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The Effectiveness of Dance Interventions to Improve Older Adults' Health: A Systematic Literature Review

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Abstract

Background—Physical inactivity is commonly observed among individuals aged ≥60 y. Identified barriers to sedentary older adults beginning activity include low self-efficacy, pre-existing medical conditions, physical limitations, time constraints, and culture. Dancing has the potential to be an attractive physical activity that can be adjusted to fit a target populations age, physical limitations, and culture.

Objectives—This review examined the benefits to physical health of dance interventions among older adults.

Methods—Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a systematic search using the PubMed database was conducted. Eighteen studies met the inclusion and exclusion criteria and were analyzed for type of intervention, the study's design, participants' demographics, and outcomes, including attrition.

Results—The 18 articles reported on studies conducted in North America, South America, Europe, and Asia. Of the styles of dancing, 6 studies used ballroom, 5 used contemporary, 4 used cultural, 1 used pop, and 2 used jazz. Two studies targeted older adults with pre-existing medical conditions. The average age of participants ranged from 52–87 y. Researchers used a variety of measures to assess effectiveness; (1) 3 of 5 (60%) that used measures to assess flexibility showed significant positive results; (2) 23 of 28 (82%) that used measures of muscular strength and endurance showed significant positive changes; (3) 8 of 9 (89%) that used measures of balance showed significant positive changes; (4) 8 of 10 (80%) that used measures of cognitive ability showed significant positive changes; and (5) the one that measured cardiovascular endurance showed significant positive changes. Only 6 studies reported participation, and they found low attrition.

Conclusions—The findings suggest that dance, regardless of its style, can significantly improve muscular strength and endurance, balance, and other aspects of functional fitness in older adults.

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Future researchers may want to analyze the effects of dance on mental health and explore ways to make this intervention attractive to both genders. Standardizing outcome measures for dance would facilitate meta-analysis.

Physical inactivity contributes to many health conditions, including obesity,[1] cancer, coronary heart disease,[2] sarcopenia,[3] cerebrovascular disorders,[4] circulatory diseases,[5] and frailty.[6] Fortunately, adding physical activity to one's life is an effective method of preventing, controlling, and alleviating some health conditions. Studies have demonstrated that physical activity has positive effects on depression, anxiety,[7] dementia,[8] heart failure,[9] stroke,[10] cognition,[11] and sleep.[12,13] The harmful effects resulting from physical inactivity and the positive effects of physical activity suggest that further efforts are needed to encourage physical activity, with an emphasis on populations at high risk for inactivity.[14]

Physical inactivity is commonly observed among individuals aged 60 y and older.[15] Although many older adults have positive attitudes toward physical activity and its benefits, factors such as the person who is recommending physical activity, the older adult's environment, costs of activities, and safety concerns affect their behaviors regarding physical activity.[16] Identified barriers to sedentary older adults beginning activity include low self-efficacy, pre-existing medical conditions, physical limitations, time constraints, and culture.[17]

The United States' older adult population has been steadily increasing since the 1900s. It is predicted that 92 million older adults will live in the United States in 2060, compared with 30 million in 2000.[18] Therefore, creative, appealing, and effective methods of physical activity need to be investigated to accommodate this growing population.

Dance therapy is a creative arts therapy that has been defined by the American Dance Therapy Association as "the psychotherapeutic use of movement to further the emotional, cognitive, physical, and social integration of the individual."[19] Cross-sectional studies have shown that older adults who dance on a regular basis have greater flexibility, postural stability, balance, physical reaction time, and cognitive performance than older adults who do not dance on a regular basis.[20]

Unlike other holistic approaches used to increase physical activity, dance includes an aesthetic form of artistic expression.[21] Dancing can produce physical results comparable with those of formal exercise training, and it also has been found to improve social and behavioral factors, such as self-motivation.[22] In addition, it can improve the emotional, psychological, and physical well-being of individuals.

Qualitative studies have shown that aesthetic forms of expression build passion and can contribute to older adults' physical, intellectual, and social development.[23,24] Dancing has the potential to be a versatile activity that can be adjusted to fit a target population's age, physical limitations, and culture.

Two previously compiled literature reviews have examined the health benefits of dance.[25,26] However, one review focused on the effectiveness of dance for healthy people regardless of age. The other specifically examined dance in older adults but excluded studies with elders who had health conditions as well as studies that did not specify the health status of the older adult. In addition, those 2 literature reviews focused on the effectiveness of dance as a substitute for physical activity rather than the feasibility of and adherence to the dance programs. Common reasons for the demise of interventions related to physical activity for older adults are poor adherence and high dropout rates.[27] Therefore, additional research is needed to identify an intervention's ability to be individualized and tailored to populations of older adults in ways that maintain participants' involvement in the activity. The current study is meant to further scientific knowledge on this issue.

Given that many of older adults have cognitive and sensory motor impairments[28] and that 45.3% of older adults aged 65 years and older have 2 or more chronic conditions,[29] studies of interventions for older adults should not exclude those with chronic conditions. Thus, the purpose of the current review was to examine the effectiveness of dance programs in improving the physical health of all older adults, both those with health conditions and those considered healthy.

METHODS

Databases

Guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were used to develop the current systematic review.[30] PubMed was searched using the keywords *dance, aged*, and *older adults.* In addition, the term *dance therapy* was used as a medical subject heading and used in searching as text words. The search was conducted from September 2013 through October 2013. Citation chasing was also used by searching the reference sections of other papers that pertain to the topic.

Inclusion and Exclusion Criteria

To be included in the current review, a study had to evaluate the benefits of a dance intervention to the physical health of older adults lacking prior dance experience, within the age limits defined by a reviewed study's authors. Studies had to present results in a quantitative format. *Dance* was defined as a form of artistic expression through rhythmic movement to music, which does not include aerobic fitness classes taught to music, such as Zumba and step-aerobics. The authors placed no limitations on the location of the research, intervention, or year the study was published. However, publications reviewed had to be peer reviewed and written in English.

Data Extraction and Coding

Upon availability, the following information on each intervention and study was abstracted from each publication: (1) the mean age and gender of participants, (2) the dance style studied, (3) the program's implementation strategy, (4) the study's results, (5) the researchers' decision about the effectiveness of the intervention, (6) the study's attrition rates, and (7) the researchers' conclusions. Effectiveness decisions were coded in the following manner: A plus (+) was used for significant results in positive health improvement, a 0 for null results, and a minus (−) for significance results in the negative direction.

Quality Analysis

The scientific rigor of each study was evaluated using 6 criteria adapted from Sackett[31] and Megens and Harris.[32] Specifically, studies were assessed for the presence of (1) clearly stated inclusion and exclusion criteria for participants, (2) an adequate description of the dance program, (3) reliable outcome measures, (4) valid outcome measures, (5) assessors who were blinded to the participants' groups, and (6) participants' attendance, retention, and dropout rates.

RESULTS

The article selection process is illustrated in Figure 1. Specifically, 268 articles were identified based on search terms. Of those articles, 173 were excluded by title; 28 duplicates were removed; 51 were excluded based on the article's content; and 2 were included from citation chasing. Remaining were 18 articles published from 2004 to 2013.[33–50]

Intervention Designs

Regarding styles of dancing, of the 18 interventions examined, 6 used ballroom, 5 used contemporary, 5 used cultural, and 2 used jazz (Table 1). Ballroom interventions included foxtrot, salsa, tango, bolero, swing, polka, cha-cha, waltz, and merengue. Two of the studies that used ballroom interventions used more than 1 style of ballroom dance in the program. Contemporary interventions included improvisation and the Lebed method. Cultural dance interventions included Greek, Turkish, Korean, Cantonese, and line dancing.

Eleven studies reported on the location of interventions. Two were implemented in the United States; 6 were in Europe; 2 were in Asia; and 1 was in South America. The frequency of the interventions ranged from 1 to 4 times per week. The duration of the interventions ranged from 6 weeks to 8 months. The length of each session ranged from 45 minutes to 2 hours.

Participants

Two of the 18 studies examined the effectiveness of dance interventions for older adults who had been diagnosed with specific health conditions (Table 2). Those conditions included visual impairment[33] and metabolic syndrome.[48] The remaining 16 studies targeted the general population of older adults. Groups ranged in size from 13 to 97 participants. In 8 studies, more than one-half of the participants were females, and in 5 studies, all the participants were females. The remaining 3 studies did not specify the gender of their participants. The average age of participants ranged from 52 to 87 years.

Study Designs

Of the 18 interventions, 10 were randomized controlled trials (RCTs),[34–36,39,40,42,44,46–48] 4 used a quasiexperimental design,[37,43,49,50] and 4 included only 1 group using pre- and posttest designs[33,38,41,45] (Table 2). Of the 14 RCTs and quasiexperimental designs combined, 4 had control groups that engaged in another activity, such as walking,[42] line dancing,[50] t'ai chi,[37] and a fall prevention program.[35,37] The other 10 did not provide their control groups with alternate activities.

Quality Analysis

Scientific rigor was assessed by the 6 criteria provided by Sackett[31] and Megens and Harris.[32] As shown in Table 3, none met all 6 criteria; 10 met 5 criteria[34,36,38,40,42,44,47–49]; 6 met 4 criteria[33,35,43,45,46,50]; and 2 met 3 criteria.[37,39] All 18 studies specified the inclusion and exclusion criteria for participants and employed valid and reliable outcome measures in their evaluations. Fifteen studies adequately described the intervention. However, only 6 used blinded assessors, and only 6 provided information on participants' attrition.

Outcomes

The studies' authors used a variety of measures of health outcomes. For the current review, each physical health outcome of dance measured by studies' investigators was grouped into 1 of the 6 measurement categories: (1) flexibility—the flexibility of an older adult's upper and lower body; (2) muscular strength and endurance measures— the general functional fitness of an older adult using tests such as get up and go, chair squats, or gait speed; (3) balance—the ability of an older adult to stand on 1 or 2 legs without swaying or with no center-of-pressure displacement; (4) cardiovascular endurance—the maximum volume of oxygen intake; (5) cognitive function—the older adult's memory and organizational ability; and (6) body composition—the older adult's body mass index and body fat percentage.

Across the 18 studies, 59 measurements were reported (Table 1). These measurements include 5 measurements of flexibility, 28 of muscular strength and endurance, 9 of balance, 1 of cardiovascular endurance, 10 of cognitive ability, and 6 of body composition. Studies employed approximately 3 measures on average. Of the 18 studies, 6 used measurements from 1 category.[35,37,39,41,45,49] All other studies used measurements from multiple categories.

All but 1 study showed significant improvement in at least 1 of their measures of physical health, and no change in measurement was significant in the negative direction. Specifically, 3 of 5 (60%) measurements of flexibility showed significant positive results, and 2 showed no significant changes. Twenty-three of the 28 (82%) measurements of muscular strength and endurance showed significant positive changes, and 5 showed no significant changes. Eight of the 9 (89%) measurements of balance showed significant positive changes, and 1 showed no significant change. One study measured cardiovascular endurance, showing significant positive change. Eight of the 10 (80%) measurements of cognitive ability showed significant positive changes, and 2 showed no significant changes. Finally, for the 2 studies that used a measure of body composition, neither showed a significant change.

Attrition

Only 6 of the 18 studies examined rates of attrition from their interventions (Table 3). Three reported completion rates of 100%[34,38,40]; 1 reported a completion rate of 81%[48]; 1 reported a completion rate of 93%[41]; and 1 reported a completion rate of 86%.[36] The programs' lengths for these 6 studies ranged from 6 weeks to 2 months. No correlation existed between a programs length and the attrition rate.

Older Adults With Health Conditions

Although most the 18 studies focused on improving health among older adults in general, 2 studies limited their interventions to older adults with specific health conditions or statuses (Table 2). Conditions examined were visual impairment[33] and metabolic syndrome.[48] Both studies demonstrated an improvement in the constructs measured. For example, the dance program for visually impaired older adults used a self-reported visual function test, covering measures of muscular endurance, strength, and balance. Significant positive increases were observed in all 3 tests. The study that examined older adults with metabolic syndrome found a significant positive increase in older adults' cognitive functioning, although no change in body composition occurred.

DISCUSSION

Eighteen studies that fit the search criteria were assessed on each study's quality, its design, the intervention design, physical health outcomes, and attrition. The results for the current review have shown that dance is a promising method for improving older adults' physical health. In addition, studies show that dance interventions may address older adult barriers to being physically active such as cultural preferences, pre-existing medical conditions, and physical limitations.

Dancing to Improve Overall Physical Health

Every study except for 1 showed an improvement in a measure of physical health among older adults. With the exception of body composition, improvements were seen for 60% to 90% of measurements in the other categories of physical health measurement—flexibility, muscular strength and endurance, balance, cardiovascular endurance, and cognitive function. Lack of improvement in body composition is perhaps not surprising. Older adults on average increase 7.5% of their body fat mass and decrease 2% of the fat-free body mass per decade, even with moderate sports or recreational activity.51 In addition, dietary intake affects the lean mass of older adults and should be considered as a confounding factor when measuring body composition.[52] However, because no significant negative changes were observed, perhaps dance can be seen as a method to maintain body composition. Body composition may not be a realistic evaluation measure for dance, because many variables contribute to body composition.

A majority of the studies tested muscular strength and endurance and balance, showing a significant positive effect for dance on older adults' functional fitness. These measures are significant when identifying the physiological parameters that support physical mobility and independence in older adults[53] and are also commonly used in basic tests of functional fitness for older adults. Therefore, dance interventions increase the functional fitness of older adults, which strengthens their bodies, allowing them to perform day-to-day tasks independently.

Intervention Design

All types of dance reviewed in this article showed significant positive changes. Because the effectiveness of dance as an intervention was observed across a wide range of dosages, the dosage may be modifiable for participants as long as dance occurs at least once per week, for at least 6 weeks, with a minimum of 45-minute sessions.

The current review included a focus on attrition because a common downfall of physical activity interventions for older adults is poor adherence and high dropout rates.[27] Unfortunately, only 6 of the 18 interventions reported program completion rates. However, these 6 reported low attrition rates.

Dancing to Improve Health Conditions

Two studies specifically examined the effects of dance interventions on populations of older adults with health conditions. This preliminary evidence suggests that dance interventions should not automatically exclude older adults with pre-existing medical conditions from participating. Rather, dance interventions can be offered to older adults with a variety of conditions. Additional research is needed to confirm the efficacy of dance to improve specific health conditions.

Limitations

Limitations of this review of research studies include imbalanced demographics for participants, inconsistent outcome measures, and lack of process evaluations. More specifically, all examined studies reported samples with more than 50% female. In fact, several studies had only female participants. Future investigations should identify gender-related barriers in recruitment, retention, program design, and study objectives. Further, research should explore if dance is a gender-oriented activity or can be used across all demographics. The wide variety of measures used to test outcomes limited comparisons across studies and precluded a meta-analysis. Finally, only 6 studies reported attrition data.

The review was limited in that the only database searched was PubMed. This choice was made because of the review's focus on physical health outcomes. Researchers who want to examine mental health outcomes of dance should expand the search to databases such as PsycNET.

Recommendations

After reviewing the 18 studies that met the search criteria, the authors propose the following recommendations. First, dance interventions that aim to affect body composition should either incorporate a nutritional component into the intervention or document the participants' dietary intakes. Second, the research community should broaden study parameters to include dance styles other than the popularly used contemporary and ballroom styles. Third, dancing should be used as a medium to promote older adults' physical health. Dance programs should provide a minimum of 1 45-minute session per week for a total duration of 6 weeks. Program completion and reasons for attritions should be tracked.

Last, a majority of the studies in the current review tested muscular strength and endurance and balance. Those measures are useful in measuring physiological parameters that support physical mobility and independence in older adults.[53] The measures are also commonly used in basic tests of functional fitness for older adults. Therefore, future studies should include measures that examine the functional fitness of older adults. Standardizing outcome measures for dance would facilitate future meta-analyses.

CONCLUSIONS

To the authors' knowledge, no systematic literature reviews have occurred that document how dance affects the physical health of older adults. Strong evidence suggests that dance, regardless of style and dosage, significantly improves older adults' functional fitness. However, dance may not be sufficient to change body composition significantly. Although dance interventions have low attrition rates, a majority of the older adults participating in the dance interventions were female. Additional studies are needed to investigate the physical effects of dance coupled with nutritional education, the psychological impacts of dance, and rates of and reasons for adherence to dance as a physical activity.

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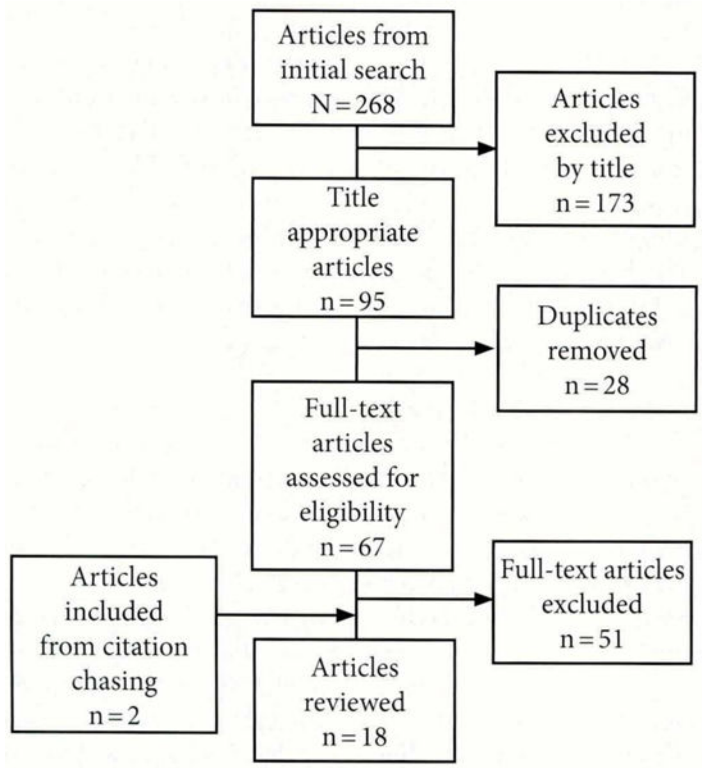

Figure 1.
Article selection process.

Table 1

Intervention Design and Physical Outcomes

		Intervention Design		Physical Outcomes[a]					
Study	**Location**	**Style of Dance**	**Dosage—Frequency of Session, Duration of Program, and Session**	**Flexibility**	**Muscular Strength/ Endurance**	**Balance**	**Cardiovascular Endurance**	**Cognition**	**Body Composition**
Hackney et al[33]	Atlanta, GA, USA	Ballroom (tango)	2/wk, 11 wk, 1.5 h		0 +	+			
Granacher et al[34]	Switzerland	Ballroom (salsa)	2/wk, 8 wk, 1 h		+ + + 0 0				
Ferrufino et al[35]	France	Contemporary (improvisation)	1/wk, 4.4 mo, 1 h	+ 0					
Krampe et al[36]	–	Contemporary	3/wk, 6 wk, 45 min	0	0	0			
Coubard et al[37]	Paris, France	Contemporary (improvisation)	1/wk, 5 mo, 1 h					+ 00	
Krampe et al[38]	–	Contemporary (Lebed method)	3/wk, 6 wk, 45 min	+	+				
Marmeleira et al[39]	Evora, Portugal	Contemporary	3/wk, 12 wk, 1.5 h					+ + +	
Sofianidis et al[40]	Finland	Cultural (Greek)	2/wk, 10 wk, 2 h		+	+ + +			
Alpert et al[41]	Las Vegas, Nevada, USA	Jazz	15 wk					+	
McKinley et al[42]	–	Ballroom (Argentine tango)	2/wk, 10 wk, 2 h		+ +	+			
Hui et al[43]	–	Cultural (Cantonese pop)	2/wk, 12 wk, 50 min		+ + +		+		
Eyigor et al[44]	–	Cultural (Turkish folklore)	3/wk, 8 wk, 1 h		+ + + 0	+			
Wallman et al[45]	–	Jazz	1/wk, 15 wk, 1.5 h			+			
Borges et al[46]	Brazil	Ballroom (foxtrot, bolero, swing, waltz, rumba)	3/wk, 8 mo, 50 min		+	+			
Holmerova et al[47]	Czech Republic	Ballroom (polka, foxtrot, waltz, cha-cha)	1/wk, 3 mo, 75 min	+	+ + +				
Kim et al[48]	Korea	Ballroom (cha-cha)	2/wk, 2 mo, 1 h					+ + +	0 0 00
Song et al[49]	Korea	Cultural (Korean)	4/wk, 6 mo, 50 min		+ + +				
Young et al[50]	–	Cultural (line)	1/wk		+ +				00

[a] +, significant positive change; 0, no significant change. Each represents the results of a specific measure used to indicate a physical outcome.

Table 2

Studies' Designs and Participants' Demographics[a]

Study	Study Design	Experimental Participants	Control Participants	Diagnosed Health Condition
Granacher et al[34]	RCT	N = 14 (y = 71)	N = 14 (y = 68.9)	–
Ferrufino et al[35]	RCT	N = 16 (f= 16, y = 73)	Fall prevention: N = 23 (f = 23, y = 72)	–
Krampe et al[36]	RCT	N = 15 (f= 11, y = 85)	N = 12 (f= 6, y = 85)	–
Marmeleira et al[39]	RCT	N = 19 (f= 15, y = 64)	N = 15 (f= 10, y = 66)	–
Sofianidis et al[40]	RCT	N = 14 (f= 13, y = 69)	N= 12 (f= 7, y = 72)	–
McKinley et al[42]	RCT	N = 14 (f= 11, y = 78)	Walking: N = 11 (f = 8, y = 74.6)	–
Eyigor et al[44]	RCT	N= 19 (f= 19, y=73)	N = 18 (f = 18, y= 71.2)	–
Borges et al[46]	RCT	N = 39 (y=67)	N = 36 (y = 67)	–
Holmerova et al[47]	RCT	N = 27 (f= 25, y = 81)	N = 25 (f= 21, y = 82)	–
Kim et al[48]	RCT	N = 26 (f= 19, y = 68)	N = 12 (f= 10, y = 68)	Metabolic syndrome
Coubard et al[37]	Quasiexperimental	N = 16 (f = 16, y = 74)	Fall prevention: N = 67 (f = 64, y = 75), Ta'i chi chuan: N = 27 (f = 24, y = 72)	–
Hui et al[43]	Quasiexperimental	N = 52 (f= 50, y = 52)	N = 45 (f= 44, y = 69)	–
Song et al[49]	Quasiexperimental	N = 46 (f=43, y = 76)	N = 27 (f = 21, y = 74)[b]	65% diagnosed with chronic disease[c]
Young et al[50]	Quasiexperimental	Line dance only: N = 15 (f= 15, y = 61) Line dance + squats: N= 15 (f= 15, y=61) Line dance + squats + stomping: N = 15 (f = 15, y = 64)	–	Postmenopause
Hackney et al[33]	1 group, pre- and posttest	N = 13 (f=7, y = 87)	–	Visual impairment
Krampe et al[38]	1 group, pre- and posttest	N = 11 (f = 7)	–	–
Alpert et al[41]	1 group, pre- and posttest	N= 13 (y = 68)	–	–
Wallman et al[45]	1 group, pre- and posttest	N = 12 (f= 12)	–	–

[a] f, female; y, mean age.

[b] The control group consisted of the program's dropouts.

[c] Although the study was not restricted to participants with chronic disease, the percentage of participants diagnosed with chronic disease was reported.

Table 3

Evaluative Criteria for Studies

Study	Inclusion and Exclusion Criteria	Intervention Adequately Described	Reliable Outcome Measures	Valid Outcome Measures	Blind Assessment of Outcome Measures	Accounted for Attrition	Total No. Criteria Met
Granacher et al[34]	✓	✓	✓	✓		✓	5
Krarape et al[36]	✓	✓	✓	✓		✓	5
Krampe et al[38]	✓	✓	✓	✓		✓	5
Sofianidis et al[40]	✓	✓	✓	✓		✓	5
Alpert et al[41]	✓	✓	✓	✓		✓	5
McKinley et al[42]	✓	✓	✓	✓	✓		5
Eyigor et al[44]	✓	✓	✓	✓	✓		5
Holmerova et al[47]	✓	✓	✓	✓	✓		5
Kim et al[48]	✓	✓	✓	✓		✓	5
Song et al[49]	✓	✓	✓	✓	✓		5
Hackney et al[33]	✓	✓	✓	✓			4
Ferrufino et al[35]	✓		✓	✓	✓		4
Hui et al[43]	✓		✓	✓	✓		4
Wallman et al[45]	✓	✓	✓	✓			4
Borges et al[46]	✓	✓	✓	✓			4
Young et al[50]	✓	✓	✓	✓			4
Coubard et al[37]	✓		✓	✓			3
Marmeleira et al[39]	✓		✓	✓			3

Note: ✓ indicates criteria were met; blank indicates criteria were not met.