

## COMPARATIVE EFFECTIVENESS RESEARCH

# Influencing Self-rated Health Among Adolescent Girls With Dance Intervention

## A Randomized Controlled Trial

Anna Duberg, RPT; Lars Hagberg, PhD; Helena Sunvisson, PhD; Margareta Möller, PhD

**Objective:** To investigate whether dance intervention influenced self-rated health for adolescent girls with internalizing problems.

**Design:** Randomized controlled intervention trial with follow-up measures at 8, 12, and 20 months after baseline.

**Setting:** A Swedish city with a population of 130 000.

**Participants:** Girls aged 13 to 18 years with internalizing problems, ie, stress and psychosomatic symptoms. A total of 59 girls were randomized to the intervention group and 53 were randomized to the control group.

**Intervention:** The intervention comprised dance classes twice weekly during 8 months. Each dance class lasted 75 minutes and the focus was on the joy of movement, not on performance.

**Main Outcome Measures:** Self-rated health was the primary outcome; secondary outcomes were adherence to and experience of the intervention.

**Results:** The dance intervention group improved their self-rated health more than the control group at all follow-ups. At baseline, the mean score on a 5-point scale was 3.32 for the dance intervention group and 3.75 for the control group. The difference in mean change was 0.30 (95% CI, -0.01 to 0.61) at 8 months, 0.62 (95% CI, 0.25 to 0.99) at 12 months, and 0.40 (95% CI, 0.04 to 0.77) at 20 months. Among the girls in the intervention group, 67% had an attendance rate of 50% to 100%. A total of 91% of the girls rated the dance intervention as a positive experience.

**Conclusions:** An 8-month dance intervention can improve self-rated health for adolescent girls with internalizing problems. The improvement remained a year after the intervention.

*JAMA Pediatr.* 2013;167(1):27-31.  
Published online November 12, 2012.  
doi:10.1001/jamapediatrics.2013.421

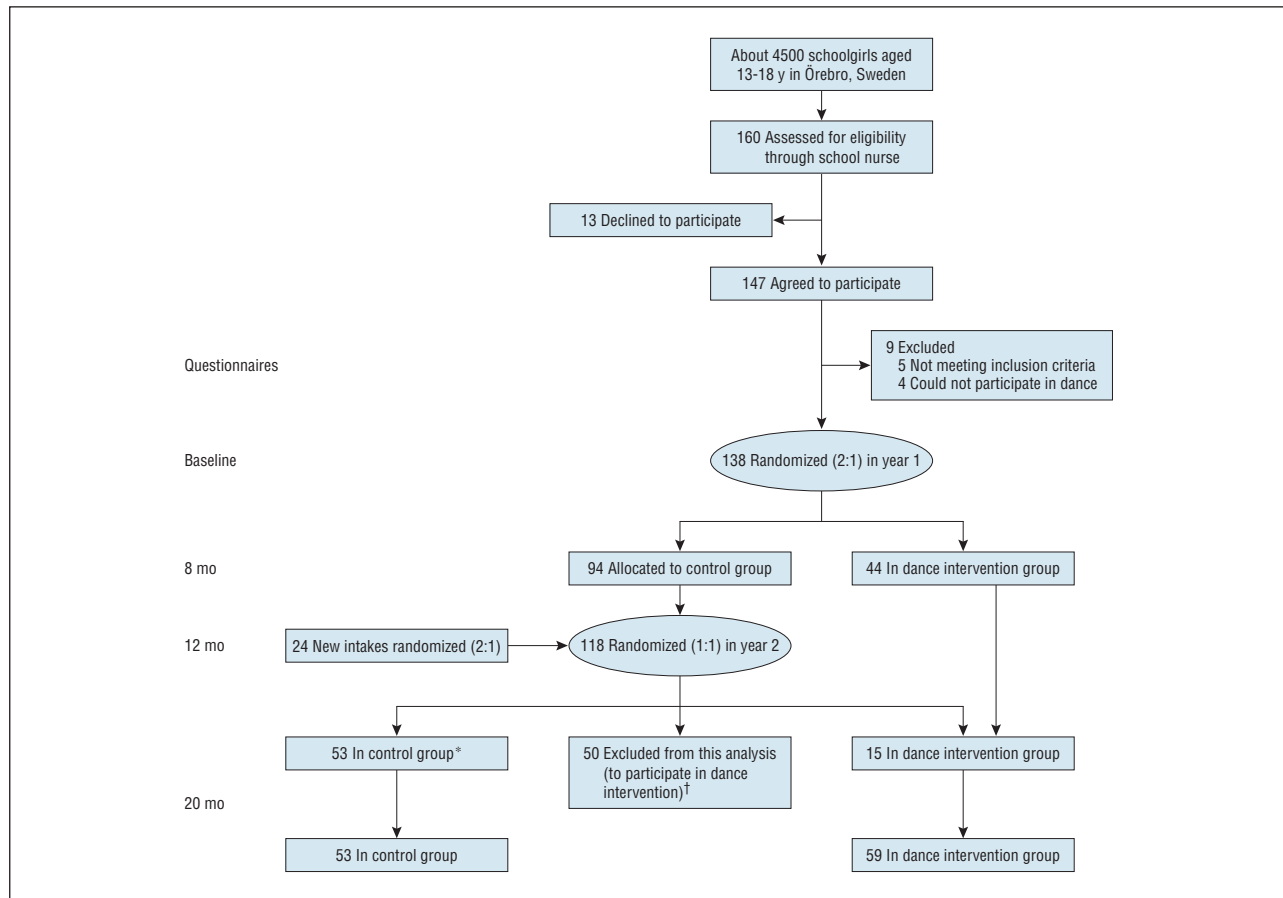
**Author Affiliations:** Centre for Health Care Sciences (Ms Duberg and Dr Hagberg), Örebro County Council (Ms Duberg and Drs Hagberg and Möller), and Örebro University (Ms Duberg and Drs Sunvisson and Möller), Örebro, Sweden.

**R**ECENT RESEARCH HAS FOUND an increasing prevalence of psychological health problems among adolescents, especially girls.<sup>1</sup> This may have long-term consequences for the individual, such as poor academic performance, social dysfunction, substance abuse, and suicide.<sup>2,3</sup> The number of adolescents who rate themselves to have poor health is 3 times higher for girls than boys.<sup>4</sup>

Many young girls with internalizing problems (ie, depressed mood, low self-worth,<sup>5</sup> psychosomatic symptoms<sup>6</sup>) need more help than the school or primary health care can offer but are too healthy to be patients within Child and Adolescent Psychiatric Care. The need to develop treatment and intervention alternatives for young girls with internalizing problems is evident.

Exercise is considered an active strategy to prevent and treat depression and anxiety<sup>7,8</sup> for school-aged youth.<sup>9</sup> It has been shown to promote positive thoughts and feelings, enhance confidence to cope with problems, and provide increased confidence and self-control.<sup>10,11</sup> Participating in physical activity can also improve self-esteem<sup>12</sup> and foster positive self-worth.<sup>13</sup> To increase physical activity in young age, an organized, noncompetitive, leisure-time intervention is considered beneficial.<sup>14</sup>

Dance is a well-established and popular form of physical activity, particularly for young women.<sup>15,16</sup> It can provide a supportive environment and an opportunity to enhance low body attitudes and physical self-perceptions.<sup>10</sup> It is suggested that dance can reduce disabling conditions resulting from stress.<sup>17,18</sup>



**Figure.** Randomization flowchart. \*Nine girls from the new intake of 24 were allocated to the control group, for a total of 53 girls in the control group in year 2. †Fifty girls were in the control group during the first year and then removed from the analysis to participate in the dance intervention in year 2. The dance intervention was equally performed during both years. The 44 girls from the first year and the 65 girls from the second year were divided into smaller dance groups, equally sized in both years.

The primary aim of this article is to describe whether and how a dance intervention for adolescent girls with internalizing problems can influence self-rated health (SRH). A secondary aim is to describe the adherence to and experience of the dance intervention.

## METHODS

### STUDY DESIGN

A randomized controlled intervention trial was conducted for 3 years. Data were collected with a questionnaire that was administered regularly (**Figure**). The 8-month dance intervention was performed during years 1 and 2, from October to May. Both interventions were prompted by a randomization. By running the dance intervention during 2 years, it was possible to offer the intervention to more girls.

### STUDY POPULATION

The study population comprised girls aged 13 to 18 years with internalizing problems who had recurrent visits to the school nurse for psychosomatic symptoms such as pain in the head, stomach, neck, back, and/or shoulder and for persistent feelings of tiredness, being worried, or being in low spirits. Exclusion criteria were severe hearing impairment, intellectual disability, difficulties with the Swedish language, or if Child and

Adolescent Psychiatric Care had advised against participation. Baseline characteristics are presented in **Table 1**.

### DANCE INTERVENTION

The dance intervention took place in a central gym twice weekly for 8 months under the guidance of 3 educated dance teachers (1 at a time). The duration of the class was 75 minutes, which included 15 minutes of warm-up, 40 minutes of dance practice, 15 minutes of stretching, light massage in pairs, and relaxation, and 5 minutes of reflection. The dance practice was classified as moderate to vigorous physical activity, and the intention was to offer an opportunity to experience the own body in a positive way. The choreography included a part when the girls created their own dance routine and moved spontaneously.

During the intervention year, the theme of dance styles varied between African dance, jazz, and contemporary dance.

The internalizing problems were not brought up during the dance classes. At the end of the intervention, the participants were presented with a number of alternatives to keep up dancing or exercise elsewhere.

### PROCEDURE

Recruitment was carried out in collaboration with the school health care program. The school nurses asked eligible girls who sought consultation for internalizing problems or stress whether they wished to participate in the dance project. Written and oral in-

**Table 1. Baseline Characteristics**

Variable	No. (%)	
	Intervention (n = 59)	Control (n = 53)
Age, y <sup>a</sup>		
13-14	8 (13)	13 (25)
15-16	27 (46)	23 (43)
17-18	24 (41)	17 (32)
Weight class <sup>b</sup>		
Underweight	1 (2)	3 (6)
Normal	46 (78)	44 (83)
Overweight	12 (21)	5 (9)
Born in Sweden	55 (93)	49 (93)
Lives with both parents	24 (41)	30 (57)
Parent on sick leave		
Mother	6 (10)	6 (11)
Father	3 (5)	3 (6)
Both	1 (2)	0
Parents' employment status		
Both unemployed	4 (7)	0
Both employed	41 (69)	36 (68)
Rates health as poor or very poor	8 (14)	3 (6)
Experiences feeling of stress frequently	41 (69)	28 (53)
Participated in dancing before start of study <sup>c</sup>	33 (56)	36 (68)

<sup>a</sup>Mean age for both the intervention group and the control group was 16 years.

<sup>b</sup>Weight class is based on body mass index adjusted for age. Missing data for 1 person (2%) in the control group.

<sup>c</sup>This variable was dichotomized into rarely (never, rarely, or sometimes) or frequently (frequently or always).

formation about the dance project was given to prospective participants. Those who agreed to participate provided written consent, and written parental consent was also obtained for those younger than 15 years. A baseline questionnaire was completed; 138 girls were included the first year and 24 were included in the second year (Figure). At the study's start, two-thirds were allocated to the control group. At year 2, half of them were removed and entered the dance intervention and half remained in the control group. The 24 new girls had a 2:1 randomization and 15 of the girls were allocated to the intervention group. Consequently, analysis is based on the 53 girls in the control group and 59 girls in the dance intervention group (44 from year 1, 15 from year 2).

Randomization was carried out in sealed envelopes by an external statistician and was conducted twice, first at baseline and second when starting the intervention in year 2.

The participants in the control group were informed that they should continue living as usual and that they would receive a cinema ticket as compensation each time they completed the questionnaire. School health care was available for everyone when needed as usual.

## ETHICAL CONSIDERATION

The Regional Ethical Review Board in Uppsala, Sweden, approved the study. Participants found to be at risk for severe depression, indicated by a score of 34 points or higher on the Center for Epidemiologic Studies Depression Scale for Children,<sup>19</sup> were offered to meet with an experienced licensed psychologist.

## OUTCOME MEASURES

The questionnaire contained 88 questions regarding lifestyle, eg, SRH, emotional distress, psychosomatic symptoms, feel-

ings, depression, sleep, school, interests, friends, leisure time, and how they enjoy dance. In this article, we will share results concerning SRH, adherence, and experience.

Self-rated health is typically measured with the single-item question "How do you rate your general health?" with the following responses: 1 indicates very poor; 2, poor; 3, neither good nor poor; 4, good; and 5, very good. It has proven to be a strong predictor of physical health status for adolescents<sup>20</sup> and has been tested for validity and reliability.<sup>21</sup> It includes general health, well-being, perceptions of symptoms, and vulnerability.<sup>21</sup>

The experience of the dance intervention was evaluated with a graphic rating scale,<sup>22</sup> which has proven to be superior to the visual analog scale in terms of both consistency and stability.<sup>23</sup> The question was "How do you experience dancing while you perform it?"; the rating scale started at entirely negative and ended at entirely positive. The cutoff was set between neutral and mostly positive.

## STATISTICAL ANALYSIS

Differences between groups in SRH were analyzed with *t* test. The change score was analyzed using paired observations. Statistical significance was set at  $P < .05$ . Linear regression analysis was also performed to study the effect of the SRH baseline values on the change score.

## RESULTS

The current analysis includes 112 adolescent girls with internalizing problems. The baseline characteristics of the participants in the 2 groups were well balanced in most variables (Table 1), but the control group scored higher at baseline concerning good SRH. This has been adjusted for and will be described further.

## ADHERENCE TO THE INTERVENTION

A total of 59 girls were randomized to the intervention group, of whom 11 dropped out (10 girls due to scheduling conflicts between the dance class and their school curriculum and 1 girl because the dancing did not suit her interest) and 48 girls remained. The dance classes were given 48 times during the 8-month period. A total of 6 girls (13%) attended more than 89% of the classes, 26 girls (54%) attended 50% to 89%, and 16 girls (33%) attended 10% to 49%.

## EXPERIENCE OF THE DANCE INTERVENTION

At the 8-month follow-up, directly after the intervention had ended, the remaining 48 girls rated their experience of the intervention; 47 answered the question. Forty-three girls (91%) rated the intervention to be a positive experience, 3 girls (6%) rated it as neutral, and 1 girl (2%) rated it as negative.

## SELF-RATED HEALTH

The dance intervention group improved their SRH more than the control group at all follow-ups (Table 2). The difference in mean change was 0.30 (95% CI, -0.01 to 0.61) at 8 months, 0.62 (95% CI, 0.25 to 0.99) at 12 months, and 0.40 (95% CI, 0.04 to 0.77) at 20 months.

**Table 2. Self-rated Health at Baseline and at 8, 12, and 20 Months' Follow-Up and Mean Change Score Compared With Baseline<sup>a</sup>**

SRH	No. (%)			
	Baseline	8 mo <sup>b</sup>	12 mo <sup>c</sup>	20 mo <sup>d</sup>
Dance intervention group	(n = 59)	(n = 50)	(n = 49)	(n = 50)
SRH score				
1	2 (3)	0	1 (2)	0
2	6 (10)	1 (2)	0	2 (4)
3	26 (44)	8 (16)	5 (10)	5 (10)
4	21 (36)	29 (58)	24 (49)	32 (64)
5	4 (7)	12 (24)	19 (39)	11 (22)
Mean (SD) score	3.32 (0.880)	4.04 (0.699)	4.22 (0.798)	4.04 (0.699)
Mean change score, paired (95% CI)		0.58 (0.32 to 0.84)	0.82 (0.54 to 1.10)	0.66 (0.40 to 0.92)
Control group	(n = 53)	(n = 50)	(n = 46)	(n = 43)
SRH score				
1	0	0	0	0
2	3 (6)	0	2 (4)	2 (5)
3	13 (25)	7 (14)	9 (20)	5 (11)
4	31 (58)	33 (66)	22 (48)	24 (56)
5	6 (11)	10 (20)	13 (28)	12 (28)
Mean (SD) score	3.75 (0.731)	4.06 (0.568)	4.00 (0.816)	4.07 (0.768)
Mean change score, paired (95% CI)		0.28 (0.11 to 0.45)	0.20 (-0.50 to 0.44)	0.26 (0.004 to 0.51)
Difference in mean change score (95% CI)		0.30 (-0.01 to 0.61)	0.62 (0.25 to 0.99)	0.40 (0.04 to 0.77)

Abbreviation: SRH, self-rated health.

<sup>a</sup>The SRH scores were as follows: 1 indicates very poor; 2, poor; 3, neither good nor poor; 4, good; and 5, very good.

<sup>b</sup>The mean SRH score for missing subjects was 2.56 for the dance intervention group and 3.33 for the control group.

<sup>c</sup>The mean SRH score for missing subjects was 2.90 for the dance intervention group and 3.43 for the control group.

<sup>d</sup>The mean SRH score for missing subjects was 3.00 for the dance intervention group and 3.50 for the control group.

Owing to the differences in SRH at baseline, a linear regression also including baseline values was conducted. This analysis, including study group as well as baseline SRH as independent variables, showed an association between the study group and changed SRH of 0.082 at 8 months ( $P = .27$ ), 0.204 at 12 months ( $P = .02$ ), and 0.076 at 20 months ( $P = .38$ ).

### COMMENT

The key finding in this study was that girls participating in the dance intervention improved their SRH more than those in the control group. This effect remained 4 and 8 months after the intervention had ended. The results also show high adherence and positive experience, which suggest that an intervention with dance can be suitable for adolescent girls with internalizing problems.

Improved SRH for adolescents after physical activity is consistent with a study from 2008.<sup>24</sup> A questionnaire answered by 1090 Swedish high school students showed that the number of students who participated regularly in physical activity reported good or very good health ( $n = 669$  [84.2%]) compared with the students who irregularly performed physical activities ( $n = 198$  [70%]) ( $P = .001$ ). The connection between SRH and physical activity was also shown in a study comprising 466 Australian students (medium activity,  $P = .002$ ; high activity,  $P = .001$ ).<sup>25</sup> The suggestion to use dance in an intervention for adolescent girls is supported in a descriptive epidemiologic study in the United States including 3598 adolescents.<sup>26</sup> The investigators describe dance as a viable avenue to increase physical activity in adolescent girls owing to the popularity among girls (prevalence of 34.8%)

and the intensity level (contributes 39.3% of daily moderate to vigorous physical activity).

Self-rated health is not an objective physical health evaluation. Given the subjectivity of the possible answers, this could reflect how the girls may have felt. Still, the severe nature of the girls' problems makes it important not to underestimate the value of feeling better. We would like to suggest 3 possible reasons for this increased feeling of better health reported in our study. First, the girls experienced the dance intervention to be enjoyable and undemanding, without the usual associated school pressures. The importance of enjoyment to increase participation in physical activity for adolescent girls is emphasized by Barr-Anderson et al.<sup>27</sup> Second, the girls included had the opportunity to provide some input into the dance classes regarding music, and the girls themselves always created part of the choreographies. This is said to facilitate a sense of ownership.<sup>28</sup> Finally, the social aspect is very important. The opportunity to make new friends and spend time doing something they enjoy with others who have a similar interest might be a main issue that can affect recruitment, retention, and interest to participate.<sup>28</sup> It is possible that the social aspect combined with the attention given to the girls affected SRH. In future studies, it would be interesting to have several intervention arms for comparison. The current study examines the effect of a whole intervention, not the actual dancing. However, research shows that dance appeals to adolescent girls, which in turn incorporates involvement<sup>29</sup> and contributes to an increased physical effect.<sup>30,31</sup>

Some limitations in the design should be noted. The baseline scores were lower in the intervention group compared with the control group, and lower scores generally improve more than high scores. There is a risk that the treat-

ment effect is overestimated by looking at change scores.<sup>32</sup> Nevertheless, linear regression showed that a significant difference between the groups remained at the 12-month follow-up, despite the inclusion of baseline values.

Moreover, given the subjective nature of the study outcome (SRH) and that the girls knew the study purpose, there is a risk of potential bias in favor of the dance intervention arm. This sort of bias easily arises in subjective measures. The risk that the girls in the intervention group reported higher values to please the instructors or to show gratitude to the research team needs to be taken into consideration. In all, however, the questionnaire comprised 88 questions, and analyses show that there are areas without any differences between the groups and some areas where the control group had improved more. This might illustrate straightforwardness in how the girls answered the questionnaire, and further results will be illuminated in coming articles.

This study points out the role of joyful social physical activity in influencing health. We conclude that an intervention with dance twice weekly for 8 months is feasible and can improve SRH in adolescent girls with internalizing problems, even if the girls lacked previous experience in dancing. According to these results, despite problems such as stress and psychosomatic symptoms (and other potential challenges in being an adolescent girl), dance can result in high adherence and a positive experience for the participants, which might contribute to sustained new healthy habits.

Accepted for Publication: June 7, 2012.

Published Online: November 12, 2012. doi:10.1001/jamapediatrics.2013.421

Correspondence: Anna Duberg, RPT, Centre for Health Care Sciences, Örebro County Council, and Örebro University, PO Box 1324, SE-70113 Örebro, Sweden (anna.duberg2@orebroll.se).

**Author Contributions:** Study concept and design: Duberg, Hagberg, and Möller. Acquisition of data: Duberg, Hagberg, Sunvisson, and Möller. Analysis and interpretation of data: Duberg, Hagberg, and Möller. Drafting of the manuscript: Duberg, Hagberg, and Möller. Critical revision of the manuscript for important intellectual content: Duberg, Hagberg, Sunvisson, and Möller. Statistical analysis: Duberg and Hagberg. Obtained funding: Sunvisson and Möller. Administrative, technical, and material support: Duberg and Möller. Study supervision: Hagberg and Möller. Conflict of Interest Disclosures: None reported.

**Funding/Support:** This work was supported by the Örebro County Council and the municipality of Örebro.

**Additional Contributions:** We thank the school nurses in Örebro for assistance with recruitment, all the girls in the study, and Göran Jutengren, PhD, for statistical assistance.

## REFERENCES

1. National Board of Health and Welfare. *Public Health Report 2009*. Västerås, Sweden: National Board of Health and Welfare; 2009.
2. Katon W, Richardson L, Russo J, et al. Depressive symptoms in adolescence: the association with multiple health risk behaviors. *Gen Hosp Psychiatry*. 2010; 32(3):233-239.
3. Merry S, McDowell H, Hetrick S, Bir J, Muller N. Psychological and/or educational interventions for the prevention of depression in children and adolescents. *Cochrane Database Syst Rev*. 2004;(1):CD003380.
4. Statistics Sweden. *Survey of Living Conditions Among Children, 2009*. Stockholm: Statistics Sweden; 2009.
5. Reynolds BM, Juvonen J. The role of early maturation, perceived popularity, and rumors in the emergence of internalizing symptoms among adolescent girls. *J Youth Adolesc*. 2011;40(11):1407-1422.
6. Daughters SB, Reynolds EK, MacPherson L, et al. Distress tolerance and early adolescent externalizing and internalizing symptoms: the moderating role of gender and ethnicity. *Behav Res Ther*. 2009;47(3):198-205.
7. Jerstad SJ, Boutelle KN, Ness KK, Stice E. Prospective reciprocal relations between physical activity and depression in female adolescents. *J Consult Clin Psychol*. 2010;78(2):268-272.
8. Rethorst CD, Wipfli BM, Landers DM. The antidepressive effects of exercise: a meta-analysis of randomized trials. *Sports Med*. 2009;39(6):491-511.
9. Strong WB, Malina RM, Blimkie CJ, et al. Evidence based physical activity for school-age youth. *J Pediatr*. 2005;146(6):732-737.
10. Burgess G, Grogan S, Burwitz L. Effects of a 6-week aerobic dance intervention on body image and physical self-perceptions in adolescent girls. *Body Image*. 2006;3(1):57-66.
11. Ekeland E, Heian F, Hagen KB. Can exercise improve self esteem in children and young people? a systematic review of randomised controlled trials. *Br J Sports Med*. 2005;39(11):792-798.
12. Mead GE, Morley W, Campbell P, Greig CA, McMurdo M, Lawlor DA. Exercise for depression. *Cochrane Database Syst Rev*. 2009;(3):CD004366.
13. Schmalz DL, Deane GD, Birch LL, Davison KK. A longitudinal assessment of the links between physical activity and self-esteem in early adolescent non-Hispanic females. *J Adolesc Health*. 2007;41(6):559-565.
14. Kien CL, Chiodo AR. Physical activity in middle school-aged children participating in a school-based recreation program. *Arch Pediatr Adolesc Med*. 2003; 157(8):811-815.
15. Grieser M, Vu MB, Bedimo-Rung AL, et al. Physical activity attitudes, preferences, and practices in African American, Hispanic, and Caucasian girls. *Health Educ Behav*. 2006;33(1):40-51.
16. Wellard J, Pickard A, Bailey R. "A shock of electricity just sort of goes through my body": physical activity and embodied reflexive practices in young female ballet dancers. *Gen Educ*. 2007;19(1):79-91. doi:10.1080/09540250601087793.
17. Bojner Horwitz E. *Dance/Movement Therapy in Fibromyalgia Patients: Aspects and Consequences of Verbal, Visual and Hormonal Analyses* [dissertation]. Uppsala, Sweden: Uppsala University; 2004.
18. Hanna JL. The power of dance: health and healing. *J Altern Complement Med*. 1995;1(4):323-331.
19. Olsson G, von Knorring AL. Depression among Swedish adolescents measured by the self-rating scale Center for Epidemiology Studies-Depression Child (CES-DC). *Eur Child Adolesc Psychiatry*. 1997;6(2):81-87.
20. Vingilis ER, Wade TJ, Seeley JS. Predictors of adolescent self-rated health: analysis of the National Population Health Survey. *Can J Public Health*. 2002;93(3):193-197.
21. Bue Björner J. *Self-rated Health: A Useful Concept in Research, Prevention and Clinical Medicine*. Stockholm, Sweden: Swedish Council for Planning & Coordination of Research; 1996.
22. Hagberg LA, Lindahl B, Nyberg L, Hellénus ML. Importance of enjoyment when promoting physical exercise. *Scand J Med Sci Sports*. 2009;19(5):740-747.
23. Svensson E. Comparison of the quality of assessments using continuous and discrete ordinal rating scales. *Biom J*. 2000;42(4):417-434. doi:10.1002/1521-4036(200008)42:4<417::AID-BIMJ417>3.0.CO;2-Z.
24. Reichard YK, Alricsson M, Werner S. Self-related health, physical activity and musculoskeletal complaints in Swedish high school students. *Minerva Pediatr*. 2008;60(3):263-271.
25. Alricsson M, Domalewski D, Romild U, Asplund R. Physical activity, health, body mass index, sleeping habits and body complaints in Australian senior high school students. *Int J Adolesc Med Health*. 2008;20(4):501-512.
26. O'Neill JR, Pate RR, Liese AD. Descriptive epidemiology of dance participation in adolescents. *Res Q Exerc Sport*. 2011;82(3):373-380.
27. Barr-Anderson DJ, Young DR, Sallis JF, et al. Structured physical activity and psychosocial correlates in middle-school girls. *Prev Med*. 2007;44(5):404-409.
28. Jago R, Davis L, McNeill J, et al. Adolescent girls' and parents' views on recruiting and retaining girls into an after-school dance intervention: implications for extra-curricular physical activity provision. *Int J Behav Nutr Phys Act*. 2011;8:91.
29. Pelclová J, Frömel K, Skalík K, Stratton G. Dance and aerobic dance in physical education lessons: the influence of the student's role on physical activity in girls. *Acta Univ Palacki Olomuc Gymn*. 2008;38(2):85-92.
30. O'Neill JR, Pate RR, Beets MW. Physical activity levels of adolescent girls during dance classes. *J Phys Act Health*. 2012;9(3):382-388.
31. O'Neill JR, Pate RR, Hooker SP. The contribution of dance to daily physical activity among adolescent girls. *Int J Behav Nutr Phys Act*. 2011;8:87.
32. Vickers AJ, Altman DG. Statistics notes: analysing controlled trials with baseline and follow up measurements. *BMJ*. 2001;323(7321):1123-1124.