



Early View

Correspondence

The efficacy of singing *versus* exercise training: do the data really support the authors' conclusions?

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Please cite this article as: Vaes AW, Spruit MA, Franssen FME, *et al.* The efficacy of singing *versus* exercise training: do the data really support the authors' conclusions?. *Eur Respir J* 2021; in press (<https://doi.org/10.1183/13993003.02857-2021>).

This manuscript has recently been accepted for publication in the *European Respiratory Journal*. It is published here in its accepted form prior to copyediting and typesetting by our production team. After these production processes are complete and the authors have approved the resulting proofs, the article will move to the latest issue of the ERJ online.

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The efficacy of singing *versus* exercise training: do the data really support the authors' conclusions?

To the editor,

With great interest we have read the article by Kaasgaard et al. entitled 'Use of Singing for Lung Health as an alternative training modality within pulmonary rehabilitation for COPD: an RCT' (1). Earlier studies already suggested that singing may improve health status, respiratory muscle strength and functional exercise capacity, though, quality of evidence was often low and conflicting findings exist (2). In this randomized controlled trial, a singing program ('Singing for Lung Health') was compared with conventional exercise training as part of a 10-week community-based pulmonary rehabilitation (PR) program in patients with COPD. Based on their findings, the authors concluded that a singing program was not inferior to an exercise training program in improving functional exercise capacity. However, there are several methodological issues, which we like to highlight to frame these somewhat surprising results.

First, at the time of randomization, the patients generally had an impaired exercise performance, a poor health status, and a majority reported severe to very severe dyspnea. These patients typically show an improvement on all these outcomes following an exercise-based intervention (3). Surprisingly, Kaasgaard and colleagues reported a mean improvement of 14 meters on the six minute walk distance (6MWD) following the 10-week exercise training program, which remains far below the lower limit of the 95% confidence interval of the mean improvement in 6MWD, as reported in the latest Cochrane review on the efficacy of exercise-based PR in patients with COPD (mean (95%CI): 43.9 (36.2-55.2) meter) (3). Furthermore, it remains also clearly below the expected minimal important difference for the 6MWD (mean (95%CI): 30 (25-33) meter) (4). This may, at least in part, explain that there is no difference between the two study arms for the 10-week change in 6MWD. Whether the significant, but modest mean improvement in 6MWD is due to a lack of total training stimulus (i.e., only two supervised exercise sessions per week, and 43% of the patients completing <75% of the 20 exercise sessions) remains unclear, also because the actually performed exercise training load remains unreported. However, this reasoning seems likely as also the mean change in total SGRQ score following 10 weeks of exercise training (-1.5 points) remains far below the mean improvement as reported by McCarthy and colleagues (mean (95%): -6.9 (9.3-4.5) points). Additionally, all other reported outcomes did not improve, indicating that the total amount and intensity of the exercise training provided was insufficient.

Second, the authors do not report whether the 6-minute walk test (6MWT) was performed twice at baseline, as recommended in the ERS/ATS Technical Standard (4). Indeed, the 6MWT shows a clear

learning effect of almost 30 meters (5). If this is the case, the results as reported by Kaasgaard and colleagues are most probably due to the learning effect and not an intervention-induced improvement.

Third, it remains unclear why the 6MWD and SGRQ total score improved significantly, but modestly following 10 weeks of singing. Is this mostly a learning effect on the 6MWT? Or are there true physiological changes in the respiratory muscles that may partly explain these changes? Does singing with peers and meeting each other twice weekly improve quality of life? The authors did not sufficiently consider this social aspect. Indeed, patients with COPD participating in community-based singing groups reported it as fun, 'highlight of the week', a possibility to build new friendships, and a 'feel-good' factor which led to motivation to participate in further activities (6).

Fourth, multiple secondary outcomes, as registered on clinicaltrials.gov, are lacking in the current manuscript: physical activity, musical ear test, single breath count, and breath-hold test. Did the interventions have any impact on these outcomes?

Fifth, the authors mentioned that the effect size was comparable to the largest community-based exercise training study included in the Cochrane review (3). However, in this referred trial (7), no improvement in functional exercise capacity was found after a community-based exercise training program. Indeed, a decrease in 6MWD was reported, though to a lesser extent in the exercise-based intervention group compared to the usual care control group (7).

Sixth, the comparable improvements detected might also be due to the other treatment modalities which all patients received (i.e., breathing exercises, home exercise instructions). Table 1 also indicates that both groups received endurance training, while the detailed supplementary information suggests otherwise. Besides that, patients participating in the singing group also received respiratory muscle training while the comparison group did not (the exact modality and intensity of respiratory muscle training remained also unclear). We suggest clarifying table 1 as the information is confusing.

Finally, the program was offered in a low resource setting and information about a multidisciplinary rehabilitation team as included in the official American Thoracic Society/European Respiratory Society statement on key concepts and advances in PR (8) is lacking. So, instead of concluding that a PR program including singing was not inferior to a PR program including physical exercise training, we believe that it rather can be questioned whether this twice-weekly exercise training program can be defined as 'pulmonary rehabilitation'. To conclude, we do appreciate the fact that Kaasgaard and colleagues are studying the efficacy of different interventions as possible alternatives of PR. However, taking the abovementioned methodological limitations into consideration, their data do not seem to support their conclusions.

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Conflict of interest:

A. W. Vaes has nothing to disclose.

M. A. Spruit is member of the Executive Board of Ciro, which offers inpatient and outpatient pulmonary rehabilitation

F. M.E. Franssen is member of the Executive Board of Ciro, which offers inpatient and outpatient pulmonary rehabilitation and reports speaker fees from Chiesi, Boehringer Ingelheim, GlaxoSmithKline, Novartis, AstraZeneca, consultancy fees from AstraZeneca, MSD and study support from AstraZeneca, outside the submitted work.

A. J. van 't Hul has nothing to disclose.

C. Burtin has nothing to disclose.

R. Gloeckl has nothing to disclose.

S. Houben-Wilke has nothing to disclose.

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