

ORIGINAL ARTICLE

Sing4Health: Randomised controlled trial of the effects of a singing group program on the subjective and social well-being of older adults

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Funding information

Portugal's Participatory Budget, Grant/Award Numbers: 626, OPP 2017, 11,409 C/2017

Abstract

Group singing may be an optimal intervention strategy to promote active ageing and well-being; however, evidence with experimental validity is scarce. This study aims to fill this gap by analysing the effects of a 34-session singing group programme (SGP) on participants' subjective and social well-being and the mediating roles of social identification with the singing group and of self-esteem. An RCT with intervention ($n = 89$) and active waiting-list control ($n = 60$) conditions was conducted, and a mixed method quantitative and qualitative data collection and analysis were performed. Participants were mostly elderly day-care centre users ($M = 76.66$ years old; $SD = 8.79$) with low average levels of education and income. Structured measures of life satisfaction, positive and negative affect, self-esteem, loneliness, social identification and social well-being were collected, as well as interviews on the perceived benefits of participating in the SGP. Results showed significant effects of the SGP on the positive affect, social well-being and marginally on the self-esteem of the participants. The observed effects were sustained at the

RCT registration number: Sing4Health; trial registration number: NCT03985917, June 14, 2019.

follow-up. Qualitative analysis corroborated the quantitative results. Mediation analysis showed indirect effects of social identification with the singing group on loneliness and social identification with the social care institution group; and of self-esteem on positive and negative affect.

KEYWORDS

loneliness, singing group, self-esteem, social identification, social well-being, subjective well-being

INTRODUCTION

In the field of active ageing, singing groups are a formal activity that have been studied as an enhancer of Subjective Well-Being (SWB; Ardahan, 2018; Daykin et al., 2018; Dingle et al., 2019; Stewart & Lonsdale, 2016). Although evidence exists of their beneficial potential for older people, few randomised control trials (RCTs) have tested these effects with higher scientific validity. Likewise, the literature grants more attention to negative indicators of mental health, compared with positive indicators such as SWB and Social Well-being (ScWB). Most studies on singing groups used samples of higher social-educative status older adults in which singing group enrollment was their own initiative. There is a gap in the literature on the adherence and efficacy of this type of intervention on more diverse and socially vulnerable backgrounds (Dingle et al., 2019). Furthermore, despite the social nature of this activity, the role that continued participation in singing groups plays in Social Well-being (ScWB) and the social identification that emerges in the singing groups has not been sufficiently studied. Besides describing the beneficial effects of singing groups, it is also necessary to understand the specific processes involved in the impact of such activities on the participants' SWB and ScWB, related with personal processes such as self-esteem and social processes such as social identification with the singing group.

Active ageing is the process of optimising opportunities for health, participation and security to enhance the well-being and functionality of people as they age (WHO, 2015). Well-being can be operationalised as the subjective evaluation of feeling good and satisfied with life (Diener & Ryan, 2009). ScWB, in turn, would be 'the appraisal of one's circumstance and functioning in society' (Keyes, 1998, p. 122) in five components: social integration, social acceptance, social contribution, social actualisation and social coherence. Rowe and Kahn (1997) highlighted two kinds of activities to promote older adults' well-being: interpersonal relations and productive use of leisure time. The singing group activity involves both components.

Literature showed evidence of the efficacy of group singing to promote active ageing and well-being in older adults. In an RCT, Mathew et al. (2017) found evidence of group singing being an effective therapy to reduce depression and loneliness among institutionalised elders. Previously, Cohen et al. (2006), in a quasi-experimental study with intervention (choral) and comparison (usual activity) groups, had found a decrease of loneliness in older adults. In a systematic review, Ronzi et al. (2018) noticed a tendency of most studies of music and singing

programmes meant for social inclusion in community-residing older adults to focus on testing the effects of the interventions on negative variables such as depression, anxiety and stress. Remarkably, none of the studies included positive measures of SWB, ScWB or social integration benefits, despite the relevance of social factors on elders' well-being (Lamont et al., 2018; Petrovsky et al., 2020).

The most recurrent criterion of well-being according to Carol Ryff (1989) is self-acceptance, measured as self-esteem, the degree to which the qualities and characteristics contained in one's self-concept are perceived to be positive. Yang and Wen (2019) further highlighted the close association between self-esteem and well-being in older adults, showing how life satisfaction is mediated by self-esteem and feelings of uselessness. Ronzi et al. (2018) suggested that self-esteem can be a mediator between participating in SGPs and mental health.

Social identification, in turn, is defined as the extent to which group membership shapes self-conception through its contribution to self-evaluation and the emotional ties between the individual and a specific group (Tajfel, 1978). Following the social identity approach perspective of Cameron et al. (2018), Inoue et al. (2019) recently showed that social activity participation (e.g., as a local sports team supporter) promotes feelings of emotional support through team identification. Thus, emotional support perception is related with SWB through the feeling of belonging to a group (as a mediator). In this framework, Dingle et al. (2019) also proposed that group identification is a key factor through which well-being and health benefits are achieved in singing groups. Literature confirmed the relationship between social identification and SWB but did not test the possible effects of this variable on ScWB. Albarello et al. (2020) found that identification with classmates not only fulfils individual needs such as self-esteem or self-understanding but also increases ScWB. Despite the social nature of group singing and the benefits it provides for older people, no specific RCTs with this age group specifically tested social identification with the singing group (SISG) and its impact on the participants' ScWB.

Bailey and Davidson (2002) remarked that the group interpretation of a song in a homeless men's choir increased the participants' self-esteem. A similar effect was observed in the qualitative study of Lally (2009), in a 30-week singing workshop with 35 participants (aged 51–83 years), in which 32% of the participants reported improvements in self-esteem, social participation and group development. In line with Seligman's PERMA model, social relationships and accomplishments are particularly mentioned by older adult singing group members as reasons for improving their well-being (Lamont et al., 2018).

Solé et al. (2010) also remarked upon the social relationship benefits of taking part in musical activities. However, despite the evidence of the positive social implications of group singing and its relevance for social identification (Lamont et al., 2018), not enough studies have specifically addressed older adults' SISG and how it may contribute to their ScWB. Also, most studies on the social benefits of singing groups used qualitative data analysis. The use of quantitative contrast measures and RCTs with follow-up measurement and mixed methods on the impact of singing groups in the SWB and ScWB of older adults are scarce and critical to overcoming literature limitations. Finally, it is important to understand the mechanisms involved in the singing groups that contribute to well-being, analysing plausible mediators, such as self-esteem and SISG.

This study is framed within the pre-registered trial Sing4Health RCT (Galinha et al., 2020), aimed at analysing the effects of a singing group intervention on the well-being, cognitive functions and health of older adults (see also Galinha et al., 2021; Galinha et al., in press). This

paper focuses on the effects of SGP on the SWB and ScWB, loneliness, social identification and self-esteem of the participants. It also aims to test the mediating roles of self-esteem and SISG of the SGP on SWB and ScWB.

Hypothesis 1. Participation in a SGP has a positive effect on the participants' SWB, increasing life satisfaction and positive affect and decreasing negative affect.

Hypothesis 2. Participation in a SGP has a positive effect on the participants' ScWB, loneliness and social identification with the Social Care Institution (SII).

Hypothesis 3. Participation in the SGP has a positive effect on the self-esteem of the participants, which has a mediating role in the effect of the SGP on the participants' SWB.

Hypothesis 4. SISG has a mediating role in the effect of the SGP on the participants' ScWB, SII and loneliness.

METHOD

Study design

This study is an RCT design where the participants were randomly allocated to one of two conditions: the intervention group (IG) and the active waiting-list control group (WLG). The participants in the IG took part in the Sing4Health programme, which included the following components: relaxation and vocal warm-up exercises, vocal technique, rehearsal of repertoire, a social component, creation and presentation of a final show. It was pre-defined to be developed along 34 two-hour sessions, two times per week, with a 20-min break for socialisation (see study protocol, Data S3; Galinha et al., 2020). The WLG participated in a second edition of the Sing4Health programme. Two final shows were held, where 57 participants in the IG and 30 participants in the WLG were present. The repertoire was chosen by the intervention team and participants together. It consisted of popular and traditional songs and songs that had been selected for Eurovision over the last seven decades.

Participants in the WLG were involved in the usual social, artistic and leisure activities provided by the SCI except group singing: namely, sports activities 16.67% (aerobics and water aerobics), artistic activities 12.96% (theatre, painting and music), voluntary activities in the day-care centres 7.41% (baking cakes and collaboration in the day-care centre activities), crafts 3.7% (sewing), tours and trips 3.7% and training activities 1.85%. All structured activities reported were shorter than 3 h per week. However, the majority of participants (53.7%) did not enrol in the structured activities offered by the day care centres. Instead, they opted for the general socialisation activities offered in the living rooms (e.g., watching television programmes, playing table games and talking with other users).

This is a mixed-method study. Structured measures of the study variables and interviews on the perceived benefits of participating in the SGP were collected. Data collection took place in the immediate 2 weeks before and after the SGP (T0 and T1) and in a 6-month follow-up (T2). Thus, the study comprises a randomised phase, T0 to T1, and a follow-up phase, T1 to T2.

Participants

Older adult beneficiaries of the various services of SCM in Lisbon and Almada (e.g., day-care centres, nursing homes and home care) were invited to participate in a SGP and a research study. SCM is a Portuguese social care institution (SCI) with the mission of improving the quality of life of socially disadvantaged people. The inclusion criteria for the participants were being 60 years old or older, retired, accepting the invitation to take part in the SGP and not having participated in structured intervention programmes in the previous 4 months. The exclusion criterion was having a severe sensorial or mobility impairment that impeded participation in the SGP. One hundred and forty-nine participants were accepted to the SGP and randomly allocated to the IG or the WLG, in approximately 50%, using the SPSS randomisation tool (CONSORT Flow Chart, Data S1). A power analysis shows that this sample can detect a large effect size ($n_2 = 0.14$) with an 88% power. A dropout of 15 participants per group will reduce the study power to 79% (Galinha et al., 2020). Twelve participants dropped out at the beginning of the programme; therefore, 14 additional participants were randomly selected from the WLG ($n = 60$) and relocated to the IG ($n = 89$), using the SPSS randomisation tool. The randomisation process was performed by the research team, while the enrollment and assignment of the participants was developed by the SCI. The main reasons for dropping out were health issues (illness, scheduled treatments or operations and recovery from operations) and health issues of spouses, having enrolled with friends or spouses that were allocated to a different group and scheduling incompatibility with the SGP sessions. When participants in the WLG, opted to enrol in activities involving group singing (e.g., popular marches) that implied the exclusion of the Sing4Health intervention. The great majority of participants reported a diagnosed health condition (77.9) at T0.

Procedure

All eligible older adults were invited by the SCI staff to take part in the Sing4Health programme. After a briefing session with the intervention and research teams, the informed consent form was signed, pre-test measures were collected and the participants were randomised into the IG and the WLG. The data collection took place three times in the SCI facilities, over 10 days, prior to the SGP (T0, February 2019), after the SGP (T1, July 2019), and 6 months after the SGP (T2, February 2020). Data was assessed by independent researchers blinded to the group allocation. Primary and secondary outcome measures were pre-registered. The study protocols were approved by an Ethics Committee.

Materials

Subjective well-being: (a) *Life Satisfaction* was measured by the Satisfaction with Life Scale (Diener et al., 1985), composed of five items and adapted to the Portuguese by Neto et al. (1990) with a Cronbach's Alpha internal consistency from .83 to .87; (b) *Positive and Negative Affect* was measured by the Positive and Negative Affect Schedule (Watson et al., 1988), composed of 20 items and adapted to the Portuguese by Galinha and Pais-Ribeiro (2005). Cronbach's Alpha of positive affect is from .83 to .87, and of negative affect from .84 to .87.

Social Well-Being was accessed by a multidimensional measure that included the (1) short version of the Scale of Social Well-Being with six items (Keyes, 2009), adapted to the Portuguese by Silva (2016); (2) the satisfaction with social relationships subscale of the WHOQOL-BREF, with three items (WHOQOL Group, 1998, adapted to the Portuguese by Vaz Serra et al., 2006), and (3) the satisfaction with social participation subscale of the WHOQOL-OLD with four items (Power et al., 2005, adapted to the Portuguese by Vilar, 2015). The scales above showed low internal consistency; however, the computed measure of the three social constructs, with 13 items, yielded a satisfactory Cronbach's alpha of .64, .71 and .75.

Loneliness was measured by the short version of the UCLA Loneliness Scale (Pocinho et al., 2010), with four items with a Cronbach's Alpha from .69–.88.

Social Identification was measured by the Four-Item Measure of Social Identification (Doosje et al., 1995), which assesses the emotional evaluation of the identification of the self with the in-group of the Social Care Institution (SII) and the in-group of the singing group (SISG) with a Cronbach's Alpha from .82 to .88.

Self-Esteem was measured by the Rosenberg Self-Esteem Scale (Rosenberg, 1965), with 10 items and validated for the Portuguese by Pechorro et al. (2011). Cronbach's Alpha internal consistency from .78 to .86.

Motivations, expectations and perceived benefits of participating in the SGP were collected with a semi-structured interview.

Data was collected from the participants in the IG and in the WLG at baseline (T0), 4 months after the baseline assessment (T1) and again at the 6-month follow-up (T2). Data collection took place for 10 weekdays, from 10 to 15 participants per day. It started at 8 a.m., while participants were fasting, for (i) biomarkers, respiratory function and balance data collection, followed by a buffet breakfast; (ii) cognitive assessment and, after a 15-min break, (iii) psychosocial measurement questionnaires and interviews. Every step of the data collection was performed by different researchers.

Data analysis

Quantitative analysis

A preliminary inspection of the dataset was conducted to screen the data for accuracy, missing values and outliers. All variables showed reasonable univariate normality (i.e., skewness and kurtosis values between ± 2) in all assessment phases. Outliers three interquartiles above the mean were substituted according to the winsorising method. The homogeneity of the groups in the demographic and outcome variables of the study at baseline (T0) was tested using Students' *t* test for independent samples and chi-square (for categorical variables). The Hypotheses 1 to 3 of the effects of the SGP in the outcome variables were tested using the general linear model, ANOVA with repeated measures (GLM), with interaction between time (T0 and T1) and group (IG vs. WLG or Completers vs. WLG and dropouts), using the SPSS program, version 25.0 (IBM Corp., 2017). The GLM analysis carried out followed an 'intention-to-treat' (ITT) approach (the missing data were replaced using the 'last observation carried forward', LOCF; McCoy, 2017). A per-protocol approach (PP) analysis was also performed, comparing the completers of at least 75% of the sessions and the other participants (WLG and dropouts). Statistical analyses were performed with the data from 149 participants with the ITT approach (124 with the PP): 89 participants in the IG (53 with the PP)

and 60 participants in the WLG (27 with the PP). An alpha level of .05 was maintained for all tests. *T* tests were also applied to contrast intragroup changes between the three assessment times T0 to T1 and T1 to T2. To test Hypotheses 3 and 4, of the mediation effects between participation in the SGP and the outcome variables, the PROCESS macro (ver. 3.3) model 4 analysis was used (Hayes, 2018). We defined the condition and number of sessions attended as the independent variable, and the outcome and mediator variables as measured in T1, while using the measurement of the same variables in T0 as covariates. Data is available from the authors on request.

Qualitative analysis

The interviews were recorded and transcribed verbatim, followed by a condensation of the content to minimum units of meaning, followed by coding, thematic analysis and frequency counting. Thematic topics were developed a priori, and coding categories were created from the analysis. Content analysis was developed by two independent researchers (masters' students) and supervised by an auditor (the principal researcher of the study). The analyses were developed independently, and differences in the analyses were resolved through consensus after discussion between the three coders.

RESULTS

The sociodemographic characteristics of the participants and the mean levels of the variables under study, at baseline, are shown in Table 1, where no significant differences between the IG and the WLG were found.

Testing Hypothesis 1, of the effects of the SGP on the life satisfaction of the participants, the GLM analysis from T0 to T1, between the IG and WLG, showed that life satisfaction declined in both groups from T0 to T1. It declined less in the IG; however, the differences were not significant ($F[1, 147] = .936, p = .335, \eta^2 = .006$). Intragroup differences via Students *t* test also showed no significant differences in the WLG from T1 to T2 ($t[28] = -1.20, p = .242$). Similar results were obtained with the PP analysis (see Tables 2 and 3). Therefore, the hypothesis that participating in the SGP has an effect on the life satisfaction of the participants was rejected.

Still testing Hypothesis 1, of the effects of the SGP on the positive affect of the participants, GLM analysis showed that, from T0 to T1, while the positive affect increases in the IG, it decreases in the WLG. The differences were statistically significant ($F[1, 147] = 6.56, p = .011, \eta^2 = .043$), with an observed power of .72. Similar results were obtained with the PP approach ($F[1, 120] = 7.23, p = .008, \eta^2 = .057$), with an observed power of .76. In the IG, in the follow-up 6 months after the SGP, positive affect slightly decreased, although not significantly ($t[56] = 1.69, p = .097$). In the WLG, from T1 to T2 after participating in the SGP, the positive affect slightly increased, although not significantly ($t[27] = -.77, p = .446$). Therefore, Hypothesis 1 that participating in the SGP has an effect on the positive affect of the participants was confirmed with a strong observed power, and the effect was sustained in the follow-up, 6 months after the programme.

Regarding the hypothesis of the effect of the SGP on the negative affect of participants, results show that, from T0 to T1, a decrease is observed in the IG, while in the WLG, no

TABLE 1 Descriptive statistics of the variables at baseline ($N = 149$) and mean comparison between IG and WLG

Variables	Normality Skewness/ kurtosis	Homogeneity variances Levene F/p	IG ($n = 89$) M (DP)	WLG ($n = 60$) M (DP)	Mean differences (gl) t test/ χ^2 p
Age	.00/-.99	.01/.933	76.76 (8.93)	76.51 (8.66)	$t(143) = 1.66$; $p = .869$
Gender	-1.80/1.24	-			$\chi^2(1) = 1.72$; $p = .190$
Male			12	13	
Female			77	47	
Marital status	-.11/-.83	-			$\chi^2 = 8.19$; $p = .146$
Single			9	8	
Married			28	13	
Divorced			5	10	
Widowed			40	25	
Cohabitation			0	1	
Separated			1	2	
Education	1.21/2.01	.20/.655	4.82 (3.32)	4.75 (3.39)	$t(141) = .133$; $p = .894$
Socioeconomic status ^a	1.25/1.78	2.05/.154	544.74 (267.08)	604.66 (338.69)	$t(142) = -1.19$; $p = .238$
Life satisfaction	-.46/-.50	.60/.439	3.33 (.80)	3.33 (.91)	.00/.998
Positive affect	-.19/-.50	1.11/.294	2.91 (.72)	2.90 (.76)	.10/.924
Negative affect	.73/-.33	1.57/.212	2.10 (.82)	2.03 (.76)	.55/.584
Self-esteem	-.51/-.18	.587/.445	3.76 (.73)	3.87 (.63)	-.94/349
Social well-being	-.26/-.04	1.93/.167	3.75 (.50)	3.76 (.58)	-.17/.869
Loneliness	.34/-.63	.10/.758	2.31 (.79)	2.29 (.83)	$t(147) = .18$; $p = .857$
Social identification institution	.05/.36	.38/.540	4.11 (.47)	4.10 (.54)	.20/.844

^aTwo outliers three interquartiles above the mean were substituted by the Winsorizing method.

changes occurred. GLM analysis showed no statistically significant differences between groups from T0 to T1 ($F[1, 147] = .66, p = .419, \eta^2 = .004$). Similar results were obtained in the PP analysis. In the follow up, from T1 to T2, no significant differences were observed ($t[56] = -.22, p = .827$), as well as in the WLG from T1 to T2, after the SGP ($t[27] = -.21, p = .839$). Therefore, Hypothesis 1 that participating in the SGP has an effect on the negative affect of the participants was rejected.

The quantitative results above are convergent with the qualitative results, obtained from the content analysis of the participants' responses to the question, 'What benefits (or advantages)

TABLE 2 Effects of the Sing4Health programme on the outcomes, mean and standard deviation at T0, T1 and T2, repeated-measures ANOVA, T0-T1, with the between factor group (IG vs. WLG) and intention to treat (LOCF) approach, and Student's *t* test within-group comparison, T1-T2

	T0 M (SD)	T1 (ITT) M (SD)	Time (T1-T2)			Interaction group-time			Within-group T1-T2					
			F (gl)	p	n2	F (gl)	p	n2	M (SD)	T2 M (SD)	t	gl	p	
Satisfaction with life	IG (89)	3.33 (.80)	2.28 (.86)	3.49 (1,147)	.064	.023	.936 (1,147)	.335	.006	3.31 (.90)	3.29 (.76)	.30	56	.765
	WLG (60)	3.33 (.91)	3.16 (.86)							3.06 (.84)	3.21 (.79)	1.20	28	.242
Positive affect	IG (89)	2.91 (.72)	2.99 (.72)	.95 (1,147)	.332	.006	6.56 (1,147)	.011	.043	3.05 (.72)	2.88 (.82)	1.69	56	.097
	WLG (60)	2.90 (.76)	2.74 (.80)							2.61 (.79)	2.73 (.63)	-.77	27	.446
Negative affect	IG (89)	2.10 (.82)	2.01 (.81)	.66 (1,147)	.419	.004	.66 (1,147)	.419	.004	1.82 (.73)	1.83 (.75)	-.22	56	.827
	WLG (60)	2.03 (.76)	2.03 (.83)							2.07 (.98)	2.09 (.88)	-.21	27	.839
Social well-being	IG (89)	3.75 (.50)	3.70 (.55)	5.96 (1,142)	.016	.040	1.70 (1,142)	.194	.012	3.81 (.57)	3.74 (.63)	.97	55	.337
	WLG (60)	3.76 (.58)	3.61 (.55)							3.51 (.61)	3.68 (.64)	-1.66	27	.108
Social identification institution	IG (89)	4.11 (.47)	4.06 (.54)	1.39 (1,147)	.240	.008	.005 (1,147)	.945	.000	4.11 (.53)	4.16 (.55)	-.77	55	.447
	WLG (60)	4.10 (.54)	4.04 (.53)							3.93 (.54)	3.76 (.66)	1.36	28	.773
Loneliness	IG (89)	2.31 (.80)	2.15 (.80)	5.46 (1,147)	.021	.036	.22 (1,147)	.639	.002	2.03 (.77)	2.10 (.78)	-.75	55	.445
	WLG (60)	2.29 (.83)	2.17 (.72)							2.13 (.75)	2.17 (.63)	-.29	28	.773
Self-esteem	IG (89)	3.76 (.73)	3.76 (.63)	1.07 (1,146)	.304	.007	.951 (1,146)	.331	.006	3.91 (.69)	3.85 (.64)	.91	55	.366
	WLG (60)	3.87 (.63)	3.79 (.59)							3.74 (.56)	3.85 (.48)	-1.26	25	.221

TABLE 3 Effects of the Sing4Health programme on the outcome variables, repeated-measures ANOVA, T0-T1, with the between factor group (completers of 75% sessions vs. WLГ and dropouts), with a per protocol approach

	T0 M (SD)	T1 (PP) M (SD)	Time (T0-T1)		Group × time (T0-T1) interaction			
			F (gl)	p	F (gl)	p	n2	
Satisfaction with life	IG (53)	3.37 (.71)	3.27 (.88)	2.72 (1,122)	.102	.078 (1,122)	.781	.001
	WLГ + DO (71)	3.24 (.90)	3.10 (.81)					
Positive affect	IG (53)	2.93 (.63)	3.07 (.69)	.017 (1,120)	.897	7.23 (1,120)	.008	.057
	WLГ + DO (69)	2.80 (.79)	2.64 (.76)					
Negative affect	IG (53)	2.01 (.82)	1.85 (.70)	1.33 (1,120)	.250	1.73 (1,120)	.190	.014
	WLГ + DO (69)	2.08 (.76)	2.09 (.83)					
Social well-being	IG (50)	3.81 (.49)	3.86 (.50)	3.59 (1,113)	.061	8.33 (1,113)	.005	.069
	WLГ + DO (66)	3.72 (.57)	3.50 (.56)					
Social identification	IG (52)	4.06 (.44)	4.08 (.51)	.94 (1,121)	.334	1.93 (1,121)	.167	.016
	WLГ + DO (71)	4.09 (.55)	3.96 (.57)					
Loneliness	IG (53)	2.23 (.81)	1.97 (.73)	6.93 (1,122)	.010	1.31 (1,122)	.254	.011
	WLГ + DO (71)	2.37 (.79)	2.27 (.75)					
Self-esteem	IG (53)	3.86 (.75)	3.92 (.71)	.397 (1,118)	.530	3.74 (1,118)	.055	.031
	WLГ + DO (67)	3.78 (.66)	3.66 (.62)					

did you feel after participating in the singing group programme?' (Data S2). Thus, the main subtopic, reported by 50% of the participants, was well-being benefits, including responses such as feeling good, feeling better, forgetting problems, feeling pride, feeling enthusiasm, feeling affection or having a good experience, corroborating the benefits in the positive affect obtained from the quantitative data.

Testing Hypothesis 2, on the effects of the SGP on the ScWB of the participants, the GLM results using the ITT and the PP approaches were not similar. With both approaches, from T0 to T1, an increase in ScWB of the IG was observed, while a decrease was observed in the WLG. However, with the ITT approach the difference (group \times time) was not significant ($F[1, 142] = 1.70, p = .194, \eta^2 = .012$), while with the PP approach, it was significant ($F[1, 113] = 8.33, p = .005, \eta^2 = .069$) with an observed power of .82. In the follow-up, from T1 to T2, no significant differences were observed ($t[55] = .97, p = .337$) in the IG. In the WLG, from T1 to T2, after the second edition of the SGP, an increase of the ScWB was observed, although not significantly ($t[27] = -1.66, p = .108$). Therefore, the effects of the SGP in the ScWB of the participants are confirmed only with the PP approach, for the completers of the SGP compared with those who did not (dropouts and WLG).

Testing Hypothesis 2, in relation to loneliness, a decrease was expected in the IG after participation in the SGP. Results showed that loneliness decreased significantly in both groups ($F[1, 147] = 5.46, p = .021, \eta^2 = .036$), from T0 to T1. Loneliness decreased more in the IG compared with the WLG; however, GLM results showed that the differences were not significant ($F[1, 147] = .22, p = .639, \eta^2 = .002$). In turn, intragroup analysis showed that the decrease in loneliness in the IG from T0 to T1 was significant ($t[88] = 2.34, p = .022$) and was maintained from T1 to T2 ($t[55] = -.75, p = .455$). In the WLG, from T1 to T2 after the SGP, loneliness decreased although not significantly ($t[28] = -.29, p = .773$). Results with the PP approach were similar, not supporting an effect of the SGP on the loneliness of the participants, although yielding a significant decrease of loneliness in the IG between the T0 and the T1.

Still testing Hypothesis 2, concerning the effects of the SGP on the SII, results show a slight decrease of SII in both groups, from T0 to T1. GLM analysis showed that the differences were not significant ($F[1, 147] = .005, p = .945, \eta^2 = .000$). In the WLG, from T1 to T2, after the SGP, SII also decreased although not significantly ($t[28] = 1.36, p = .773$). Results with the PP approach were similar, not supporting the hypothesis of an effect of participating in the SGP on the SII of the participants.

In turn, the qualitative results showed that social benefits were the second category of benefits from participating in the SGP most reported by the participants with 31% of the responses. Thus, social benefits were highlighted by nearly a third of the participants, including the benefits of socialising, forming new relationships, sharing, participating in activities and communicating within the singing group.

Testing Hypothesis 3, on the effect of participating in the SGP on the self-esteem of the participants, the GLM results using the ITT and the PP approaches were different. In both analyses from T0 to T1, self-esteem decreased in the WLG and remained identical in the IG. However, using the ITT approach the difference between groups was not significant ($F[1, 146] = .95, p = .331, \eta^2 = .006$), while in the PP approach, the difference was marginally significant ($F[1, 118] = .374, p = .055, \eta^2 = .031$), with an observed power of .48. Between T1 and T2 (follow-up), in the IG, the level of self-esteem remained consistent, no significant differences being observed ($t[55] = .91, p = .366$). In the WLG from T1 to T2, after the SGP, the level of self-esteem did not significantly change ($t[25] = 1.26, p = .221$). Therefore, participating in the SGP had a marginally significant effect on self-esteem, only among the participants who completed

the programme. The probability of committing type I error by accepting this hypothesis is high; therefore, this result should be considered with caution and replicated in future studies.

Still testing Hypothesis 3, on the mediating role of self-esteem between participating in the SGP and SWB, we ran a simple mediation analysis, using model 4 of PROCESS. Analyses were carried out defining condition (IG vs. WLJ) as an independent variable; measures of life satisfaction, positive affect and negative affect, at T1, separately as outcomes, and self-esteem at T1, as moderator, including the same measures at T0 (life satisfaction, positive affect and negative affect and self-esteem) as covariates (see Figure 1, models A to C). No statistically significant mediating effect of self-esteem was observed on each of the SWB variables. Participation in the SGP showed a direct effect on positive affect ($\beta = .012$, $p = .004$) but not on life satisfaction ($\beta = .003$, $p = .560$) nor on negative affect ($\beta = -.003$, $p = .432$). An indirect effect of self-esteem on the participants' negative affect ($\beta = -.25$, $p = .035$) and positive affect ($\beta = .28$, $p = .014$) was observed, but not on life satisfaction ($\beta = .001$, $p = .992$). Thus, the mediating role of self-esteem was not confirmed in any of the SWB indicators, leading to reject Hypothesis 3.

Finally, to test Hypothesis 4, on the mediating role of SISG between participating in the SGP and ScWB, three models were defined with participation in the SGP (number of sessions attended) as an independent variable, ScWB, SII and loneliness, at T1, separately as outcome variables, and SISG measured, at T1, as a mediator, including the same variables (ScWB, SII and loneliness), at T0, as covariates (Figure 1, models D to F). SISG was measured only in the IG ($n = 89$) at T1. The results showed that SISG did not show a significant mediating effect between participation in SGP and changes in ScWB, loneliness or SII, rejecting Hypothesis 4. However, a direct effect of participation in the SGP on SISG was observed in the three models.

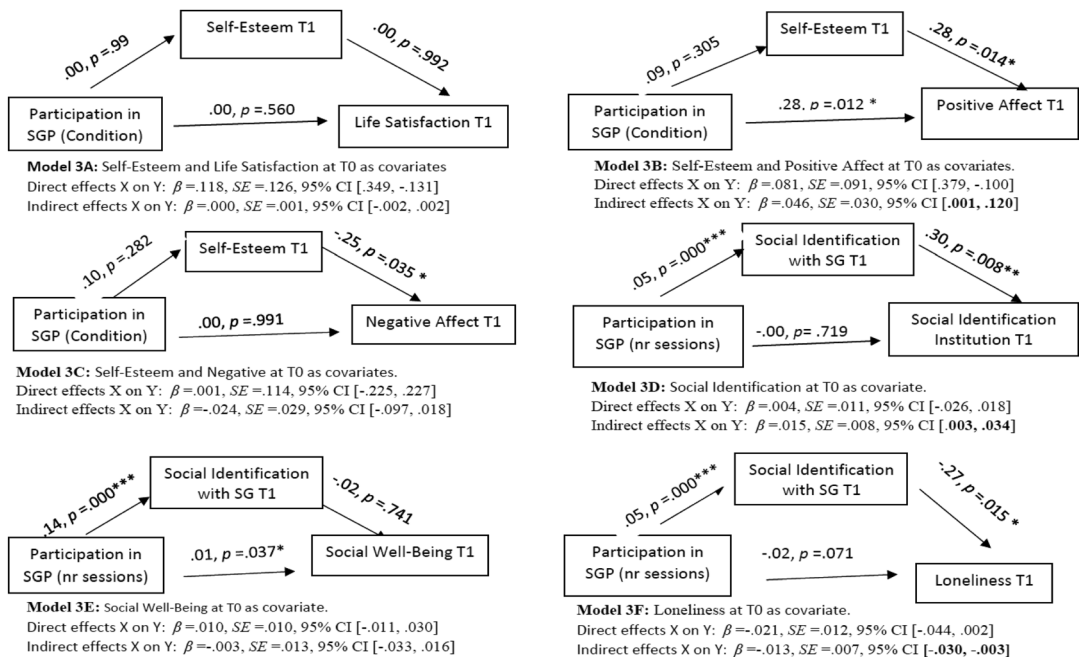


FIGURE 1 Mediation model 4 process 3.3. Participation in SGP on SWB variables, ScWB, SII and loneliness, mediated by self-esteem and SISG

Furthermore, an indirect effect of SISG on SII ($\beta = .299$, $p = .008$) and on loneliness ($\beta = -.272$, $p = .015$) was also observed, suggesting that SISG predicts higher SII and lower loneliness.

DISCUSSION

The literature reports evidence on the psychological and social benefits of SGPs for older adults, which can constitute a pleasurable and cost-effective strategy to improve the SWB and ScWB of older adults and their associated health benefits. However, to propose a wider implementation of SGPs for older adults, more scientific results with controlled validity for a variety of older adults are necessary.

In this RCT, a structured SGP with 34 sessions for older adults from a social care institution was implemented and tested. The results confirmed that participation in this SGP had a significant robust effect on the positive affect of the participants, which was sustained in the follow-up, 6 months after the SGP. These results are in line with the quasi-experimental study of Stewart and Lonsdale (2016) that compared choral singers ($n = 175$) with solo singers ($n = 175$) and team sports players ($n = 175$) of younger and older adults (between 18 and 78 years old). They found that choral singers and team sports players reported significantly higher levels of hedonic and eudemonic well-being than solo singers, suggesting that membership in a choral singing group may have a more important influence on well-being than solo singing. Also, the RCT by Pires et al. (2017), with a small sample ($n = 30$) and a short duration SGP, showed a significant decrease in negative affect in the singing group, which was sustained in the follow up. In the study of Creech et al. (2013), it compared two groups of older adults, 398 singing and playing instruments, and 102 doing yoga and social club activities. In the music intervention group the SWB was higher, and it was underpinned by a sense of purpose, feeling in control and receiving validation through social relationships. Thus, our results corroborate previous literature that shows positive effects of SGPs on the emotional dimension of SWB of participants.

Regarding the cognitive component of SWB from T0 to T1, decreases in life satisfaction were observed in both the IG and WLG. The decrease in life satisfaction after the SGP was smaller in the IG, although not significantly different from WLG. These results are also consistent with the Pires et al. (2017) study, where a decrease in life satisfaction was observed in both experimental and control groups and no significant differences between the groups found. Life satisfaction is a more stable variable than the emotional component of SWB, which is probably more prone to fluctuation. However, in the descriptive study of Ardahan (2018) and Cuypers et al. (2011), an association between participating in singing activities and an increase in life satisfaction was observed. Ardahan (2018) compared a sample of 372 nonprofessional older adult choir singers and 296 older adults who had never participated in a choir before and a significant difference in life satisfaction was higher in the singers' group. The Cuypers et al. (2011) study with a sample of 5,080 Norwegian adults (aged 20 to 80) found that creative cultural activities (i.e., singing, music and theatre) were significantly associated with increased life satisfaction in women, although not in men. Neither of those studies were RCTs and participants in both studies were younger and had higher education levels, compared to our sample, which may partly explain the different results in terms of life satisfaction.

Regarding the qualitative results in this study, the most reported benefits for participating in the SGP were the benefits in emotional well-being (with 50% responding feeling 'good' or 'better', forgetting problems, etc). Thus, there is a clear convergence with the quantitative results of

a significant effect of the SGP on the positive affect of the participants. This result is also in line with the benefits for well-being found by Skingley and Bungay (2010) in a qualitative cross-sectional study with older adults attending the Silver Song Clubs SGP (12 women and 5 men, mean age of 77). Therefore, Hypothesis 1 is partially confirmed, with evident benefits of the SGP on the emotional dimension of SWB, supported by both the quantitative and qualitative analyses.

The second hypothesis of this study posited that participating in the SGP improves the social integration of participants, increasing ScWB and SII and decreasing loneliness. Results showed a significant effect of participating in the Sing4Health programme on the ScWB of the participants who completed the programme, and the effect was sustained in the follow-up, 6 months after the programme's end. However, these results were only observed when the PP approach (comparing the completers of 75% of the sessions with the other participants) was used. In relation to SII, results did not show a significant effect from participating in the SGP. Loneliness in turn significantly decreased in both groups, from T0 to T1. Although a significant reduction in loneliness in the IG, between T0 and T1, was observed and sustained in the follow-up it was not significantly different from the WLG. Therefore, we cannot confirm if these results are the consequence of the enrollment and expectation of participating in the SGP or of another external factor. These results are in line with those of Cohen et al. (2006), who found a reduction in loneliness among the participants of artistic activities, including singing groups, after a 12-month intervention. In an RCT by Mathew et al. (2017), with 80 institutionalised older women, aged 65 or older with mild depression, the effect of daily group singing therapy on loneliness was significant compared to the control group after a 3-week intervention.

Very few quantitative results on the social benefits of SGPs were available in the literature. Consequently, this study contributes with quantitative positive results of a short-duration SGP on the ScWB of vulnerable older adults from a SCI. Moreover, the content analysis of the interviews further corroborated the quantitative results. The second most reported category of benefits from the SGP were the social benefits. This category, reported by 31% of the participants, included responses such as an increase in socialising, meeting new people, participating in activities and projects, going out and communicating. These results are in line with several qualitative studies. Bailey and Davidson (2002), for example, interviewed homeless men taking part in a singing group and found improvements in social interaction skills. Creech et al. (2013) found an increase in positive social relationships among older adults playing music in groups. Solé et al. (2010), in a quasi-experimental study with older adults, participating in three music programmes (choir $n = 52$, music appreciation $n = 12$ and music therapy $n = 14$), found no significant effects in terms of life satisfaction; however, participants reported feeling involved in the programmes, improving social relations and making more friends. Also, in the qualitative analysis of Pires et al. (2017), social benefits were the most reported by 38.4% of the participants of SGP and included categories such as social involvement, socialising and supporting each other. Likewise, in the study of Pérez-Aldeguer and Leganés (2014), improvements in positive relationships are reported by older adult female choristers ($n = 496$). Finally, Petrovsky et al. (2020) highlighted two subthemes from interviews with SGP participants: a 'joyful time together' and 'an uplifting experience performing for others'.

In this study, SISG did not play a mediating role in the effect of the SGP on the participants' ScWB, SII or loneliness. However, SGP participation was associated with the SISG that predicted the increase of SII and the decrease of loneliness. We did not find previous quantitative studies that tested the mediating role of SISG between participating in SGPs and other outcome variables, to compare our results. Consequently, this is a novel empirical contribution to

the literature supporting the social identity theory that group membership identification is associated with other social benefits in older adults, such as the reduction of loneliness and an increase in social identification with other groups (Cameron et al., 2018; Dingle et al., 2019; Inoue et al., 2019). Similarly, in the qualitative study of Lamont et al. (2018), SISG was reported by older adult choir members for a period of 4 years, and its members also expressed an increase in their sense of community and social connection. Participants in the Sing4Health programme also highlighted social benefits, with new relationships within the singing group, being the second most reported benefit in the interviews. However, they did not report higher social identification in the day-care centres, outside of the singing group context.

Among the several explanations for the hypothesised direct impact of the SGP on the SII and loneliness of participants not being observed is probably due to the short duration of the intervention, the characteristics of the participants and of the contexts they belong to. The sample of this study was mainly composed of older adults of an advanced age, with low socio-educative status. These participants did not take the initiative to enrol in the SGP, mostly are day-care centre users (79,2%) of a SCI, where social participation and new relationships are somewhat limited. Although the SISG of the participants was high and predicted SII, a short-term intervention of 4 months may not be sufficient to consolidate social integration within the singing group context and further transfer it to the day-care centres which they belong to. Also, the characteristics of our sample, vulnerable older adults with mobility restrictions and diagnosed health conditions, may lessen the effects of the SGP on the SII. These are important results to take into consideration in future SGP for this population, which has been infrequently studied in SGP studies. Although positive ScWB results were observed, future studies should further test the effects of longer SGPs on social integration variables such as loneliness and social identification beyond the SG. ScWB and loneliness are also being tested as mediators of the effects of the Sing4Health programme on the cognitive function of the participants in another article of this study (anonymous, et al., 2020).

Self-esteem marginally significantly improved for the completers of the Sing4Health programme. Results were not significant when using an ITT approach. The qualitative results did not support an increase in self-esteem after participation in the SGP, as only eight of the participants reported feeling pride as a benefit of the SGP, and no other categories related to self-esteem were reported. Therefore, the statistical validity of this result is weak and needs further testing. Two previous qualitative studies on singing groups found reports of self-esteem improvement in older adults after participating in SGPs (Bailey & Davidson, 2002; Lally, 2009). In turn, the role of self-esteem as a mediator of the effects of singing group participation on the SWB of the participants was tested and not observed. The increase in self-esteem during the SGP, however, predicted a decrease in negative affect and an increase in positive affect. These results are in line with previous evidence of an association between self-esteem and SWB in older adults (Hajek & König, 2019; Yang & Wen, 2019), and also with Ryff's (1989) proposal of self-acceptance as the most recurrent criteria of well-being.

Although the observed evidence of an effect of the SGP on the self-esteem of the participants is weak, some guidelines for further promoting self-esteem in this population may be important in designing future studies. It is plausible that for some of the participants of our study, the difficulty level of the programme was a challenge. Having to follow lyrics and memorise entrances, in a big singing group, with little individualised support, may be a difficult task for the more vulnerable old-aged participants with a low educational level and concomitant cognitive deficits, limiting their feelings of personal achievement. Future SGPs for vulnerable

older adults should adjust the objectives of the programme, the size of the groups and the availability of individualised support according to the characteristics of the participants in the singing groups.

In summary, in this RCT with a mixed-method design, quantitative and qualitative results indicate that singing groups gather two important factors that account for the results in SWB and ScWB. On the one hand, being a group activity, individuals work together towards a common goal, harmonising their voices, and coordinating musical parts and vocal arrangements, they socialise and establish new relationships, thus producing social identification with the group. On the other hand, singing songs and melodies with meaningful lyrics, is a pleasurable activity, particularly linked to the expression and regulation of emotions.

Concerning the theoretical implications of the results, the effects of the SGP on the SWB and ScWB of older adults from day-care centres are in line with two models of well-being and successful ageing: (1) the Seligman's PERMA model, which poses positive emotions, engagement, social relationships and accomplishments as critical aspects of adults' global well-being (Seligman, 2011), and (2) the Rowe and Kahn (1997) model of successful ageing, proposing the maintenance of physical and cognitive function and sustained engagement in social and productive activities as important components of older adults' well-being. Therefore, multicomponent SGPs, such as the Sing4Health programme, are enjoyable strategies able to attract older adults from day-care centres to develop and improve these central aspects of SWB.

Limitations in the implementation of the group-dynamic exercises of the social component of the SGP may have hindered some positive results. Group-dynamic activities are developed in pairs, aimed at promoting a connection between the group members (for example, one participant imitates [mirrors] the moves of the other; one shares memories with the other, who then transmits it to the group; one writes down 'wishes' as Christmas gifts for the others). The group-dynamic exercises that were planned for the initial 15 min of each session, along with the physical exercises and warmup, were not implemented with as many exercises as initially planned. The intervention team, mainly composed of musicians, tended to shorten this part of the session, and focused more on the singing component, attributing more importance to the technical part of the choir and less to the group-dynamic exercises. Another limitation of the study, implemented in a natural context, concerns the difficulty in standardising the activities of the WLG. The fact that participants in the WLG enrolled in a variety of structured and non-structured activities includes a diversity of experiences that makes it more difficult to interpret the results comparing the IG and the WLG.

CONCLUSION

Participating in the Sing4Health programme had robust effects on the positive affect of the older adults, which was sustained for 6 months after the intervention. Participating in the SGP also showed a significant effect on ScWB and a marginally significant effect on the self-esteem for the completers of 75% of the SGP sessions, which were sustained in the follow-up. Loneliness decreased in both groups. It is not possible to conclude whether it was an effect of enrolling in the intervention study or due to a variable external to the study. Satisfaction with life, negative affect, and SII did not reveal significant effects from the SGP.

Mediation roles of SISG and self-esteem were not significant. However, SGP was associated with higher SISG that predicted the increase of SII and the decrease of loneliness. Moreover,

during the SGP the increase in self-esteem predicted the increase of positive affect and the decrease in negative.

The sample of the study was mainly composed of elderly day-care centre users with low educational and socioeconomic status, with diagnosed health conditions, and where the enrollment in the SGP was not their own initiative. The rarity of previous studies on SGPs in this target population adds value to the current findings. This study provides controlled quantitative and qualitative evidence of the efficacy of SGPs for increasing the SWB and ScWB of vulnerable older adults, compared to their usual activities developed in day-care centres, validating its wider implementation for this target group. The marginally significant effect of self-esteem should be considered with caution, requiring further testing.

More studies on the effects of SGPs for vulnerable older adults from SCIs are needed to test the consistency of the results. Longer SGPs, with smaller groups of participants, more individualised support, and tailor-made objectives to the characteristics of the sample may increase the benefits of the programme for this population.

ACKNOWLEDGEMENTS

We thank all the partners and collaborators in this project: Anabela Pires (Singer) and João Frizza (Singer) for the artistic direction of the intervention; Sérgio Fontão (Maestro) and Pedro Baião (Pianist) for the singing group intervention implementation; Maria D'Assis Ribamar and Alexandra Rodrigues from the Santa Casa da Misericórdia of Almada and Etelvina Ferreira, Neusa Freixinho and Maria Teresa Barata from the Santa Casa da Misericórdia of Lisboa for the promotion and logistics support of the intervention and for the recruitment, contacts, transportation and support of the participants and the City of Almada and the OPART TNSC (National Opera House) for providing theatres and rehearsal rooms.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICAL STATEMENT

The study protocols were approved by an Ethics Committee.

DATA AVAILABILITY STATEMENT

Data are available on request from the authors. The database of the study is available online (at <https://www.dropbox.com/t/7JiRIXSiI31BgrZo>).

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How to cite this article: Galinha, I. C., Garcia-Martín, M. Á., & Lima, M. L. (2021). Sing4Health: Randomised controlled trial of the effects of a singing group program on the subjective and social well-being of older adults. *Applied Psychology: Health and Well-Being*, 1–20. <https://doi.org/10.1111/aphw.12297>