 diabetes mellitus. 44 patients participated in the study, of which 34 were adults, aged 22 to 70 years and 10 were adolescents aged 12 to 18 years. The program included one hour of exercise on a floor ergometer or 30 minutes on a bicycle. The results of the study showed that the better the fitness level of a diabetic patient with type 1 diabetes, the less likely they were to develop hypoglycemia during exercise.

Sideraviciute, Gailiūnienė and Visagurskienė (2006) in their study aimed to evaluate the effect of aerobic exercise on blood glucose concentration in a sample of girls with and without type 1 diabetes. The study included 19 girls with type 1 diabetes aged  $16.6 \pm 0.24$  years and 28 healthy girls aged  $16.9 \pm 0.36$  years. Two different exercise protocols were implemented, the first included a combination of aerobics and swimming (7 days duration) and the second included swimming, with a frequency of twice a week, with an intervention duration of 14 weeks. The effects of swimming and aerobic exercise were associated with reduced blood glucose levels for both groups of girls. Regarding the group of girls with type 1 diabetes, it appeared that swimming contributed to effective glycemic control compared to the aerobic group of girls with type 1 diabetes. Sideraviciute, Gailiūnienė, Visagurskienė and colleagues (2006) studied the effect of swimming on achieving glycaemic control in girls aged 14–19 years with and without type 1 diabetes. The programme was of a total duration of 12 weeks, with a frequency of twice-weekly 45-minute swims. The results showed that after the end of the intervention program, statistically significant reductions in glycosylated hemoglobin (HbA1c) and hyperglycemia were found in the diabetic girls' group, who also showed an increased degree of response to the program, compared to the corresponding girls in the control group.

Dance is an alternative form of aerobic exercise that attracts the interest of people of all ages. It is an ideal form of exercise, because it improves the memory with personal fun of the participants, which maintains the interest, communication and socialization of individuals, their fitness level and quality of life (Ermidou, Mameletzi, Lykesas, Kouidi, 2016; Mangeri, Montesi, Forlani, Grave, & Marchesini, 2014). Dance in various forms reduces body fat, improves body mass index, blood



pressure and glycemic control, improving the quality of life of patients with diabetes (Murrock & Gary, 2010).

Greek dance, although it has been used in many cases as a means of improving health - various forms of cancer, mental retardation, in people with hearing loss and other chronic diseases, it has not been used in patients with diabetes, aiming to improve the psychological state, reduce anxiety, depression and tension. Thus, the aim of the present study was to investigate the psychological mood of people diagnosed with type 1 diabetes and the possible differences between those who participate in organized dance activities of Greek traditional dance and those who have adopted a sedentary lifestyle.

## Method

### *Participants*

The study sample consisted of 162 men and women diagnosed with type 1 diabetes mellitus. 40.1 (65) were men and 59.9% (97) were women. Of the total sample, 54.1% (88 persons) participated in organized Greek traditional dance activities while 45.7% (74 persons) did not participate in any organized physical activity and followed a sedentary lifestyle (Table 1).

**Table 1.** Distribution of the sample by gender and participation or not in dance activities.

	Men		Women		Total	
Physical Activity -Dance		%		%		%
Participation	39	24.1%	49	30.2%	88	54.3%
Nonparticipation	26	16.0%	48	29.6%	74	45.7%
Total	65	40.1%	97	59.9%	162	100.0

### *Measurement*

The data collection was carried out using the Greek version (Zervas, Ekkekaki, Psychoudaki, & Kakkos, 1993) of the Profile of Mood State (POMS) of McNair, Lorr and Droppleman (1971). The questionnaire consists of 37 items which answer the question "How do you feel at this moment?". The specific form of the POMS with its 37 items contains 6 factors: a) the first factor refers to tension with 6 items (e.g. nervous), b) the second factor refers to depression with 8 items (e.g. sad), c) the third factor refers to aggression with 7 items (e.g. d) the fourth on energy with 6 themes (e.g. lively), e) the fifth on fatigue and contains 5 themes (e.g. "weakened") and f) the sixth refers to confusion (e.g. unable to concentrate). Responses are given on a 5-point Likert-type scale with 0 = not at all, 1 = a little, 2 = moderately, 3 = quite a lot and 4 = extremely. The overall psychological mood is found by calculating the six factors: anxiety + depression + aggression + fatigue + confusion + energy +100. Values close to 100 or less indicate good T.P.M.

### *Procedure*

In order to find the sample, the researchers addressed the Panhellenic Federation of Associations of People with Diabetes (P.F.A.P.D.), and then, after a telephone contact with the leaders of the associations of diabetic patients, they informed them about the purpose and importance of the research. This was followed by the distribution of the questionnaire to the patients with type 1 Diabetes. Completion of the questionnaires was voluntary since it was explained to them beforehand



that participation in the survey was voluntary on the one hand and the importance of the results for their own physical and psychological health was stressed on the other. The survey was completed in about three months and the questionnaires were always collected by the researchers themselves. The questionnaires were completed through the online platform Google form.

### *Statistical Analysis*

The SPSS 21 statistical package was used to statistically process the data: Descriptive statistics (Frequencies) with indicators of central tendency and dispersion (mean, standard deviation), the convergent validity was considered the indicator average variance extracted, t-test for independent sample to check for possible differences due to participation or non-participation in organized courses of Greek traditional dance. The significance levels of statistically significant differences were defined as  $p < .05$ .

## **Results**

### *Composite reliability and average variance extracted*

All factors showed good reliability since the CR index takes values from .841 (Confusion) to .929 (Fatigue). In terms of discriminant and convergent validity, the AVE index showed satisfactory values for the four factors, from .601 (Aggression) to .739 (Fatigue). In contrast, the two factors, Tension, and Confusion, showed marginally acceptable values, .537 and .516 respectively (Table 2).

**Table 2.** AVE and CR.

Items	Loading	AVE	CR
<b>Tension</b>			
1	.587		
10	.828		
15	.681	.537	.873
16	.750		
22	.737		
27	.789		
<b>Depression</b>			
4	.832		
8	.730		
12	.705		
14	.810	.623	.929
20	.708		
23	.880		
28	.853		
33	.778		
<b>Aggression</b>			
2	.767		
7	.880		
11	.635		
19	.799	.601	.913
21	.798		
25	.696		
31	.808		



<b>Energy</b>					
5	.792				
9	.780				
13	.838				
24	.831	.627		.909	
32	.832				
35	.686				
<b>Fatigue</b>					
3	.884				
18	.855				
26	.895	.739		.934	
29	.825				
37	.836				
<b>Confusion</b>					
6	.704				
17	.671				
30	.686	.516		.841	
34	.833				
36	.686				
<b>Total P.M.</b>					
All items		.607		.900	

### *Differences according to participation or nonparticipation in Greek traditional classes*

Analysis of variance (Independent t-test) was performed for independent samples, with each of the Profile of Mood States (POMS) factors as the dependent variable and participation or non-participation in dance activities (with 2 levels, Yes - No participation) as the independent variable. From the analyses, statistically significant differences were found between the means for participation or non-participation in all the Profile of Mood States (POMS) factors tested. In particular, statistically significant differences were found in the factor "tension" [ $t(160)=11.637$ ;  $p<.001$ ], "depression" [ $t(160) =10.43$ ;  $p<.001$ ], "aggression" [ $t(160) =.796$ ;  $p<.001$ ], "energy" [ $t(160) =16.097$ ;  $p<.001$ ], "fatigue" [ $t(160) =9.185$ ;  $p<.001$ ] and "confusion" [ $t(160) =3.037$ ;  $p<.01$ ], with participants in organized dance activity programs of individuals with type 1 diabetes having higher mean energy and lower mean scores on all factors that negatively affect individuals' psychological state. Furthermore, there was a statistically significant difference in the mean of the overall psychological state of the people with type 1 diabetes in the sample in terms of participation or non-participation (Table 3). Specifically, participants in dance activity programs had a lower mean negative psychological state (M.O.=106.72; T.A.=1.68) compared to individuals with type 1 diabetes in the sample (M.O.=110.96; T.A.=1.68) who had a negative psychological state (Table 3).

**Table 3.** Means, SD, & differences according to participation or nonparticipation in Greek traditional classes.

Factors	Participation	Total			
		M	SD	M	SD
Tension	Yes	2,06	.42	2.43	.61
	No	2,88****	.49		
Depression	Yes	1,83	.36	2.12	.49
	No	2,46****	.40		





Aggression	Yes	1,82	.38	2.03	.42
	No	2,28***	.34		
Energy	Yes	3,17***	.46	2.75	.58
	No	2,25	.41		
Fatigue	Yes	2,18	.41	2.47	.38
	No	2,83***	.47		
Confusion	Yes	1,98	.36	2.33	.77
	No	2,47***	.37		
TPM	Yes	106,72	1.68	108.64	3.10
	No	110,96	2.82		

## Discussion

The present study was designed to investigate the relationship between the psychological mood of people with type 1 diabetes diagnosed who participated regularly in dance activities and those who followed a sedentary lifestyle. Of the total sample, 88 persons (54.3%), 39 males and 49 females, participated in dance activities and 74 (45.7%) persons did not participate in any organized physical activity. The main research hypothesis of this thesis was that patients with type 1 diabetes who participate in dance activity programs will have better overall psychological mood (POMS) than patients with type 1 diabetes who do not participate in any organized form of activity and have adopted a sedentary lifestyle.

Data collection was carried out using the Greek version (Zervas, Ekkekakis, Psychoudaki, & Kakkos, 1993) of the Profile of Mood States (McNair, Lorr, & Droppleman, 1971). The internal consistency check of the questionnaire established its validity and suitability for use in the Greek context.

Looking at the results for the six factors of the Profile of Mood States (POMS), the highest mean was found for the factor of energy, but the factors that contribute negatively to the psychological state of the individuals also had high mean values, with the highest mean values for the factor of fatigue and tension in the whole sample. Regarding the overall psychological mood of the individuals in the whole sample, it showed a negative value, as it was above 100 in the whole sample ( $M = 108.64$ ,  $SD = 3.10$ ). Low value in overall psychological mood and especially below 100 means good psychological state.

According to most scientific research, the presence of type 1 diabetes is strongly associated with psychological disorders and social problems in type 1 diabetes patients and a significant number of patients (42.3%) show a high level of psychological mood disorders (Abdelsalam et al., 2018). From the results of the present study, using analyses of variance to investigate any differences in overall psychological mood between patients with type 1 diabetes who participate in dance activities and those who do not, statistically significant differences were found. Participants with type 1 diabetes, in dance activity programs, showed a better mean overall psychological mood ( $M = 106.72$ ) compared to those with type 1 diabetes in the sample, who did not participate ( $M = 110.96$ ) in any activity and had a negative psychological state. The most important result of the present study is that there was a statistically significant difference in the mean of the overall psychological mood of the subjects with type 1 diabetes in the sample, in terms of participation or non-participation. The results of the study agree with scientific research that has documented that people of all ages with type 1 diabetes who participate in appropriately structured physical activity programs have multiple health benefits, such



as improved cardiovascular fitness, better overall health quality and enhanced psychological health and well-being (Brazeau et al., 2012; Chimen et al., 2012). Systematic participation in aerobic exercise or organized physical activity programs has a significant effect on reducing depression, improving physical strength, regulating normal glucose uptake in peripheral tissues, controlling blood glucose and relieving mental stress, fatigue and tension, several researchers have argued (Camacho et al., 2006).

Analyses of variance for each of the factors of the Profile of Mood States questionnaire regarding participation or non-participation in organized dance programs revealed statistically significant differences between the means of all the Profile of Mood States (POMS) factors examined. Specifically, participants in dance activity programs had lower means on the factors of tension ( $M = 2.06$  vs.  $M = 2.88$ ), depression ( $M = 1.83$  vs.  $M = 2.46$ ), aggression ( $M = 1.82$  vs.  $M = 2.28$ ), fatigue ( $M = 2.18$  vs.  $M = 2.83$ ) and confusion ( $M = 1.98$  vs.  $M = 2.47$ ), which negatively affected the psychological mood of individuals, compared to those who followed a sedentary lifestyle. In contrast, they had a statistically significantly higher mean activity level ( $M = 3.17$  vs.  $M = 2.25$ ) compared to subjects with type 1 diabetes who did not participate in any activity. Similarly, the study by Ivanova et al. (2017) with a sample of 1691 adults with type 1 diabetes in Canada showed that symptoms of depression, fatigue and confusion were associated with lower frequency of participation in exercise programs. Also, Katon et al. (2010) examined changes in symptoms of depression and confusion with physical activity participation in a sample of adults diagnosed with type 1 DM, and their results showed that individuals with symptoms of depression engaged in less physical activity or did not engage in any physical activity at all.

People with type 1 diabetes should participate in a wide variety of aerobic activities and sports, ranging from recreational activities to high level competitive sports. Dance, in any form, is an alternative form of aerobic exercise, improves mood with pleasant music and personal entertainment for participants, reduces stress and tension, improves fitness level, communication and socialization of individuals, and contributes significantly to quality of life (Ermidou et al, 2016; Mangeri et al., 2014). Also, dancing in various forms reduces body fat, improves body mass index of people with diabetes mellitus, blood pressure, and glycemic control of patients, most researchers have claimed (Murrock & Gary, 2010; Murrock, Higgins, & Killion, 2009).

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## Η συμμετοχή σε μαθήματα ελληνικού παραδοσιακού χορού συμβάλλει στη βελτίωση της ψυχολογικής διάθεσης ασθενών με σακχαρώδη διαβήτη τύπου 1;

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### ΠΕΡΙΛΗΨΗ

Ο σακχαρώδης διαβήτης αποτελεί μία από τις πλέον συχνές χρόνιες διαταραχές στον κόσμο και αναδεικνύεται σε ένα από τα κυριότερα προβλήματα της δημόσιας υγείας. Σκοπός της παρούσης μελέτης ήταν να διερευνηθεί την ψυχολογική διάθεση ατόμων που έχουν διαγνωσθεί με σακχαρώδη διαβήτη τύπου 1 και των πιθανών διαφορών μεταξύ αυτών που συμμετέχουν σε οργανωμένες χορευτικές δραστηριότητες ελληνικού παραδοσιακού χορού και εκείνων που έχουν υιοθετήσει τον καθιστικό τρόπο ζωής. Το δείγμα της μελέτης αποτελούνταν από 162 άνδρες και γυναίκες που είχαν διαγνωστεί με σακχαρώδη διαβήτη τύπου 1. Το 40.1 (65) ήταν άνδρες και το 59.9% (97) ήταν γυναίκες. Από το σύνολο του δείγματος, το 54.1% (88 άτομα) συμμετείχε σε οργανωμένες δραστηριότητες ελληνικού παραδοσιακού χορού ενώ το 45.7% (74 άτομα) δεν συμμετείχε σε καμία οργανωμένη σωματική δραστηριότητα και ακολούθησε καθιστική ζωή. Η συλλογή των δεδομένων πραγματοποιήθηκε με τη χρήση της ελληνικής έκδοσης (Ζέρβας, Εκκεκάκη, Ψυχουδάκη, & Κάκκος, 1993) του Profile of Mood State (POMS) των McNair, Lorr και Droppleman (1971). Η στατιστική ανάλυση των δεδομένων περιελάμβανε περιγραφική στατιστική (Συχνότητες) με δείκτες κεντρικής τάσης και διασποράς (μέσος όρος, τυπική απόκλιση), έλεγχος της εσωτερικής συνοχής (σύνθετη αξιοπιστία) και της δομικής εγκυρότητας (εξαγόμενος μέσος όρος διακύμανσης), t-test για Ανεξάρτητα δείγματα για τον έλεγχο πιθανών διαφορών λόγω συμμετοχής ή μη συμμετοχής σε οργανωμένα μαθήματα ελληνικού παραδοσιακού χορού. Η παρούσα μελέτη δείχνει τη θετική επίδραση της συμμετοχής σε χορευτικές δραστηριότητες ατόμων με διαβήτη τύπου 1 στη βελτίωση της συνολικής ψυχολογικής διάθεσης. Επιπλέον, οι συμμετέχοντες με διαβήτη τύπου 1, που συμμετείχαν σε χορευτικές δραστηριότητες, εμφάνισαν χαμηλότερη μέση βαθμολογία στους παράγοντες της έντασης, της κατάθλιψης, της επιθετικότητας, της κόπωσης και της σύγχυσης, παράγοντες που επηρεάζουν αρνητικά την ψυχολογική διάθεση, σε σύγκριση με αυτούς που ακολούθησαν καθιστική ζωή.

**Λέξεις κλειδιά:** χορευτικό γεγονός, κόπωση, κατάθλιψη, άγχος.

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