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LONG-TERM ADHERENCE TO EXERCISE: THE RELATIONSHIP WITH FUNCTIONAL FITNESS AND PERSONAL MOTIVATION AMONG COMMUNITY- DWELLING INDEPENDENT-LIVING OLDER WOMEN*

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ABSTRACT

Objective: The aim of this study were to examine the relationships between functional fitness, self-esteem, aesthetic body care and long-term adherence to dance, and to identify other characteristics related to dance adherence in the elderly. Methods: Seventeen women, aged 59-86 years-old, who practised a type of dance labeled "bodily expression". Results: Functional fitness was correlated to dance adherence and was the only factor related to this variable in a linear regression analysis. Self-esteem and aesthetic body care seemed to play an indirect role on adherence. Functional fitness, specially upper-body flexibility and lower-body muscular function, and interest in dance (qualitative data) were related to long-term adherence to dance. Conclusions: Functional fitness and interest in exercising were the main aspects related to participants' long-term adherence to dance.

KEY WORDS: *Dance; older adults; exercise adherence; physical fitness.*

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INTRODUCTION

Physical activity and exercise are important components of a successful aging (PEEL; MCCLURE; BARTLETT, 2005). A physically active lifestyle is associated with reduction in all-cause mortality rates (KESANIEMI *et al.*, 2001) and contributes to maintenance of optimal levels of physiological systems (AMERICAN COLLEGE OF SPORTS MEDICINE [ACSM], 1998), functional fitness (TORAMAN; ERMAN; AGYAR, 2004) and cognition (COLCOMBE; KRAMER, 2003), and, consequently, independence even in later life. Exercise also influences psychosocial factors among older adults such as optimal social functioning (MCAULEY; BLISSMER, 2000), self-esteem (MCAULEY *et al.*, 2000), and self-reported health (HAVEMAN-NIES; DE GROOT; VAN STAVEREN, 2003).

To benefit from exercise outcomes the principle of training “continuity” needs to be respected (MOREY *et al.*, 2002). This principle indicates that exercise must be executed in a regular way, without long-time interruptions (ACSM, 2004). However, just few studies have investigated long-term adherence to exercise in older adults, which increases scientific interest on this subject (HUI; RUBENSTEIN, 2006). According to Annesi (2003), between 40% and 65% of the persons who begin an exercise drop out after 3 to 6 months.

Brassington *et al.* (2002) found that self-efficacy was related to exercise adherence among the elderly, in a 12-month exercise program. McAuley *et al.* (2003) indicated that exercise frequency and social support indirectly influence long-term exercise adherence in the elderly because they are associated with self-efficacy. In turn, self-efficacy was related to physical activity at 6 and 18-month follow-up.

Litt, Kleppinger and Judge (2002) found that social support was a better predictor of adherence to a 12-month exercising program than self-efficacy in an older adult population. A meta-analysis also showed that center-based exercise programs present better adherence than home-based ones, which led the authors to speculate that some older adults may find exercising with others more motivating and satisfying than individual exercise (CONN; VALENTINE; COOPER, 2002). A review showed that reductions in exercise adherence rates were smaller among older adults in group-based programs than in individualized home-based ones (VAN DER BIJ; LAURANT; WENSING, 2002).

Researchers found other characteristics related to long-term exercise adherence in elderly subjects. Forkan *et al.* (2006) indicated that a lack of interest in exercising, a lack of muscular strength, and bad health (SCHUTZER; GRAVES, 2004) constituted barriers to exercise adherence. Similarly, Boyette *et al.* (2002) indicated that good self-reported health status is the main personal characteristic associated with exercise adherence among older people. ACSM (2004) emphasized the role played

by social support and self-efficacy as contributors to exercise adherence in the elderly. More recently, ACSM (2006) indicated that older adults' personal characteristics such as "symptoms, emotions, motives, and beliefs are as important to adherence and to the outcomes of intervention as the physical training regimen itself".

Although some researchers studied the influence of physical activity and functional fitness on well-being in the elderly (NETZ *et al.* 2005), few studies have examined the role played by functional fitness, self-esteem and aesthetic body aspects on long-term exercise adherence. Further, to the authors' knowledge, long-term adherence to dance exercise in the elderly has not yet been studied. The aims of this study were to examine the role played by functional fitness, self-esteem, and aesthetic body care on long-term adherence to dance, as well as to identify other characteristics related to adherence to this exercise among older women.

METHODS

This cross-sectional study was developed in France and complies with ethical standards in this country. All of the participants signed an informed consent form, which explained the study purposes, procedures, and health risks. Data were collected in 2007 by a test administrator with experience in the assessment of functional fitness in the elderly. Complete description of methodology was reported elsewhere (BARRETO *et al.*, 2009). We briefly present the study methodology below.

PARTICIPANTS

The sample was 17 community-dwelling independent-living older women, age 59-86 years-old, that dance in Marseille, France. They had a high educational level and had been participating in dance exercise for more than 27 years (see Table 1). Participants practised a kind of dance labelled "bodily expression".

BODILY EXPRESSION

This exercise is based on principles of fall and recovery, and individuals are free to create and execute movements as they wish to. Movements are executed with music and stress the expression of emotions. It is characterized by movements with large amplitudes in joints, particularly hip and shoulders ones.

MEASURES

Functional fitness. By functional fitness, we mean upper and lower-body strength, upper and lower-body flexibility, dynamic balance and aerobic endurance.

Participants took the six physical functional tests in the Senior Fitness Test (SFT) battery (RIKLI; JONES, 2001), which assesses upper and lower-body strength, upper and lower-body flexibility, dynamic balance and aerobic endurance, and BMI. The physical tests scores (absolute scores) of each participant were classified with respect to percentile tables (RIKLI; JONES, 2001) of normative data for each 5-year age group (from 60-64 to 90-94). A rating from 1 to 20 (normalized scores) was given according to each 5-percentile range, with 1 being the worst performance (score below the 5th percentile) and 20, the best (performance in or above the 95th percentile). The sum of the normalized scores of the six SFT items (excepted BMI) was called the "FF score". "FF score" represents the overall physical performance of each participant in relation to women of the same age-group in general population. Hand-grip strength was assessed with a hand-held dynamometer (Stoelting Co.) that gives a measure to the nearest kilogram; this measure was assessed (the best score of two trials with the dominant hand) with participants in an upright position (arms near to the body).

Self-esteem and aesthetic body care. To measure self-esteem, we utilized the Toulouse Self-Esteem Scale for Older Adults (PIQUEMAL-VIEU, 1999), which is formed by 20 items (e.g., 'I feel I am frail'), rated on a 5-point scale. In our study we utilized a 19-item scale (Cronbach's Alpha 0.80; test-retest Spearman rank correlation = 0.76, $p < 0.001$ ¹) because, in a prior study (PIQUEMAL-VIEU, 1999), one of the items did not show a good internal consistency. The self-esteem scores vary from 19 to 95, with better self-esteem represented by higher scores. To assess aesthetic body care, we utilized the scale developed by Macia (2006), which is formed by 7 items (e.g., 'Do you utilize body creams daily?'), rated from 0 to 7. Better aesthetic body care is represented by higher scores. The aesthetic body care scale (Cronbach's Alpha = 0.72; test-retest Spearman rank correlation = 0.86, $p < 0.001$ ²) was designed to determine the degree of self-care of one's appearance in older women.

SEMI-STRUCTURED INTERVIEW

After the physical test procedures, one of the dancers expressed her intention to drop out of the study for personal reasons so she was not interviewed. A semi-structured interview with each participant ($n = 16$) was conducted. The initial conversation addressed the participant's exercise history in general, her

1. Unpublished study

2. Unpublished study

experience with dance in particular, and her daily physical activity level. To study adherence-related aspects, qualitative data were collected by asking “*When and why have you initiated to practise dance exercise?*” and “*Why do you continue to do dance exercise?*”. Responses to the former question allowed us to create a variable called “dancing background”, which represents the number of years in dance practice; this is the quantitative variable that defines long-term adherence in this study. Other questions were about weekly frequency of dance exercise, their session duration, and self-reported intensity of physical effort (through a Modified 0-10 Borg Scale). Directly following this initial conversation, a socio-demographic and health questionnaire (with self-esteem and aesthetic body care scales) were administered.

STATISTICAL ANALYSIS

By the statistical software “SPSS 11.0”, Spearman rank correlations were used to find relationships between “dancing background” and the other variables (age, level of education, weekly frequency of dance, self-esteem, aesthetic body care, weight, BMI, number of diseases, number of medications taken, handgrip strength, SFT normalized scores, “FF score”). We ran a backward stepwise multiple linear regression with “dancing background” as the dependent variable; among the variables correlated with “dancing background” (see Table 2), we selected “FF score”, weight and number of diseases as the independent variables to avoid multicollinearity between “FF score”, upper-body flexibility and lower-body strength if these two latter variables had been entered into the model. Fisher’s exact test was used to verify if “FF scores” varies between dancers who had more time of dance adherence and those who had less years of dance practice. This variable was dichotomized according to its median value in our population (see Table 1).

RESULTS

Table 1 shows participants’ characteristics as measured by means and standard deviation (SD) of age, years of education, BMI, FF score, self-esteem, aesthetic body care, dancing background, weekly frequency of dance, and handgrip strength.

Table 1. Mean values of BMI, FF score, self-esteem, aesthetic body care, years of education, dancing background, dance frequency (days per week), and handgrip strength.

	Age	BMI	FF	SE	ABC	Years of	Dancing	Dance	Handgrip
	score			education background			frequency		
Mean	72.77	24.1	80.6	76.31	5.88	14	27.75	1.59	27.9
SD (±)	8.93	2.66	13.35	6.19	1.36	3.08	12.65	0.61	5.31
Median	73.0	24.2	80.3	81.0	6.1	13.7	27.5	1.56	27.7
25th	63.8	22.6	69.5	77.5	5.1	11.6	20.0	1.1	24.7
75th	80.3	25.0	88.5	83.5	6.9	16.3	37.0	2.1	31.0

Note. BMI – body mass index; FF score – functional fitness score; SE – self-esteem; ABC – aesthetic body care.

Utilizing normalized scores in a correlation analysis (see Table 2), “dancing background” was correlated with “FF score”, upper-body flexibility, lower-body strength, weight, and number of diseases.

Table 2. Correlations among “dancing background” and the other variables.

Variables	Coefficient of correlation	p-value
Age	0.40	0.10
Level of education (yrs)	-0.12	0.33
Weekly frequency of dance	0.16	0.28
SE	0.00	0.50
ABC	0.06	0.41
Weight	-0.48	0.03
BMI	-0.40	0.07
Number of diseases	-0.45	0.04
Number of medications taken	-0.28	0.14
Handgrip strength	0.01	0.49
Lower-body flexibility	0.25	0.18
Upper-body strength	0.23	0.20
Lower-body strength	0.48	0.04
Upper-body flexibility	0.58	0.01
Dynamic balance	0.35	0.10
Aerobic endurance	0.17	0.27
FF score	0.59	0.01

Note. SE – self-esteem; ABC – aesthetic body care; BMI – body mass index; FF score – functional fitness score.

Before running the regression analysis, we examined variables distribution. "Dancing background" (Shapiro-Wilk W test equal to 0.99, with $p = 0.99$), "FF score", weight, and number of diseases had a coefficient of Fisher kurtosis of -0.40 , 0.24 , 0.32 , and -1.37 , respectively. The results of these preliminary tests permitted us to assume that the variables selected to enter in the regression analysis presented a normal distribution. The Durbin-Watson coefficient was 2.417 , indicating that there was no important autocorrelation. "FF score" was the only independent variable in the model significantly associated to "dancing background" (coefficient = 0.556 , $p = 0.021$). The model ($F = 6.936$, $p = 0.021$) explained about 30% of the total variance (adjusted R-squared = 0.298). Dancers with more than 27 years of dance practice presented a higher "FF score" than the other participants on the Fisher's exact test ($p = 0.032$).

Qualitative data showed that interest in practising dance (interest, self-satisfaction or pleasure regarding dance), and socialization (social support of friends who did dance) were the adherence-related aspects most frequently reported by participants. Fourteen of the 16 participants interviewed classified the physical effort during dance as moderate, and all of them ($n = 16$) rated their health condition as "good" or "very good".

DISCUSSION

The originality of the present work lies on two main aspects: 1) this study approached long-term exercise adherence in an understudied population (i.e., older adults); 2) and, as far as we know, the type of exercise investigated herein (i.e., dance exercise) has never been examined with regards to long-term adherence. This study showed that dancers who had more time of dance practice presented a higher functional fitness level than the other participants. High functional fitness, particularly upper-body flexibility and lower-body strength, was also associated with long-term adherence to dance. Future research is needed to tease out the causal direction. "FF score" was the only variable related to dance adherence in the regression analysis, with the model explaining around 30% of the total variation. Self-esteem and aesthetic body care seem to play an indirect role on adherence rates. Qualitative data highlighted some characteristics linked to long-term adherence to dance, such as interest in practising this exercise, socialization, and good self-reported health.

Participants' mean "FF score" ranged above the theoretical general population median (50th percentile). This result, added to high handgrip strength mean score (BARRETO *et al.*, 2009), suggests that these older women have better overall fitness than their same-age peers. In this way, a 27-year period of dance practice separates

the superior physical performance (higher "FF score") from the inferior one. Participants who did dance for more than 27 years had a higher functional fitness score than dancers who practised this exercise for 27 years or less. It does not mean that dance exercise has exerted a beneficial effect on functional fitness just after 27 years of exercise practice. However, it may mean that after 27 years of dance practice, and then after 27 years into the aging process, this exercise may have helped to maintain optimal levels of functional fitness. Moreover, regression analysis showed that "FF score" was related to dance adherence, with the model explaining around 30% of the total variance. These results suggest that high levels of functional fitness facilitate exercise adherence (RESNICK *et al.*, 2000; RHODES *et al.*, 1999), and allow us to propose that this relationship maybe occurs through a reciprocal way over time. Although it is not possible to tease out the causal direction regarding the relationship between functional fitness and exercise adherence, participants' low frequency of dance (1.59 ± 0.61 times a week) suggests that functional fitness contributes to adherence. Most of the participants (15 of the 16 subjects interviewed) practised dance once ($n = 8$) or twice ($n = 7$) a week, which is insufficient to promote general functional fitness in the elderly, especially with relation to balance and aerobic endurance (NELSON *et al.*, 2007).

Positive correlation between upper-body flexibility and "dancing background" is difficult to explain. Upper-body flexibility-related movements in dance exercise are generally executed in light intensity, and are frequently related to the artistic component of dance. We suggest that executing relatively easy movements that improve dance interpretation and provide enjoyable feelings (pleasure) may contribute to exercise adherence (see "B1" in Appendix 1). Moreover, improved flexibility can reduce joint pain (ACSM, 1998), which may increase one's perception of health status. Good self-rated health is associated to exercise adherence (BOYETTE *et al.*, 2002). It is important to note that all of the participants interviewed rated their health as "good" or "very good".

Another mechanism possibly related to exercise adherence in our sample was the high levels of muscular function. Lack of muscular strength was already established as a barrier to exercise (FORKAN *et al.*, 2006). Correlation between lower-body strength and "dancing background" as well as participants excellent outcomes in the handgrip strength test suggest that optimal muscular function contributed to long-term adherence to dance in this study.

In this way, it is plausible to suggest that physical self-efficacy (i.e., individual's beliefs in his or her physical capabilities to successfully execute specific activities) has mediated the relationship found between functional fitness and dance adherence. Therefore, based on the Social Cognitive Theory, where self-efficacy occupies a pivotal

role “because efficacy beliefs affect adaptation and change not only in their own right, but through their impact on other determinants” (BANDURA, 2001), we can speculate that high functional fitness indicates that participants are physically willing, which improves their physical self-efficacy (NETZ *et al.*, 2005). In turn, physical self-efficacy would contribute to exercise adherence. Although self-efficacy for exercise (related to barriers for exercising) is a well-known factor that influences exercise adherence (BRASSINGTON *et al.*, 2002; MCAULEY *et al.*, 2003; RESNICK *et al.*, 2000), the influence of physical self-efficacy on exercise long-term adherence deserves further research.

Although it is possible that high functional fitness has contributed to the outstanding long-term adherence to dance found in our sample, high functional fitness probably had little or no influence on immediate adherence and even on the first years of exercise practice. This should have occurred because participants initiated dance exercise when they were, in general, younger or midlife adults (mean age 44.3 ± 12.2 years-old), and thereby they did not have any difficulties to perform daily activities due to low functional fitness. To promote dance adherence in the beginning of its practice (but not just in the beginning), the main mechanism possibly involved was personal interest and pleasure (self-satisfaction regarding exercise). Doing a motivating exercise increases its adherence (MORGAN, 2005; RHODES *et al.*, 1999). Indeed, this aspect was clearly expressed by all participants (see “B2”, “D1”, and “P” in Appendix 1).

Socialization or social support, a factor that contributes to exercise adherence (ANNESI, 2004; LITT *et al.*, 2002; TAYLOR *et al.*, 2004), frequently arose in individual interviews and can be related to dance adherence herein (see “M” and “D1” in Appendix 1). In the present study, the most important social support was the social support for exercising (LITT *et al.*, 2002; MCAULEY *et al.*, 2003), i.e., having relationships with people who practised the same exercise (see “PT” in Appendix 1).

Although we did not find a significant correlation between weekly dance frequency and “dancing background”, the mean value of dance frequency found in our sample (1.59 ± 0.61 times a week) may have contributed to adherence. Annesi (2003) showed that a weekly frequency from 1.5 to 2 times was related to better exercise adherence rates. This exercise frequency allowed participants to utilize their free time to do other pleasurable activities, including different exercises (as indicated by some participants), which can facilitate dance adherence. Exercise intensity may also have contributed to long-term adherence to dance. Most dancers classified the physical effort during dance as “moderate”, intensity that is associated to long-term exercise adherence (ANNESI, 2004). Moderate intensity exercise increases functional fitness levels (NETZ *et al.*, 2005), which, in turn, may improve physical self-efficacy, and thereby long-term exercise adherence. The importance of exercise frequency and intensity on long-term exercise adherence ask for further research.

Participants had high levels of self-esteem and aesthetic body care, which suggest that those who take care of their own body increase the likelihood of maintaining a physically active behaviour; however, these psychosocial variables did not correlate with “dancing background”. Based on the literature about exercise, self-efficacy and well-being (NETZ *et al.*, 2005), we can speculate that there is a linkage between physical willingness to cope in daily life (i.e., functional fitness) and psychosocial well-being (see “P” in Appendix 1). Then it is plausible to suggest that functional fitness, self-esteem, and aesthetic body care interacted to promote adherence to dance, and maybe this relationship was partially dependent on exercise practice. In this way, good functional fitness levels positively influence psychosocial well-being, possibly through physical self-efficacy mediation. This latter, in turn, would stimulate adherence to the beneficial activity, i.e., dance. It would generate a “virtuous cycle” that would facilitate long-term exercise adherence. Further research is needed to clarify how functional fitness and psychosocial variables interact to promote dance adherence and to find out the role played by physical self-efficacy in this relationship.

FINAL CONSIDERATIONS

The results of the present study must be interpreted with caution because it was a cross-sectional research, and the sample size was small. However, the outstanding exercise adherence rates found among these older women who practised dance strengthen our results, and shed light on the field of exercise long-term adherence among the elderly.

This study was able to show some characteristics related to long-term adherence to dance. Functional fitness was the only factor related to dance adherence in a linear regression analysis. Then high functional fitness, which can improve physical self-efficacy, and interest or self-satisfaction regarding dance seem to be the most important factors related to exercise adherence among participants. Social support and high levels of self-reported health may also have contributed to long-term adherence to dance. Self-esteem and aesthetic body care may have indirectly facilitated the continuity of dance practice. However, future longitudinal research is needed to clarify how functional fitness and psychosocial aspects interact to promote exercise long-term adherence.

Maintaining a physically active lifestyle constitutes a very complex behaviour that is influenced by cultural aspects and personal feelings. It indicates that there is not a one-size-fits-all recipe regarding exercise long-term adherence. That is why a holistic approach which considers exercise regimen, but also psychosocial, physical, environmental, and cultural aspects, must be utilized to promote long-term exercise adherence during aging.

APPENDIX I

Participants' Verbalisations

B1, 81 years-old: "[In dance] there are stretch exercises ... I love stretch movements and they are indispensable for existence"

M, 86 years old: "[For me, dance-related socializing is responsible] for 25% of dance contribution.

B2, 81 years-old: "I do not think only in moving my arms. [I practise dance] because it satisfies me"

D1, 73 years old: "A friend of mine and I had decided to find an intelligent physical exercise. My friend met dance. [Dance] fits me!".

PT, 69 years old: "Some friends of mine brought me to dance exercise. Dance quickly pleased me"

P, 76 years-old: "[Dance] allowed me, even physically, to finalize with several problems! [...] My body [due dance exercise] has become more willing. I was not afraid of a lot of things [...] I think when someone feels better with oneself, one makes things more easily".

Adesão a longo prazo a um tipo de exercício físico: relação com a capacidade física funcional e motivações pessoais entre mulheres idosas fisicamente independentes

RESUMO: Objetivo: Examinar a relação entre adesão a longo prazo à prática da dança e capacidade física funcional, autoestima e atenção dada à estética corporal, e identificar outros aspectos relacionados à adesão deste exercício em indivíduos idosos. Métodos: 17 mulheres, de 59 a 86 anos, que praticavam um tipo de dança rotulada "expressão corporal".

Resultados : A capacidade física funcional se correlacionou à adesão à prática de dança, e foi o único fator relacionado a esta variável na regressão linear realizada. A autoestima e a atenção dada à estética corporal parecem desempenhar um papel indireto sobre a adesão. O "interesse em praticar a dança" também se relacionou com a adesão. Conclusão: Capacidade física funcional e "interesse em praticar a dança" foram os principais aspectos relacionados à adesão a longo prazo da dança.

PALAVRAS-CHAVE: Dança; idosos; adesão ao exercício; capacidade física funcional.

Adhesión a largo plazo de un tipo de ejercicio físico: relación con la capacidad física funcional y motivaciones personales entre mujeres mayores fisicamente independientes

RESUMEN : Objetivo: Examinar la relación entre adhesión a largo plazo de la danza y capacidad física funcional, auto-estima y atención dada a la estética corporal, e identificar otros aspectos relacionados a la adhesión de este ejercicio en individuos mayores.

Metodología: 17 mujeres, de 59 a 86 años, que practicaban una danza llamada "expresión corporal". Resultados : La capacidad física funcional fuera correlacionada a la adhesión a la práctica de danza, y fuera el único factor relacionado a esta variable en la regresión lineal realizada. La auto-estima y la atención dada a la estética corporal parecen desempeñar un papel indirecto sobre la adhesión. El "interés en practicar la danza" también se relacionó con la adhesión. Conclusión: Capacidad física funcional e "interés en practicar la danza " fueran los principales aspectos relacionados a la adhesión a largo plazo de la danza. PALABRAS CLAVE: Danza; mayores; adhesión al ejercicio; capacidad física funcional.

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