

# Cultural Participation and Health: A Randomized Controlled Trial Among Medical Care Staff

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**Objective:** Population studies demonstrate that attending cultural events is conducive to improved health when baseline health, income, education, and health habits are taken into account. Animal experiments suggest possible mechanisms. We studied the link in humans between attending cultural events and health in a randomized controlled trial. **Methods:** Members of the local government officers' union in the health services in Umeå, Sweden, were invited to the experiment and 101 people registered for fine arts visits once a week for 8 weeks. They chose films, concerts, or art exhibitions visits, or singing in a choir and were then randomized into 51 cases, starting at once, and 50 controls starting after the trial. Health was assessed before randomization and after the experimental period using the instrument for perceived health, short form (SF)-36, and tests of episodic memory, saliva-cortisol and immunoglobulin. The results were analyzed using a mixed design analysis of variance. **Results:** The SF-36 Composite Score called physical health improved in the intervention group and decreased among controls during the experiment ( $F(1,87) = 7.06, p = .009$ ). The individual factor of the SF-36 called social functioning, improved more in the intervention group than among controls ( $F(1,98) = 8.11, p = .005$ ) as well as the factor vitality ( $F(1,98) = 5.26, p = .024$ ). The six other factors and the Mental Health Composite Score, episodic memory, cortisol and immunoglobulin levels did not change otherwise than among controls. Mechanisms are left to be identified. **Conclusion:** Fine arts stimulations improved perceived physical health, social functioning, and vitality. **Key words:** environmental enrichment, cultural participation, choral singing, music, art, film.

ANOVA = analysis of variance; SF-36 = short form-36 questions; IgA = Immunoglobulin A; ELISA = enzyme-linked immunoabsorbent assay; BCA = bicinchoninic acid.

## INTRODUCTION

To participate in the cultural life and enjoy the arts is a basic human right in itself covered in the Chapter 27 of the UN declaration and part of the social resilience in a sustainable development (1). Furthermore, this enjoyment has been found to be conducive to health maintenance (2), and with prolonged survival in population studies (3). Human experiments indicate a causal link between art experience and health (4) and from emotional writing to improvement of the immune system (5). Music therapy, dance therapy, art therapy (6), in combination with psychodrama and sociodrama (7), has been found useful in medical care.

The explanations for the health effects of cultural participation are discussed in many areas of research. The philosophical discourse on the experience of art is controversial. The esthetic experiences are seen as a means for the individual to reach homeostasis with the environment in parallel with the use of plays, games, and with daily activities (8), but any use of art for

purposes other than the experience of art in itself, are often challenged (9).

The biologic and psychological approach to effects of art is concerned with changes in brain structure and function creating a cognitive reserve (10). Synaptogenic and neurogenic effects in the hippocampus region, an important center for the episodic memory and for general mood (11), and corticoid receptor gene expressions in the hypothalamus, important for modulation of the hypothalamo-pituitary-adrenal axis influencing levels of depression, and important for general homeostasis, are seen after environmental enrichment in rodents (12). After the effects of art stimulation on the central nervous system and neurotransmitters, a possible immune system response may be mediated via the innervations of lymphoid organs, or via the neurotransmitters released at the peripheral junctions influencing lymphocytes, macrophages, and granulocytes to counteract infection (13), and aberrant immune reactions (14).

In the psychological discourse, the ability to express or gain insights regarding emotion is important to health (15). The perception of works of art furthermore includes fantasies in a socially accepted form (16). Experiencing fine arts might promote well-being in instances of low levels of attention or excitement (17). The tension reduction theory states that art produces a tension that absorbs general tensions in the spectator (16). According to the communication theory, the presentational symbols used in the art are more effective in making feelings understandable than discursive symbols like words and figures (17).

A causal effect on health by cultural participation was plausible. We carried out a randomized controlled trial to study the possible effects on health dimensions by fine arts stimulation in an ordinary workplace setting.

## METHODS

### Participants

The 998 members of the local government officer's union in the health services of the Umeå district in Sweden, most of them women, were invited

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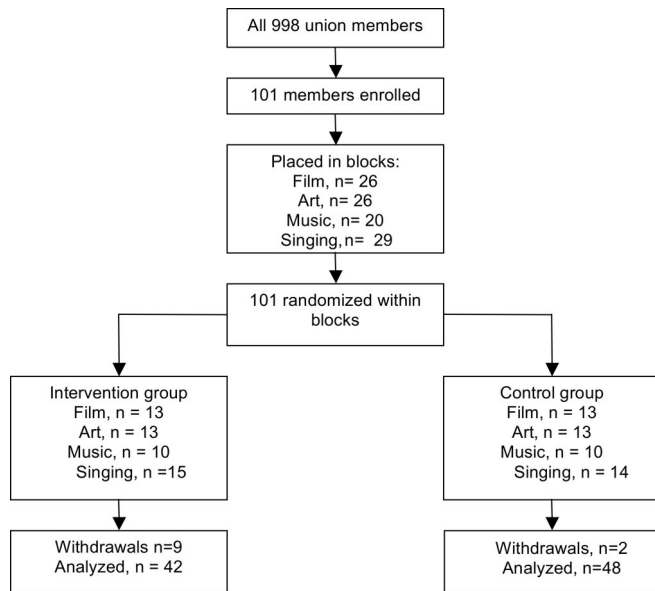


Figure 1. Trial profile.

by their union (Swedish acronym SKTF) in spring 2003 to participate in the experiment. The union represented nearly all secretaries, assistants, and middle level administrators in the health services. They were a homogeneous group of employees as to age, sex, profession, educational level, and habitual cultural participation. All members were presented with the options of singing in a choir, or enjoying films, concerts or art exhibitions once a week for 8 weeks, at no cost. Out of anticipated enrollment, anticipated effects, accepted significance level and the size of the case and control groups, the power of tests was expected to be sufficient. The expectations were 5% to 6% enrollment, one third of the effects found in an earlier cohort study of ours (3), an equal size of the case and control groups and a significance level less than

0.05. All participants gave their written and informed consent. The protocol was approved and notified by the public ethical committee.

### Procedure

Each of the participants, who accepted the invitation ( $n = 101$ ), was first asked to rank the four offered activities in order of preference. Rankings were matched against the group sizes and participants were allocated to one activity by two of the researchers (A.-B.K., L.O.B.), blinded to test results (Figure 1). Within each activity group they were then randomized by one of us (L.O.B.), blinded, into cases ( $n = 51$ ) and controls ( $n = 50$ ). The cases were offered one session per week from the end of May to the end of August with a pause during July and the beginning of August, when weekends and vacations often were spent in summer residencies. The spontaneous cultural participation was registered. Nothing exceptional for the setting occurred during the experiment. Life events of importance to the participants were registered. The controls were offered participation in fine arts activities after the experiment. In a typical film, music or art session, participants were invited to meet an expert who had chosen the piece of art and introduced the event for 15 to 30 minutes. They then attended the session and had a brief talk afterward. Those who chose choral singing were trained for 2 hours.

The main test instrument was the health questionnaire short form (SF)-36, which is widely used, translated into Swedish and tested on normal population samples (18). Its validity in testing people, like those in our experiment, was deemed high considering earlier uses of the instrument. We followed the instructions carefully and tested its internal consistence at pre- and posttest. Its eight factors are called physical functioning, role physical (i.e., limitations imposed on work or other activities), bodily pain, general health (perceived), vitality, social functioning, role emotional (i.e., limitations imposed on work or other activities), and mental health. The first four factors are combined into a Physical Component Score, based then on 20 questions covering perceived general health, bodily pain, functioning in walking, lifting, climbing, and physical impairments interfering with roles in work or other activities. The other four factors are combined into a Mental Component Score. The factor vitality described the participants energy and how full of life, worn out, and tired they were. The factor social functioning described the interference of

TABLE 1. Baseline Characteristics of Study Population

	Intervention Group ( $n = 51$ )		Control Group ( $n = 50$ )		<i>p</i>
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	
Age	51	49.8	50	50.4	.77
Gender (women/men)	51	49/2	50	45/5	.43
Attained education <sup>a</sup>	42	4/33/5	48	6/32/10	.43
Cultural participation <sup>b</sup>					
Theater, concerts	40	10/30	48	19/29	.15
Art exhibitions	41	16/25	46	17/29	.84
Making music	38	24/14	48	35/13	.94
Physical Component Score	49	47.2 (10.0)	47	51.0 (8.7)	.21
Physical functioning	51	88.8 (13.7)	49	89.8 (15.2)	.84
Role—physical	50	76.5 (35.5)	49	80.6 (34.3)	.56
Bodily pain	51	63.3 (25.5)	49	71.2 (24.6)	.56
General health	49	71.4 (19.1)	48	73.4 (20.4)	.93
Mental Component Score	49	47.8 (8.8)	47	44.3 (12.6)	.28
Vitality	51	57.8 (21.4)	49	59.6 (21.3)	.77
Social functioning	51	80.2 (21.4)	49	81.1 (23.1)	.63
Role—emotional	51	88.2 (25.7)	48	76.4 (38.3)	.07
Mental health	51	78.1 (11.7)	49	73.4 (19.1)	.30
Episodic Memory Score	51	5.71 (3.05)	49	6.29 (3.88)	.64
Salivary Cortisol, nmol/l <sup>c</sup>	41	18.1 (8.7)	40	14.3 (5.9)	.12
Salivary IgA/protein ratio <sup>c</sup>	39	12.5 (6.9)	37	16.4 (10.3)	.11

<sup>a</sup> Basic/upper secondary school/university training.

<sup>b</sup> Never/at least ones per year.

<sup>c</sup> Geometric mean.

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health problems with activities with family, friends, neighbors, and groups. The eight factors and the two component scores were used as continuous variables (19). They reflected positive health (including the factor bodily pain). The higher the point, the better the health. The episodic memory was tested to study possible change in the hippocampus, which in rodents changes with environmental stimulation (11). The center is important as well for general mood (12). The memory was challenged with a test combining names with faces. Images of faces were first exposed with their first names for 5 seconds twice, and then exposed without names after 10 minutes of distraction with another task (20). The tests were performed by one of us (A.-B.K.) in a classroom setting at baseline before allocation, and at the end of the experimental period in August. Saliva was drawn at home 30 minutes after awakening for a single cortisol analysis, and in the afternoon for analysis of immunoglobulin (IgA) and total saliva protein levels. Saliva-cortisol was analyzed at the department of Clinical Chemistry, the University Hospital, Umeå, Sweden. Saliva IgA was analyzed by enzyme-linked immunosorbent assay at the department of Clinical Immunology, Karolinska University Hospital, Huddinge, Sweden, where also the saliva protein content was measured with the bicinchononic acid-200 protein assay kit (Pierce Chemical Company).

### Statistical Analysis

The outcomes were subject to analysis of variance (ANOVA) for a mixed model with the factors time and treatment as fixed factors, and subjects within treatment as random factor (21). The residuals were studied with respect to normality and, if necessary, transformation was carried out. Interactions between kinds of treatment and outcomes were tested in ANOVAs. Chi-square and *t* tests were used for nonparametric and parametric distributions. The internal reliability was tested with Cronbachs alpha. The program used was Minitab 14 (Minitab Inc., State College, PA).

## RESULTS

### Baseline and the Experimental Phase

After withdrawals, 42 cases remained, 40 women and 2 men, aged 48.6 years on average. The remaining controls numbered 48, 45 were women and 3 men, with a mean age of 49.3 years. The majority of both cases and controls, 39 and 42, respectively, had completed upper-secondary school, and 5 cases and 10 controls had some university training. There were no significant differences in any background characteristic known to us between the groups (Table 1), or between participants and withdrawals. The cases were present at 7.02 of the eight offered sessions at an average. A sensitivity analysis, where changes among withdrawals were set to zero, produced the same significant effects (data not shown). The SF-36 factors, except the factor general health, had a Cronbachs alpha above 0.81 at baseline, and above 0.81 at posttest. Life events of importance to the cases occurred for six of the cases and for six of the controls. During the summer break, eight cases and six controls went to a cinema ( $p = .449$ ), nine cases and eight controls went to an art gallery ( $p = .6409$ ), and 16 cases and 14 controls went to a live music event ( $p = .551$ ). Singing or playing an instrument, 6 cases and 11 controls had carried out ( $p = .252$ ).

### Health Changes

Health change during the experiment in the intervention group was different from the changes in the control group as to the overall Physical Component Score ( $F(1,87) = 7.06, p = .009$ ). In the ANOVA, there was no change with treatment and no change with time but an interaction effect (Table 2). The score of the intervention group improved from 47.2 to 49.5 whereas the score of the controls decreased from 51.0 to 49.8

**TABLE 2. Individual ANOVA Tables Calculated for the Physical Component Score, the Mental Health Component Score, and for the Six Underlying Factors**

Source of Variation	DF	Adjusted MS	F	<i>p</i>
<b>Physical Component Score</b>				
Treatment	1	224.0	1.65	.202
Time	1	12.5	0.63	.429
Treatment time*	1	139.9	7.06	.009
<b>Physical functioning</b>				
Treatment	1	2.1	0.01	.937
Time	1	170.3	1.50	.224
Treatment time*	1	26.9	0.57	.451
<b>Role physical</b>				
Treatment	1	0.5	0.00	.986
Time	1	619.9	1.35	.249
Time treatment*	1	619.9	1.35	.249
<b>Bodily pain (less)</b>				
Treatment	1	910.3	1.04	.311
Time	1	1901.0	7.56	.007
Treatment time*	1	561.5	2.23	.139
<b>General health</b>				
Treatment	1	4.2	0.01	.932
Time	1	747.0	8.72	.004
Treatment time*	1	302.7	3.53	.063
<b>Mental Component Score</b>				
Treatment	1	597.5	3.74	.056
Time	1	596.5	12.58	.001
Treatment time*	1	3.2	0.07	.796
<b>Vitality</b>				
Treatment	1	259.2	0.38	.540
Time	1	2574.3	17.25	<.001
Treatment time*	1	785.1	5.26	.024
<b>Social functioning</b>				
Treatment	1	1204.6	2.21	.141
Time (prepost)	1	3706.2	17.57	<.001
Treatment time*	1	1710.2	8.11	.005
<b>Role emotional</b>				
Treatment	1	3510.3	2.69	.104
Time	1	1154.8	1.96	.164
Treatment time*	1	357.8	0.61	.437
<b>Mental health</b>				
Treatment	1	924.9	2.48	.119
Time	1	1040.4	12.23	.001
Time treatment*	1	3.9	0.05	.832

Treatment = participation in choral singing or film, concert or art museum sessions; Time = levels at baseline and follow-up.

\* No time by self-selected kind of treatment interaction was found.

(Tables 1 and 3). The net change difference was 3.55 points (7.5%). The corresponding overall Mental Health Component Score did not change differently in the groups but two of the factors underlying it, vitality and social functioning improved more in the intervention group (Figure 2 and Table 3). The score for vitality in the intervention group improved from 57.8 to 68.4 against an improvement among controls from 59.6 to 62.9 ( $F(1,98) = 5.26, p = .024$ ) (Table 3). The net difference in change was 8.2 points or 14% (Tables 1 and 2). The score for social functioning improved from 80.2 to 91.8 in the intervention group and improved from 81.1 to 84.4 among controls ( $F(1,98) = 8.11, p = .005$ ) (Table 3). The change differed between cases and controls by 12.1 points and the net improve-

TABLE 3. Changes in Participants SF-36 Characteristics During the Intervention, Mean, and SD

	Intervention Group ( <i>n</i> = 51)		Control Group ( <i>n</i> = 50)	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Physical Component Score	43	2.31 (6.67)	46	-1.24 (5.92)
Physical functioning	45	-0.47 (7.62)	48	-1.99 (11.29)
Role—physical	44	7.39 (30.30)	47	0.00 (30.40)
Bodily pain	44	9.93 (23.62)	48	2.94 (21.26)
General health	43	6.67(14.43)	47	1.48 (11.73)
Mental Component Score	43	3.93 (8.12)	46	3.40 (11.03)
Vitality	45	11.56 (19.71)	48	3.33 (14.64)
Social functioning	45	15.00 (21.09)	48	2.86 (20.01)
Role—emotional	45	2.22 (7.80)	47	7.80 (38.20)
Mental health	45	4.44 (12.48)	48	5.02 (13.55)

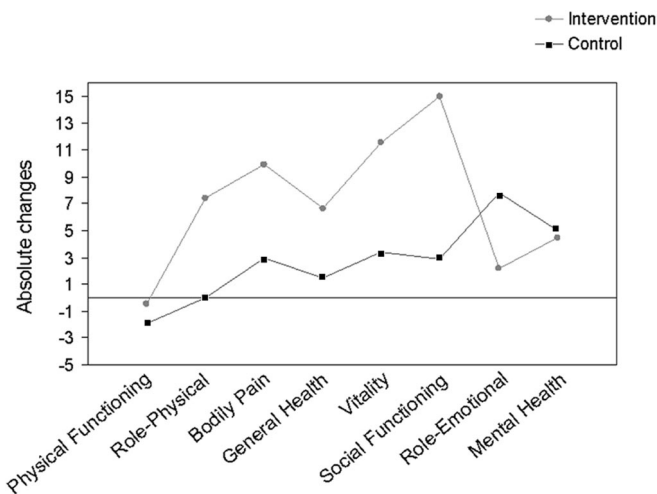
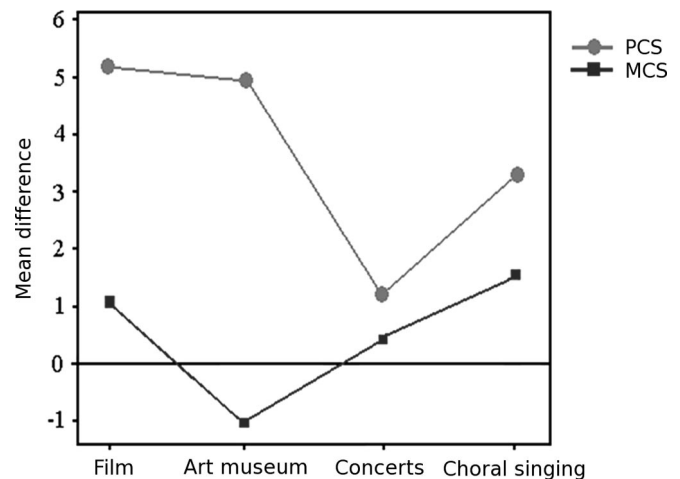


Figure 2. Absolute changes of the eight factors of SF-36 by intervention and control groups. Vitality and social functioning changed significantly different.

ment was 14% (Tables 1 and 2). The six other factors, the face recognition, cortisol level, and the immunoglobulin level did not change differently among cases and controls. The IgA share of the total protein level in the saliva, however, had a slight tendency to differ between them ( $F(1,76) = 3.01, p = .089$ ). No interaction effects were found between intervention/control group and the self-selected subgroup activities (Figure 3).

## DISCUSSION

We found that fine art stimulation promoted perceived physical health, social functioning, and vitality. The participants and all involved in the action were, however, not blinded, but aware of aims of the experiment. The attention from the intervention toward the cases and controls was equal only at the start and at the end. The controls had to wait for the fall activities, which could have been a disappointment for some. Perceived health did not, however, decrease for the control group as a whole. Some who intended to take part in the experiment withdrew, but the analysis of their characteristics and the sensitivity test did not change the interpretations of the results. The participants were most of them ordinary healthy female secretaries and assistants appreciating the offer to participate in the trial. This lessens the

Figure 3. Mean difference (before/after), between cases and controls, of the Physical Component Score and the Mental Component Score of SF-36 by kind of self-selected activity (choral singing, visiting films, concerts, and art gallery) ( $p > .05$  for all, and no interactions).

general application of findings. The demographic data, the habitual cultural activities before the randomized controlled trial, and all other background factors known to us did not differ between cases and controls. The circumstances were unchanged between pre- and posttest except for the season. The percentages of cases and controls reporting life events of importance to them were small and equal. The seasonal effects and the pause of offered sessions in July to August, a necessity in the setting, were under our control. People had enjoyed some cultural events on their own during the pause, similarly among cases and controls. The difference in cultural stimulation between cases and controls mainly came from the sessions with fine arts, chosen and introduced by our experts. Anyway, the extracultural outlet experienced during summer might be a methodologic limitation and a bias toward zero. There was no interchange between groups and interaction between cases and controls were unlikely as they were spread all over the health services. No interaction was found with the kind of cultural stimulation. The internal consistencies measured with Cronbachs alpha were high both at pre- and posttest for all but the factor general health. No interactions with subgroups were found.



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The effects were less than expected out of our population study but the stimulation lasted only 8 weeks compared with the 9-year follow-up in the population study, and large standard deviations may explain the many null effects. A hypothalamic-pituitary-adrenal activity decline was expected, and consequently an influence on the saliva–cortisol, which was not found. This undermines such an explanation of the improvement of the mental health factors vitality and social functioning. The saliva–cortisol level, however, has large normal night and day variation. It was tested only in the morning and still could have been affected if tested during the day and evening. The immune system had a tendency to be influenced ( $F(1,76) = 3.01, p = .089$ ), despite attrition and test with one globulin only. The lack of effects on the laboratory tests might undermine the argument of causal effects but the SF-36 was probably more to the point at least as to physical health (lifting, climbing, bending, walking more than one mile etc). The saliva was drawn by the participant at home, sent to the hospital with varying delay, under much less control than our testing with SF-36. The subjective measurements were more valid. In future studies, more elaborate tests of immunity and stress, and tests, e.g., of oxytocin and proinflammatory cytokines are warranted.

The social functioning increased, i.e., physical and mental complaints influenced less on the participants family and other contacts. The mechanism behind all effects of environmental enrichment in fact could be the social interaction, the social support, and the social desirability influence on the tests. The influence of art experiences are often paralleled with plays, games, and daily activities (8). Much research, however, indicates an effect from fine arts per se. In a study, where the social interaction were the same for cases and controls but the stimulation was either physical exercise or fine arts stimulation, health effects were found for both but, importantly, they differed in kind. The participants in the physical exercise activities experienced improved blood lipids and those attending cultural events got lower stress level indicators (22). In animal research, where social and environmental stimulations can be separated, environmental enrichment promotes hippocampal-neocortical pathways but social interaction promotes prefrontal cortico-striatal pathways (23,24). There might perhaps be similar human different effects on the brain from stimulation by the social interactions versus fine arts per se. For practical reasons, the separation of the social and fine arts stimulation effects could be of minor importance, but human experiments designed to test an effect per se of fine arts on health are warranted.

In conclusion, the experiment adds to the findings in population studies that fine arts stimulations might be important for health. It is unique, in its design and workplace setting, for the research on effects of fine arts on health. Significant improvements in three aspects of perceived health were found. There are many candidate mechanisms for it to be considered in future studies.

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