



Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: the HUNT study, Norway

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ABSTRACT

Background Cultural participation has been used both in governmental health policies and as medical therapy, based on the assumption that cultural activities will improve health. Previous population studies and a human intervention study have shown that religious, social and cultural activities predict increased survival rate. The aim of this study was to analyse the association between cultural activity and perceived health, anxiety, depression and satisfaction with life in both genders.

Methods The study is based on the third population-based Nord-Trøndelag Health Study (2006–2008), including 50 797 adult participants from Nord-Trøndelag County, Norway. Data on cultural activities, both receptive and creative, perceived health, anxiety, depression and satisfaction with life were collected by comprehensive questionnaires.

Results The logistic regression models, adjusted for relevant cofactors, show that participation in receptive and creative cultural activities was significantly associated with good health, good satisfaction with life, low anxiety and depression scores in both genders. Especially in men, attending receptive, rather than creative, cultural activities was more strongly associated with all health-related outcomes. Statistically significant associations between several single receptive, creative cultural activities and the health-related outcome variables were revealed.

Conclusion This population-based study suggests gender-dependent associations between cultural participation and perceived health, anxiety, depression and satisfaction with life. The results support hypotheses on the effect of cultural activities in health promotion and healthcare, but further longitudinal and experimental studies are warranted to establish a reliable cause–effect relationship.

INTRODUCTION

Previous population studies^{1–3} and a human intervention study⁴ have shown that religious, social and cultural activities predict increased survival rate and good health.⁵

A challenge for research is the inconsistent concept of culture. Unesco has defined the concept of culture enclosing not only art or literature, but also lifestyle, including physical activity, ethics, human rights and spiritual convictions.⁶ Several studies emphasise the importance of cultural capital in the distribution of health.^{7–10}

In his review on the biomedical effects of art therapies, Pratt¹¹ introduced the term creative cultural activities. In creative cultural activities, the individuals are actively engaging in a creative process, typically singing, playing an instrument or painting. Creative cultural activities include also social activities such as clubs, parish work and various physical challenging cultural activities. On the other hand, according to the study of Turpin,¹² receptive cultural activities might be activities where the individuals are receiving some kind of impressions or experiences without self-doing. Typically, receptive cultural activities are visiting museums, art exhibitions, concerts or theatres. Thus, in the present study, cultural activity is divided into receptive and creative activity.

Only a few studies have included leisure-time physical activity in the concept of culture. It has rather been used as a confounder.² According to the General Social Survey in 1993,¹³ we choose to define physical leisure-time activities in the present study as cultural activities.

The concept of health is not consistent. Research has mostly focused on the relationship between physical activity and other cultural activities and perceived health,⁵ survival^{2 14} and cancer.¹⁵ In accordance with Unesco's definition of health,⁶ it might also be important to explore the associations between cultural activities and anxiety and depression, and between cultural activities and satisfaction with life (SWL).

Despite the positive association between cultural activity and health in some studies, there are still many gaps in the knowledge of cultural activity and its impact on health.^{12 16}

In this large population-based Nord-Trøndelag Health (HUNT) Study, cultural activity and a large number of health factors were measured.¹⁷ To the best of our knowledge, no previous study has examined the relationship between participation in receptive and creative cultural activities, and perceived health (PH), anxiety (Anx), depression (Dep) and SWL. The aim of this study was therefore to analyse such associations with a focus on possible gender differences.

MATERIAL AND METHODS

The data were drawn out from the HUNT Study, a population-based study of the Nord-Trøndelag County, Norway. Nord Trøndelag County (n=130 000) has a homogenous population and has

a geographical, demographical and occupational structure fairly representative of the whole of Norway, though lacking a large city.¹⁸ The average income and mean educational level are slightly lower than the national average. The socio-economic inequality in mortality in the region is at the national level.^{18 19}

The third survey of the HUNT study (HUNT 3) was performed in 2006–2008. All citizens in the county aged 13 and older were invited for a health examination. In the present study, the 50 797 adult participants (females: 27 754; males: 23 043) aged 20 years and older were included (overall 54% response rate, 64% in the age groups 40–69). Data were collected by comprehensive questionnaires. Questionnaire 1, personally mailed to each individual, contained three pages, including questions on PH, physical and mental health, life habits and others (<http://www.hunt.ntnu.no/>). The participants were requested to fill in questionnaire 1 prior to attending the screening site. Questionnaire 2, including questions about cultural participation, was given to the attendants after the clinical examinations, asking them to fill in the questionnaire at home and return it by post. Participants who completed both Q1 and Q2, and yielded valid data for constructing indices for receptive and creative activities, were included in the present study.

Cultural participation

To compute the index for receptive cultural activities, 19 736 females and 15 937 males were included. To compute the index for the creative cultural activities, 18 906 females and 15 494 males were included.

Receptive cultural participation was assessed by asking the respondents in separate questions ‘How often in the last 6 months have you been to a museum or art exhibition, a concert/theatre/film, a church/chapel, sport-events?’ The response alternatives were for all: ‘more than three times a month, 1–3 times a month, 1–6 times in the last 6 months, or never.’ For each cultural activity, the response alternative was quantified with 1 (never) to 4 (more than three times a month). Creative cultural activities were assessed by asking in separate questions: ‘How many times in the last 6 months have you participated in the following: an association activity or club meeting, music/singing/theatre, parish work, outdoor activities, dance, worked out/sports?’ The response alternatives were: ‘More than once a week, once a week, 1–3 times a month, 1–5 times in the last 6 months, and never.’ For each cultural activity, the response alternative was quantified with 1 (never) to 5 (more than once a week).

One index for the different receptive (range 4–16) and one for the different creative (range 6–30) cultural activities were computed by summing the score for each question. The indices reflect the frequency of participation in the different cultural activities.

Two additional indices were created by summing all different activities (receptive and creative separately), which the respondents had attended. These indices reflect the total number of different receptive (range 0–4) and creative (range 0–6) cultural activities in the last 6 months. A respondent who reported attending all four receptive cultural activities obtained a score of 4, while a respondent who reported participation in all six creative cultural activities obtained a score of 6.

Outcome variables

Perceived health

Perceived health (PH) was assessed by the question, ‘How is your health at the moment?’ with the response alternatives: ‘very good,’ ‘good,’ ‘not so good’ and ‘poor.’ The variable was

dichotomised into one category (coded as 1) ‘very good’ and ‘good’ combined, and a second category (coded as 0) combining ‘not so good’ and ‘poor.’

The distribution of PH was similar in those who responded only to Q1 and those responding to both Q1 and Q2.

Satisfaction with life

Respondents were asked: ‘Thinking about your life at this moment, would you say that you by and large are satisfied with life, or are you mostly dissatisfied?’ The response alternatives were: ‘Very satisfied,’ ‘satisfied,’ ‘somewhat satisfied,’ ‘a bit of both,’ ‘somewhat dissatisfied,’ ‘dissatisfied’ and ‘very dissatisfied.’ The variable was dichotomised into the categories 1, ‘very satisfied, satisfied and somewhat satisfied,’ and 0, including ‘a bit of both, somewhat dissatisfied, dissatisfied, very dissatisfied.’

The responses on SWL by the participants only in Q1 and those in both Q1 and Q2 were similarly distributed.

Anxiety and depression

Anxiety and depression were measured in Q2 by the Hospital Anxiety and Depression scale (HADS) (range 0–42). This was divided into two subscales, HADS-A (anxiety) and HADS-D (depression) according to previous studies.^{20 21} Both scores for depression and anxiety were recoded into low, 0 (rating 0–7), and high, 1 (rating 8–42).

Other health variables

The respondents were asked whether they suffered from a chronic disease which reduced their daily functioning (yes=1, no=0) and whether they had any physical or emotional problems which limited their social life (Not at all/very little/somewhat/much/was not able to socialise). Physical leisure-time activity was measured by asking, ‘How frequently do you exercise?’ 1, 2–3 times/week or more, and 0, once/week or less. Other variables included were daily smoking (1: no; 0: yes), frequency of alcohol consumption (1: few times/year; 0: weekly). Socio-economic status (SES) was measured reclassifying the first digit in the Norwegian occupation classification (STYRK) into an approximation to the Erikson Goldthorpe Portocarero social class scheme¹⁹ (A: higher-grade professionals; B: lower-grade professionals; C: non-manual employees; D: small proprietors; E: artisans and farmers; F: lower-grade technicians, and unskilled workers).

Statistical methods

In separate models, a multiple univariate binary logistic regression was used to examine the relationships between each cultural activity and the dependent variables (PH, SWL, anxiety/depression), controlled for all relevant cofactors (age, SES, health-related cofactors: chronic disease, limitation in social contact; and other lifestyle cofactors: physical activity, daily smoking, body mass index and alcohol consumption).

Multiple univariate binary logistic regression was used to study the association between the receptive and creative cultural indices, and PH, SWL and anxiety/depression. In the first model, the association was adjusted for age. In the second model, SES, chronic disease and limitation in social contact were also added. In the third model, all covariates, also including physical activity, daily smoking, body mass index and alcohol, were entered simultaneously to adjust for eventual confounding. Gender-specific models were performed owing to significant interactions between gender and both indices for the receptive and creative cultural activities in the different models. SPSS version 16 was used.

RESULTS

In total, 17 932 women and 14 928 men had completed data on both the receptive and creative variables. More men than women reported good/very good PH and low anxiety, while depression and SWL were distributed equally among genders (table 1).

Analyses showed that more people participated in creative than in receptive cultural activities, and this was the case in both genders, and all age- and SES groups. The participation (less than once/month) in both receptive and creative cultural activities was strongly age-dependent, increasing from the youngest age group up to the age group 40–49, and then successively decreasing by age. The participation decreased by lower SES. A similar pattern was seen regarding participation in the number of different cultural activities (data not shown).

Figure 1 (A and B) shows in more detail the association between cultural participation and SES, illustrating that cultural participation was especially high in the two highest SES groups and in the young and middle-aged groups, while declining in the oldest age groups and the lower SES groups.

Socio-economic groups are defined into six scales from the Erikson Goldthorpe Portocarera social class scheme: A, higher-grade professionals, managers in large industrial establishments; B, lower-grade professionals, higher-grade technicians, supervisors of non-manual employees; C, non-manual employees, higher and lower grade; D, small proprietors, farmers and self-employed workers in primary production; E, lower-grade technicians, supervisors of manual workers and skilled manual workers; F, unskilled workers, agricultural workers.

The descriptive data (table 2) revealed that the number of participants reporting respectively good health, good satisfaction with life, low anxiety and low depression increased in relation to increasing number, and frequency of, participation in different cultural activities. SWL, low anxiety and low depression showed similar patterns.

Table 1 Participants in the third survey of the Nord-Trøndelag Health Study (2006–2008) with complete answers on all questions about receptive and creative cultural activity*

	Female n	n: 17 932 %	Male n	n: 14 928 %
Age groups				
20–29	1732	10	977	7
30–39	2812	16	1752	12
40–49	3825	21	3040	20
50–59	4023	22	3746	25
60–69	3219	18	3225	22
70–79	1678	9	1666	11
80+	643	4	522	4
Perceived health				
Not so good/poor	4643	27	3339	23
Very good/good	12636	73	11116	77
Anxiety				
High score	2284	13	1281	9
Low score	15140	87	13255	91
Depression				
High score	1688	10	1482	10
Low score	15665	90	13030	90
Satisfaction with life				
Bit of both/very dissatisfied	2365	13	1766	12
Very satisfied/somewhat satisfied	15207	87	12848	88

The variation in the number of respondents on perceived health, anxiety, depression and satisfaction with life is due to missing data.

*Data shown are number and percentage of female and male respondents, distributed in age groups and responses about perceived health, anxiety, depression and satisfaction with life.

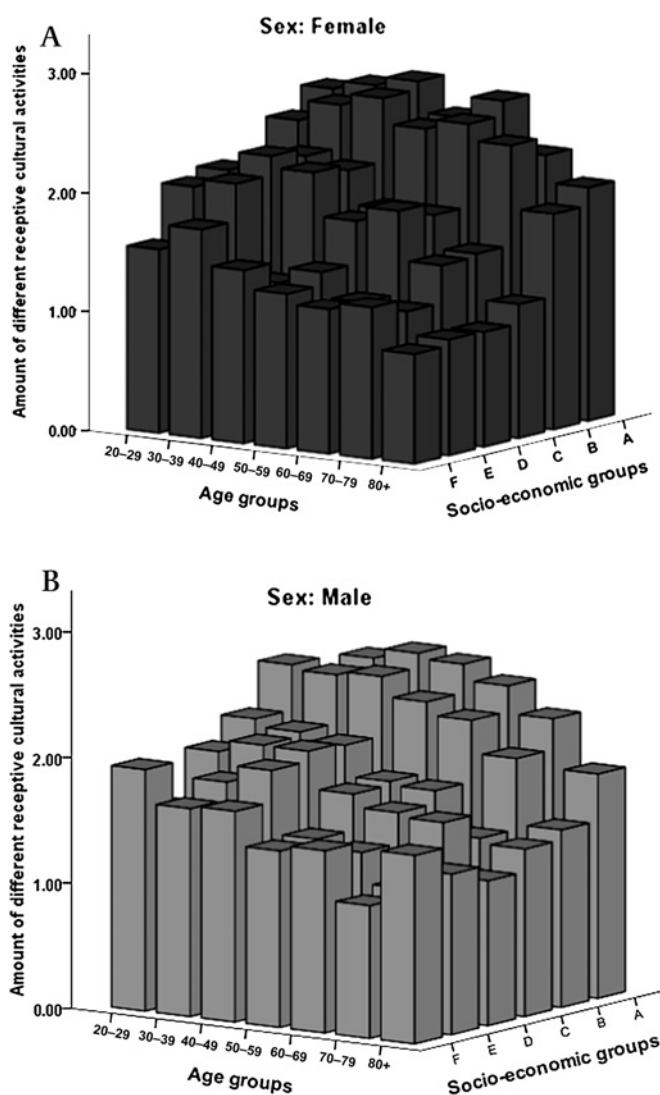


Figure 1 Relationship age groups, socio-economic groups and amounts of different receptive cultural activities in females (A) and males (B).

Single receptive and creative cultural activities

Perceived health

Fully adjusted univariate binary logistic regression models, testing the single components of receptive and creative cultural activities, revealed that for receptive cultural activities, only one activity (attending a sport event) was associated with good/very good health in women. In men, however, all receptive cultural activities were statistically significant associated with good/very good health (table 3).

Active participation in creative cultural activities (association activity or club meeting, music, singing, theatre, outdoor activities, dance and working out/sports) was associated with good/very good health in women. In men, in contrast, participation in parish work was significantly associated with good/very good health, in addition to participation in association meeting, outdoor activities, dance and working out/sports (table 3).

Satisfaction with life

The following receptive cultural activities were associated with good SWL: been to church, and sports event in women. In men, attendance for all receptive cultural activities was significantly associated with good SWL (table 3). In women, the following creative cultural activities were statistically associated with

Table 2 Cultural activities by perceived health, satisfaction with life, anxiety and depression in both genders combined

	Good/very good health n: 31 734, %	Satisfied with life n: 32 185, %	Low anxiety score n: 31 960, %	Low depression score n: 31 866, %
Receptive cultural activities				
1 activity/6 months	69.3	84.8	86.1	87.2
2 different activities/6 months	77.0	87.0	89.4	91.6
3 different activities/6 months	81.1	90.3	91.5	93.2
4 different activities/6 months	84.0	91.4	92.6	94.0
Creative cultural activities				
1 activity/6 months	66.3	84.1	85.7	86.5
2 different activities/6 months	74.6	85.8	88.2	90.1
3 different activities/6 months	79.7	89.0	90.9	92.5
4 different activities/6 months	83.5	91.0	91.9	93.7
5 different activities/6 months	83.9	91.0	92.5	94.1
Index receptive cultural activities				
Never	71.8	85.7	87.4	88.6
1–6 times/6 months	82.1	90.6	92.2	93.6
1–3 times/month	81.8	92.3	90.8	92.2
Index creative cultural activities				
Never	68.1	84.8	86.5	87.2
1–5 times/6 months	81.4	89.4	91.1	92.9
1–3 times/month	85.5	91.4	93.3	94.4

Data shown are percentages reporting very good/good health, very satisfied/satisfied/somewhat satisfied with life, low anxiety score (<8) and low depression score (<8), using the Hospital Anxiety and Depression scale.

high SWL: participation in association meeting, music, singing, theatre, outdoor activity, dance, and working out/sports. Men who participated actively in association meeting, outdoor activity, dance, workout and sports reported a significantly good SWL.

Anxiety

The receptive cultural activities been to museum, art exhibition, concert, theatre, film and sports events, in women, and all receptive cultural activities, including been to church/chapel, in men, were associated with low anxiety scores (table 3). In

Table 3 Associations between each receptive, creative cultural activity and good perceived health, good satisfaction with life, low anxiety and low depression

	Good health				Good satisfaction with life			
	Female		Male		Female		Male	
	OR (95% CI)	p Value	OR (95% CI)	p Value	OR (95% CI)	p Value	OR (95% CI)	p Value
Receptive cultural activity								
Museum/art exhibition	1.10 (1.02 to 1.18)	0.11	1.14 (1.04 to 1.25)	0.005	1.02 (0.94 to 1.10)	0.67	1.10 (1.00 to 1.22)	0.05
Concert/theatre/film	1.04 (0.98 to 1.11)	0.26	1.14 (1.06 to 1.22)	0.001	1.02 (0.95 to 1.09)	0.62	1.16 (1.06 to 1.26)	0.001
Church/chapel	1.01 (0.95 to 1.07)	0.79	1.11 (1.03 to 1.18)	0.003	1.20 (1.12 to 1.28)	0.0005	1.28 (1.19 to 1.39)	0.0005
Sports event	1.07 (1.02 to 1.13)	0.01	1.10 (1.04 to 1.16)	0.001	1.21 (1.15 to 1.29)	0.0005	1.29 (1.21 to 1.38)	0.0005
Creative cultural activity								
Association/club meeting	1.09 (1.04 to 1.14)	0.0005	1.12 (1.08 to 1.18)	0.0005	1.17 (1.11 to 1.23)	0.0005	1.11 (1.06 to 1.17)	0.0005
Music/singing/theatre	1.07 (1.03 to 1.13)	0.002	1.01 (0.97 to 1.06)	0.60	1.06 (1.01 to 1.12)	0.01	1.00 (0.95 to 1.05)	0.96
Parish work	1.06 (0.98 to 1.16)	0.15	1.20 (1.07 to 1.34)	0.002	1.09 (0.99 to 1.20)	0.09	1.06 (0.95 to 1.19)	0.32
Outdoor activity	1.08 (1.05 to 1.12)	0.0005	1.12 (1.08 to 1.17)	0.0005	1.08 (1.04 to 1.12)	0.0005	1.06 (1.01 to 1.11)	0.01
Dance	1.14 (1.08 to 1.21)	0.0005	1.09 (1.02 to 1.18)	0.02	1.14 (1.07 to 1.21)	0.0005	1.12 (1.03 to 1.22)	0.01
Workout/sports	1.06 (1.03 to 1.10)	0.0005	1.13 (1.09 to 1.17)	0.0005	1.08 (1.04 to 1.11)	0.0005	1.08 (1.03 to 1.12)	0.0005
Low anxiety score								
Receptive cultural activity								
Museum/art exhibition	1.09 (1.01 to 1.19)	0.03	1.13 (1.01 to 1.27)	0.03	1.13 (1.03 to 1.24)	0.01	1.33 (1.20 to 1.50)	0.0005
Concert/theatre/film	1.14 (1.06 to 1.22)	0.0005	1.28 (1.16 to 1.41)	0.0005	1.21 (1.12 to 1.32)	0.0005	1.39 (1.27 to 1.52)	0.0005
Church/chapel	1.04 (0.97 to 1.10)	0.31	1.14 (1.04 to 1.25)	0.003	1.11 (1.03 to 1.19)	0.007	1.03 (0.95 to 1.11)	0.52
Sports event	1.18 (1.11 to 1.25)	0.0005	1.21 (1.12 to 1.30)	0.0005	1.10 (1.03 to 1.18)	0.006	1.11 (1.04 to 1.19)	0.002
Creative cultural activity								
Association/club meeting	1.18 (1.12 to 1.24)	0.0005	1.16 (1.10 to 1.23)	0.0005	1.12 (1.06 to 1.19)	0.0005	1.18 (1.12 to 1.25)	0.0005
Music/singing/theatre	1.03 (0.98 to 1.08)	0.21	1.04 (0.98 to 1.10)	0.20	1.03 (0.98 to 1.09)	0.31	1.08 (1.02 to 1.15)	0.005
Parish work	1.05 (0.96 to 1.16)	0.29	0.98 (0.86 to 1.10)	0.69	1.06 (0.95 to 1.18)	0.34	1.07 (0.95 to 1.20)	0.29
Outdoor activity	1.09 (1.05 to 1.13)	0.0005	1.08 (1.03 to 1.13)	0.003	1.09 (1.04 to 1.14)	0.0005	1.09 (1.04 to 1.14)	0.0005
Dance	1.11 (1.05 to 1.18)	0.0005	1.07 (0.97 to 1.18)	0.16	1.10 (1.03 to 1.18)	0.005	1.06 (0.97 to 1.15)	0.20
Workout/sports	1.07 (1.04 to 1.11)	0.0005	1.10 (1.05 to 1.15)	0.0005	1.08 (1.04 to 1.12)	0.0005	1.11 (1.06 to 1.15)	0.0005

Data shown are adjusted OR and 95% CI from a logistic regression model relating each receptive and creative cultural activity to good health (1: very good, good; 0: not so good, poor), good satisfaction with life (1: very satisfied, satisfied, somewhat satisfied; 0: bit of both, somewhat dissatisfied, dissatisfied, very dissatisfied), low anxiety score (1: low; 0: high), and low depression score (1: low; 0: high). The models are adjusted for age, socio-economic status, chronic disease, limitation in social contact, physical exercise, daily smoking, body mass index and alcohol consume.

women, participation in association meetings, outdoor activities, dance and working out/sports were significantly associated with low anxiety scores. Men, participating in association meetings, outdoor activities and working out/sports reported lower anxiety scores.

Depression

Attendance for each individual receptive cultural activity was significantly associated with low depression scores in women. In men, three receptive cultural activities (been to museum/exhibition, been to concert, theatre, film and sports event) were associated with low depression scores. Women who participated in association meetings, outdoor activity, dance and working out/sports reported lower depression scores. In men, participating in association meetings, music, singing, theatre, outdoor activity and working out/sports was significantly associated with lower depression scores (table 3).

Indices of cultural activities

In both women and men, both indices of receptive cultural activities and creative cultural activities were significantly associated with good health, good SWL, low anxiety and low depression after adjusting for all confounders (table 4). At first, the effect estimates for the association between the indices of cultural activities and good SWL, low anxiety and depression increased when adjusted for age and then decreased after further adjusting for the other co-variables.

DISCUSSION

These data showed that in both women and men, participation in both receptive and creative cultural activities was associated with good health, good SWL, a low anxiety score and a low depression score, when adjusted for socio-economy and other relevant cofactors. In both women and men, a dose–response effect was indicated. The frequency of cultural participation and the number of different activities were positively associated with good health, SWL, a lower anxiety score and a lower depression score. The study revealed that men who engaged specifically in receptive, rather than creative, cultural activities reported better health-related outcomes.

Table 4 Associations between the cultural activities index and good health, good satisfaction with life, low anxiety and low depression in both genders

	Female OR (95% CI)	Male OR (95% CI)
Good health		
Index receptive cultural activities	1.03 (1.01 to 1.06)	1.09 (1.06 to 1.12)
Index creative cultural activities	1.05 (1.03 to 1.07)	1.07 (1.05 to 1.09)
Good satisfaction with life		
Index receptive cultural activities	1.08 (1.05 to 1.11)	1.14 (1.10 to 1.18)
Index creative cultural activities	1.06 (1.04 to 1.07)	1.04 (1.02 to 1.06)
Low anxiety		
Index receptive cultural activities	1.09 (1.05 to 1.12)	1.13 (1.09 to 1.17)
Index creative cultural activities	1.06 (1.04 to 1.07)	1.06 (1.04 to 1.08)
Low depression		
Index receptive cultural activities	1.10 (1.06 to 1.13)	1.12 (1.08 to 1.16)
Index creative cultural activities	1.05 (1.04 to 1.07)	1.07 (1.06 to 1.09)

Data shown are adjusted OR with 95% CI from a stepwise multivariable logistic regression model (adjusted for age, SES, chronic disease, limitation in social contact, and physical exercise, daily smoking, body mass index, alcohol drinking) relating index receptive and creative cultural activities to respectively perceived health (1: very good, good; 0: not so good, poor), satisfaction with life (1: very satisfied/satisfied/somewhat satisfied; 0: bit of both/somewhat dissatisfied/dissatisfied/very dissatisfied), anxiety (1: low; 0: high) and depression (1: low; 0: high).

As expected, cultural participation was strongly associated with socio-economy. An important question was whether the association between cultural participation and PH, anxiety, depression and SWL was due to socio-economy or other confounding factors. However, after adjusting for relevant confounding factors, it seemed that cultural participation was independently associated with good health, a low depression score and SWL dependent on gender.

Our results may be in concordance with Katz-Gerro,⁹ who stated that the relationship between health and socio-economy may not be fully explained by better access to healthcare, work conditions, social ties and health behaviours. Wilkinson⁵ noted similar tendencies in the distribution of cultural attendance in relation to social variables and physical activity.

These data showed, in concordance with Cuyper,²² and Taveras,²³ that a high participation in receptive and/or creative cultural activities may induce a higher engagement in physical activities (data not shown). Thus, it is possible that attending cultural events may serve as a marker for a healthy lifestyle.¹⁵ On the other hand, it seems that attending receptive cultural activities is associated less with good health than participating in creative cultural activities in women. This may indicate that for women, it is the difference in how they perceive their health as to whether they attend receptive or creative cultural activities. Or this may express a gender-dependent difference in the effect of the receptive cultural activities.

Several other studies have also demonstrated an association between cultural activities and health. In concordance with the present study, Bygren^{2 15} and Wilkinson⁵ also demonstrated a positive association between different cultural activities and health outcome. Konlaan²⁴ found a positive effect on longevity by attending art, museum, cinema and concert. Iwasaki²⁵ noted that relaxing leisure (listening music, reading, TV) was the strongest positive predictor of coping with stress, while social leisure (being with friends, social activities) and cultural leisure (attending concerts, ballet, theatre and museums) predicted better mental and PH.

In contrast with other studies where gender has often been handled as a confounding factor,^{2 5} we established an interaction between participation in cultural activities and gender. We found, in agreement with the study of Hyppä,¹⁴ clear gender-dependent effects of participation in different cultural activities. Furthermore, our study shows a slight but consistent stronger relationship between the receptive cultural activities and SWL, anxiety and depression in both women and men. However, the association in women between creative cultural activities seemed to be stronger with PH. By contrast, in men the relationship between the participation in receptive cultural activities and PH is stronger than the relationship between the creative activities and PH. This may indicate a distinctive difference between the effects (dose–response) of participation in receptive and creative cultural activities.

Johansson²⁶ and others²⁷ suggest that psycho-neuro-immunological theories may be of interest when trying to explain the effects of participating in cultural activities. Konlaan *et al*²⁸ found that physical exercise improved blood lipids, and cultural participation improved blood pressure and prolactin. A possible pathway of the positive influences of participating in cultural activities may be found in the stress reduction that decreases the oxidative DNA damage and the formation of 8-hydroxydeoxyguanosine, elevated levels of which are linked to the development of disease.³

The strength of this study is that the data allow the effects of cultural participation to be studied as part of a general health

study with a large number of participants and with generally high attendance rates in the middle age groups. Additionally, we have operationalised a large number of different cultural activities, which has increased the participation rate in all layers of the population. This method gives the best possible and broadest overview over the cultural activity patterns of a population. Furthermore, the study documents how the frequency in participation and each individual cultural activity are associated with not only PH but also other determinants of well-being, adjusted for several possible confounding cofactors.

The associations between cultural participation and public-health outcomes are probably more complicated than any study design and range of variables might grasp. The measurement of the social phenomenon is complicated. Another weakness is the problem with evaluating the weighting of each item in combined variables such as 'concert/cinema and in the index for creative cultural activities: physical activities and organisations, theatre. We do not know exactly which cultural activity of the subgroups the answer refers to.

Being cross-sectional, this study cannot determine cause-effect relationships. Another question to be put forward is the clinical relevance of the results of this study. Although, the ORs are very small and the CIs narrow, small changes at the population level, however, can lead to large effects on disease risk. There might also have been a vague selection bias. In this study, participants had to be able to attend the screening site and be able to fill in questionnaires, so the very sick, for example, bed-ridden patients, could not attend. Also, the very sick cannot participate easily in cultural life. On the other hand, we can imagine that the slightly sick might have abundant time to participate in cultural activities and participated in the survey. Additionally, individuals with very good health cannot improve their health much, but may strengthen it, thus preventing ill health. This may be difficult to measure in the context of this kind of study.

CONCLUSION

This population-based study suggests gender-dependent associations between cultural participation and PH, anxiety, depression and SWL. The results indicate that the use of cultural activities in health promotion and healthcare may be justified. On the other hand, the limitations of this study implicate that further longitudinal and experimental studies are warranted to establish the cause-effect relationship.

What is already known on this subject

- ▶ Previous population studies and a human-intervention study have shown that religious, social and cultural activities predict increased survival rate.

What this study adds

- ▶ This study revealed a gender-dependent association between participation in cultural activities and good health, low anxiety- and depression scores, and satisfaction with life in a population.
- ▶ Receptive cultural activities seem to have a stronger association with perceived health, anxiety, depression and satisfaction with life than the creative cultural activities.

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