BMJ Open

# Association between engagement in cultural activities and use of general practitioner consultations: 7-year follow-up of adults from the HUNT study, Norway.

Bente Irene Løkken ,[1,2] Erik R Sund,[1,3,4] Steinar Krokstad ,[2,3,4] Ottar Bjerkeset,[1,5] Vegar Rangul[1,3,4]

**To cite:** Løkken BI, Sund ER, Krokstad S, *et al*. Association between engagement in cultural activities and use of general practitioner consultations: 7-year follow-up of adults from the HUNT study, Norway.. *BMJ Open* 2023;**13**:e068004. doi:10.1136/bmjopen-2022-068004

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2022-068004).

Received 09 September 2022
Accepted 16 August 2023



For numbered affiliations see end of article.

**Correspondence to**
Bente Irene Løkken;
bente.i.lokken@nord.no

## ABSTRACT

**Objective** Assess whether engagement in a range of cultural activities, both 'passive' and 'active' (ie, receptive and creative) participation, is associated with later demand for general practitioner (GP) consultations.

**Design** Longitudinal prospective cohort study.

**Setting** Data from the population-based the third Survey of Trøndelag Health Study (2006–2008) in Norway was linked to an administrative register including service information from all GP offices nationwide.

**Participants** This study included 17 396 (54.6%) women and 14 451 (45.4%) men aged 30–79 years.

**Main outcome measures** Multilevel negative binomial regression models assessed the relationship between cultural engagement and GP consultations, and reported as rate ratios.

**Results** A mean of 3.57 GP visits per patient was recorded during the 7 years of follow-up. Participation in creative activities and a combination of both receptive and creative activities was associated with lower number of GP consultation. Gender-specific analyses suggest that these effects were attributable to men. The rate ratio of GP consultations among men taking part in creative activities less than once, twice and more than twice (<9 times) per week is 0.90, 0.89 and 0.87 times lower, respectively, compared with non-participants. Whereas weekly frequency of receptive and creative activity engagement showed a 0.92, 0.87 and 0.83 times lower rate ratio among engaged men. The variety of activities shows a similar pattern and participation in creative activities lowers the rate ratio among men. Engagement in a wide range/variety of activities, compared with non-engagement, was associated with lower numbers of GP consultations in men, but not women.

**Conclusions** Engagement in creative or combined receptive and creative cultural activities was associated with lower numbers of GP consultations among men. Thus, facilitating and promoting a culturally engaged lifestyle, particularly in men, may affect primary healthcare use. However, this study design gives no evidence of a causal relationship between cultural engagement and use of GP consultations.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study is the first to examines whether engagement in a range of cultural activities, both 'passive' or 'active' (ie, receptive and creative) participation, is associated with later demand for general practitioner (GP) consultations.
⇒ Prospective cohort study with longitudinal follow-up of primary healthcare including GP consultations over a 7-year period.
⇒ Adjustments were made for a range of confounders, residual confounding is possible, as there is a social gradient in engagement in cultural activities and GP consultation.
⇒ This observational study design cannot infer causality, and bidirectional relationship may be the case, as poor health may be the case of inactivity, and in contrast the healthier people are, the more likely they are to engage in cultural activities.
⇒ Studies performed to confirm possible mechanisms and causal direction to prove and conclude causality is necessary. Further investigation is required.

## INTRODUCTION

Cultural activity engagement has received increased attention from policy-makers and researchers in recent decades, based on its potential to improve health and well-being.[1] Cultural activity engagement has the potential to prevent diseases, can be combined with traditional medical treatment in clinical settings and may be beneficial in disease management and improving patients' quality of life.[1 2] More specifically, cultural activity engagement may encourage health-promoting behaviour[1] and promote longevity in the general population.[3 4]

The medical healthcare system's capacity is challenged by several factors[5]; a high prevalence of mental disorders and chronic physical disorders[6]; limited treatment

potential in clinical settings[5] and demographic change with increasing numbers of older people.[6] A 'multimodal' intervention, combining multiple psychological, physical, social and behavioural factors, has shown promising results.[3] Making everyday health-promoting activities easier and accessible as part of a leisure time lifestyle for the general population seems to be the most effective chronic disease prevention strategy[5] for both physical and mental health conditions.[5 7] However, health promotion is not solely the health sector's responsibility,[8] as health is developed outside the health services,[9 10] and cultural activities are incorporated into several disciplines such as psychology, sociology and education.[11] Moreover, cultural activity engagement has been recognised to have therapeutic effects.[1 2 11] Furthermore, it is suggested that high consumers of healthcare are often low consumers of cultural engagement.[12]

Engagement in cultural activity involves a broad range of activities that can be undertaken at individual level or community level,[13] yet still there is a lack of consensus regarding in the definition of activities constating the concept 'cultural activity'. Cultural activities can be undertaken every day for enjoyment, entertainment, recreation or as a contribution to society such as volunteering and association,[14] and can be in receptive and creative modes.[14–16] This reflects participation as an audience member, an attendee, a spectator or as active engagement in creative activities by doing or performing. Previous research regarding engagement in cultural activities can be mostly characterised by diverging approaches, lacking a variety of activities and a distinction between receptive and creative engagement, and different activities being examined in the same sample.[17 18] Likewise, variety (engagement in different activities) and frequency of engagement have seldom been explored in the same sample. However, these two measures are not completely independent, as the more various activities people engage in, consequently the frequently increases. Furthermore, activities can be undertaken alone or together with others and may involve physical behaviour. Previous population studies point out associations between engagement and well-being effects,[19–21] and physical, mental, social or behavioural measures. For example, lower levels of, anxiety[15] and depression,[15 22] emotional loneliness,[22] and higher level of social connectedness,[22] and satisfaction with life.[15 23]

In Norway, the general practitioner (GP) service covers the entire population, and no health insurance is needed. The GP serves as a gatekeeper to all other medical services. The GP's service activity is collected in a national reimbursement system covering the activity data. Thus, the data can be used to study the extent of consultations consumed in the population. Linking these data to observational findings from The Norwegian Trøndelag Health Study (HUNT) Study' s third cross-sectional survey included a broad variety of receptive and creative cultural activities and relevant covariates collected,[24] as well as other important explanatory factors and potential confounders.[25] This article includes a broad variety of cultural activities, to meet the gaps in different engagements, by answering three research questions.

The overall aim was to study the associations between cultural activity engagement and GP consultations. Specific types of cultural activity engagement were examined, and possible gender differences were explored in both receptive and creative engagement.

## METHODS

### Patient and public involvement

The public was not involved in the design or conduction of the study, nor the dissemination of this study. The cohort data were conducted before the initiation of this study.

### Study design and population

The HUNT is a longitudinal population health study that invited all adult residents of the former Nord-Trøndelag County area, Norway. So far, four surveys have been completed, and this study uses data from the third HUNT survey (HUNT3, 2006–2008). The participants underwent extensive health assessments in form of questionnaires, clinical measurements and blood samples, with a high participation rate. In HUNT3, 93 860 people aged ≥20 years were invited, and in total, 50 807 participated (response rate=54.1%).[25]

A longitudinal prospective cohort study was performed, linking the HUNT3 data to individual-level data for primary healthcare (Control and Payment of Health Reimbursement—KUHR). Overall, 41 198 participants returned the relevant questionnaires including the measures of engagement in cultural activities; of these, ≈2.4% (984) did not answer any of the questions concerning receptive or creative activities and were excluded. Therefore, the baseline sample comprised 40 214 participants.

### Measures

#### *Healthcare utilisation*

The KUHR register covers all Norwegian patients' contacts with GPs. GP consultations covering daytime and evening consultations were extracted by including fare codes; 2ad (daytime consultation, personal attendance), 2ak (evening consultation, personal attendance), 2ed (group treatment, per patient), 2fk (consultation and emergency response to medical practice during out-of-hours service), 615* (talking therapy by GP with patients with mental disorders) and 2ae (e-consultation to GP).[26] Our main outcome was regular GP consultations, summarised in total number of annual consultations per individual, in the period from 2009 to 2015.

#### *Cultural activity engagement*

Cultural activity measures were assessed in the HUNT3 survey using two validated questions with several predefined activity response measures, concerning receptive and creative activities separately. These questions

were proven to be sufficient for public health research[24] and were used to assess engagement in cultural activities in this study. A validation study proves the data to be sufficiently relevant to be used in population research.[24] Receptive activity engagement was measured by individual activity response measures including; museum/art exhibition; concert, theatre or film; a church/chapel; and sports event, with five frequency response options for each individual activity response measure. Creative activity measures were: an association or club meeting/activity; music, singing or theatre; parish work; outdoor activities; and dancing, with five frequency response options for each individual activity measure. The original responses for each individual activity were operationalised into three different quantifiers reflecting participation in individual activities, variety (number of different activities) and weekly frequency of engagement. The last two quantifiers were operationalised for receptive and creative engagement separately, in addition to a total measure combining the receptive and creative modes. Additional information measuring cultural activity engagement and operationalisation of exposure variables available (see online supplemental additional file S1).

### Covariates

Based on previous analysis, a range of demographic, socioeconomic and health-related confounders were obtained. Demographic confounders included age (20–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80–89 years), gender (men, women), marital status (married, unmarried, registered partner widow(er), divorced, separated, separated partner, divorced partner and surviving partner). Socioeconomic confounders included occupation type (based on the ISCO88 classification).[27] Health-related confounders included self-reported longstanding illness (at least 1 year, response: yes, no); smoking status (never, former, daily); alcohol consumption (never (0 units/week), low (1–6 units/week) and high (≥7 units/week)); self-reported physical activity (below 150 min/week, 150 min/week or more); and body mass index (BMI) (normal weight' (<18–24.9), overweight (25.0–29.9), obese (≥30)).

### Mortality

The study data were previously linked to the Norwegian Cause of Death Registry. These mortality data are based on death certificates reported by doctors, with a high degree of both coverage and completeness.[28]

## Statistical analysis

Given a hierarchical two-level data structure with annual number of primary healthcare consultations nested within individuals, multilevel negative binomial regression models were specified to account for the non-independence of healthcare consultations within individuals. Negative binomial models were chosen because of overdispersion in the outcome, that is, the variance was larger than the mean.[29] The models were fitted for both receptive and creative response activities. The effect of the number of activities was also examined, reflecting the variety of engagement and weekly frequency within each mode of cultural activities (ie, receptive and creative) separately, as well as the combined total variety and weekly frequency of engagement of cultural activities. To get separate results for males and females, the models were reparametrised by including an interaction term between the cultural activity indicator and gender while omitting the main effect of cultural activity. Based on the large number of hypothesis tests performed, the rate ratios were reported with a 99% CI. Findings with p value that is less than 0.01 is considered statistical significant. Analysis was conducted in Stata V.16 (ref StataCorp).

Before the analysis, the deaths following the 2 years after participation in HUNT were discarded to alleviate potential reverse causation between poor health and cultural participation. Of the baseline sample, 9.9% (3,996) had missing data for covariates and 0.87% (316) died within the first 2 years of baseline. The sample was restricted to ages ranging from 30 to <80 years, removing 11.29% (4,055) participants. This resulted in an analytical sample of 31 847 individuals. To account for different follow-up times (because of death after 2 years from the participation date, HUNT), models were fitted with the exposure option corresponding to the number of years they were followed. The results were reported from a complete-case analysis and models with a missing category were also fitted to check if the estimates were different.

This observational study was conducted according to Strengthening the Reporting of Observational Studies in Epidemiology recommendations guidelines.[30]

## RESULTS

In total, 31 847 participants aged 30–79 years, 17 396 (54.6%) women and 14 451 (45.4%) men, were included in the analyses (see table 1). The mean age was 53.6 years (12.4 SD) and 53.4 years (12.1 SD). The mean annual number of consultations for the whole 7-year period was 3.8 and 3.3 for females and males, respectively. Gender differences were observed for occupational class, marital status, PA, smoking, alcohol use and BMI (see table 1). Gender differences in health-related behaviours were apparent for alcohol, smoking and BMI; more men than women were overweight and reported drinking alcohol, whereas daily smoking was more common among women.

Table 2 shows the annual and mean number of consultations for women and men in the period 2009–2015. It also shows the annual distribution of consultations among women and men, where women use approximately 55% of the consultations.

## Variety of cultural activity engagement

Associations between the number of receptive and creative cultural activities and GP consultations are depicted in figures 1 and 2. The estimates are provided and available in online supplemental additional

**Table 1** Gender-specific distribution of the covariates and GP consultations of the participants for the analysed sample

| | | Females | | Males | |
|---|---|---|---|---|---|
| | | Numbers | % | Numbers | % |
| Sociodemographic | | | | | |
| Occupation level | Low | 2110 | 12.1 | 491 | 3.4 |
| | Medium | 8920 | 51.3 | 8443 | 58.4 |
| | High | 6366 | 36.6 | 5517 | 38.2 |
| Marital status | Marriage* | 11216 | 64.5 | 9937 | 68.8 |
| | Other | 6180 | 35.5 | 4514 | 31.2 |
| Limiting illness | | | | | |
| Long-standing† | Yes | 7067 | 40.6 | 5819 | 40.3 |
| | No | 10329 | 59.4 | 8632 | 59.7 |
| Behaviour factors/lifestyle | | | | | |
| Alcohol, units/week | Never | 4998 | 25.9 | 1990 | 13.8 |
| | 0.5–6.5 | 12405 | 71.3 | 11043 | 76.4 |
| | ≥7 | 493 | 2.8 | 1418 | 9.8 |
| Cigarette smoking | Never | 7523 | 43,2 | 5802 | 40.1 |
| | Former | 5620 | 32.3 | 5573 | 38.6 |
| | Daily | 4253 | 24.4 | 3076 | 21.3 |
| Physical activity, MET* | <2.5 | 9552 | 54.9 | 8713 | 60.3 |
| | ≥2.5 | 7884 | 45.1 | 5738 | 39.7 |
| BMI | Normal | 6470 | 37.2 | 3194 | 22.1 |
| | Overweight | 6759 | 38.9 | 7915 | 54.8 |
| | Obesity | 4167 | 24.0 | 3342 | 23.1 |
| | | Mean (N) | SD (%) | Mean (N) | SD (%) |
| Consultations (mean, SD)‡ | Total | 3.8 | 4.1 | 3.3 | 4.1 |
| Age (mean, SD) | | 53.6 | 12.4 | 53.4 | 12.1 |

The HUNT Study (2006–2008). Sample include total number of participants n=31 847.
*Marriage/relationship.
†LLI >1 year.
‡Total number of consultations for the period 2009–2015.
BMI, body mass index; GP, general practitioner; HUNT, Trøndelag Health Study; LLI, limiting long-standing illness; MET, metabolic equivalent.

file S2. For receptive engagement, only among men engaged in 3–4 activities, the GP consultation rate was lower 0.90 (0.85, 0.95), compared with non-attendees (figure 1A). Engagement in creative cultural activities lowered the rate ratios for GP consultation by being engaged in one, two, or the highest category of 3–5 activities with estimates 0.94 (0.90, 0.98), 0.91 (0.88, 0.95) and 0.92 (0.88, 0.96), respectively (figure 1B). When separate analyses for women and men were performed, it was found that these effects could be attributed to men, with a decreasing rate ratio with an increasing number of activities engaged in with rate ratios 0.88 (0.83, 0.94), 0.84 (0.79, 0.89) and 0.84 (0.78, 0.89), respectively.

**Table 2** Gender-specific distribution of total numbers of consultations per year (%) and mean (SD)

| | | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|
| Consultations, numbers (%) and mean (SD) | Men | 14447 (45.4) | 14366 (45.3) | 14262 (45.2) | 14144 (45.1) | 14004 (45.0) | 13874 (44.9) | 13718 (44.8) |
| | | 3.02 (4.0) | 3.21 (4.1) | 3.34 (4.2) | 3.41 (4.2) | 3.40 (4.2) | 3.35 (4.2) | 3.37 (4.1) |
| | Woman | 17396 (54.6) | 17352 (54.8) | 17281 (54.8) | 17203 (54.9) | 17116 (55.0) | 17019 (55.1) | 16913 (55.2) |
| | | 3.61 (4.0) | 3.79 (4.3) | 4.11 (4.1) | 3.86 (4.2) | 3.89 (4.2) | 3.76 (4.1) | 3.83 (4.1) |

Presentation of data over the time period 2009–2015. Total number of participants, n=31 847.

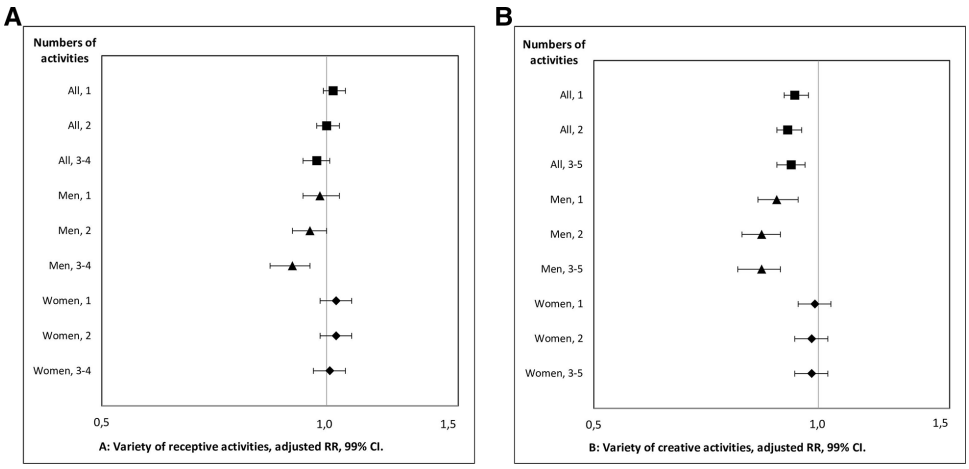


**Figure 1** Variety of engagement in receptive activities (A) and creative activities (B) with GP consultation for all and by gender. Fully adjusted (n=31 847). The HUNT Study (2006–08). GP, general practitioner; RR, rate ratio; HUNT, Trøndelag Health Study.

The total variety of cultural activities and the combined number of receptive and creative activities (figure 2) revealed that being engaged in one to three activities gave almost similar results. Engagement in four and six activities lowers the rate ratio of GP consultations with quite similar results. However, participating in four or six activities, reduced the rate ratios of GP consultation with almost similar estimates (with estimates 0.93 (0.87, 0.99) vs 0.92 (0.86, 0.98), respectively), and a lower rate when engaged in five or the highest category of 7–9 activities of 0.90 (0.84, 0.96). For men, the rate ratio increases in relation to lower GP consultations for almost every increase in number of activities (higher level of amount category) from engagement in one activity with 0.87 (0.79, 0.96), up to highest category (7–9 different activities) 0.78 (0.71, 0.87). Estimates of the variety of engagements available are provided in online supplemental additional file S2.

### Weekly frequency of cultural participation

Participants attending receptive activities once to less than twice a week on average the past 6 months, had a lower rate ratio of GP consultations with 0.94 (0.91, 0.97) compared with those who never attended (table 3). Hence, gender stratification revealed that among men, attending once to less than twice a week on average for the last 6 months, resulted in a lower rate ratio of 0.90 (0.86, 0.94) compared with non-attendees. Among women, those who attended once to less than twice a week had a lower GP consultation rate ratio of 0.95 (0.92, 0.99), than non-attendees, and higher frequency (more

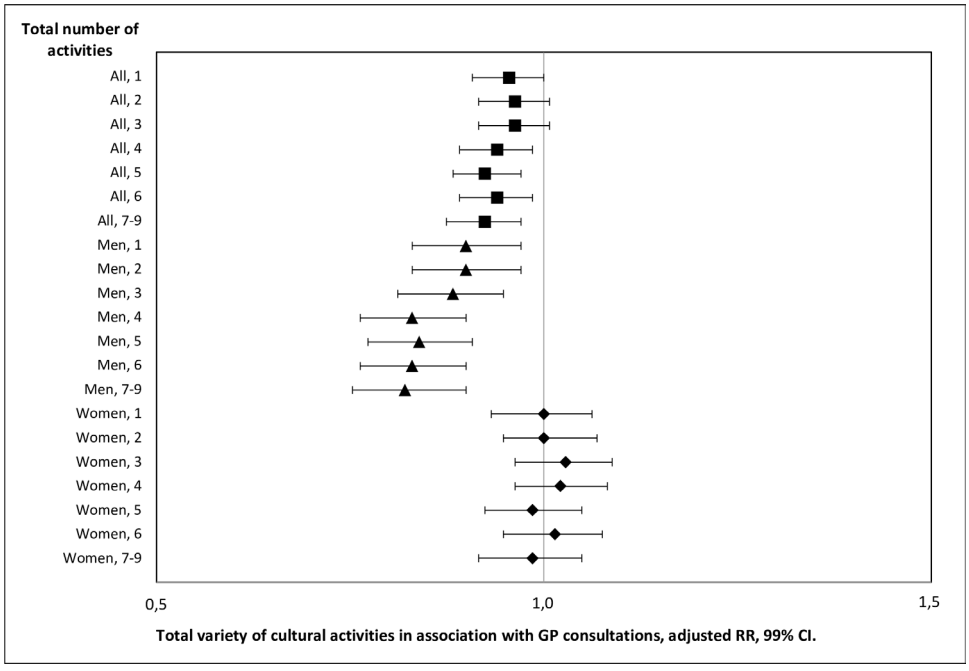


**Figure 2** Total variety of activities (combined receptive and creative engagement) associated with GP consultation for all and by gender. Fully adjusted (n=31 847). The HUNT Study (2006–2008). GP, general practitioner; RR, rate ratio; HUNT, Trøndelag Health Study.

Table 3 Weekly frequency in participation, and gender-specific analysis, in association with GP consultations, n=31 847

| Frequency/week | | Never/seldom* | 0.5 to <1 | 1 to <2 | ≥2† |
|---|---|---|---|---|---|
| Receptive | All | 1.00 | 1.00 (0.97–1.03) | 0.94 (0.91–0.97) | 0.95 (0.86–1.06) |
| | Men | 1.00 | 0.96 (0.92–1.00) | 0.90 (0.86–0.94) | 0.97 (0.83–1.14) |
| | Women | 1.00 | 1.01 (0.97–1.05) | 0.95 (0.92–0.99) | 0.92 (0.80–1.06) |
| Creative | All | 1.00 | 0.96 (0.92–0.99) | 0.93 (0.90–0.96) | 0.93 (0.89–0.98) |
| | Men | 1.00 | 0.90 (0.86–0.95) | 0.89 (0.85–0.93) | 0.87 (0.82–0.93) |
| | Women | 1.00 | 1.00 (0.95–1.05) | 0.95 (0.92–0.99) | 0.98 (0.92–1.04) |
| Total | All | 1.00 | 0.98 (0.93–1.03) | 0.96 (0.92–1.00) | 0.92 (0.87–0.96) |
| | Men | 1.00 | 0.92 (0.85–0.99) | 0.87 (0.82–0.93) | 0.83 (0.77–0.88) |
| | Women | 1.00 | 1.03 (0.97–1.10) | 1.02 (0.97–1.09) | 0.98 (0.92–1.04) |

*Seldom (score<0.5): less than once/6 months.
†Receptive frequency max: four times/week; creative frequency max: five times/week; and combined frequency max: nine times/week. Fully adjusted, ref.: never or seldom. The HUNT Study (2006–2008).
GP, general practitioner; HUNT, Trøndelag Health Study.

than twice), gave a slightly lower rate ratio. However, for the weekly frequency of creative activities, a lower consultation rate ratio was observed among those engaged less than once, once to less than twice a week, with estimates 0.96 (0.92, 0.99) and 0.93 (0.90, 0.96) compared with non-participants. Engagement with the highest frequency category more than twice a week, did not give further reduction. Stratified for gender, the GP consultation rate ratio among men was lowered with an increased weekly frequency of participation among those who participated with 0.90 (0.86, 0.95), 0.89 (0.85, 0.93) and 0.87 (0.82, 0.93), respectively compared with non-participants. Women who participated once up to less than twice a week had a slightly lower rate of 0.95 (0.92, 0.99), than non-participants.

Total weekly participance of combined receptive and creative cultural activities showed a slightly lower rate ratio when engaged less than once a week, with a further lower rate ratio when engaged more than twice a week with 0.92 (0.87, 0.96), as compared with those non-engaged. Gender-specific analyses revealed that this effect was only attributable to men, and increasing frequency gave a lower rate compared with those not engaged, with 0.92 (0.85, 0.99), 0.87 (0.82, 0.93) and 0.83 (0.77, 0.88), respectively. Hence, those women engaged had GP consultation visits almost as often as those non-engaged.

### Individual activities

Attending museum/art exhibitions and sports events is associated with a lower rate of GP consultations among attendees with 0.96 (0.94, 0.99), compared with non-attendees. Fully adjusted estimates are available in online supplemental additional file S3. Gender-specific analyses revealed that attending museum/art exhibitions led to lower GP visits in both genders, showing almost similar effect estimates with 0.95 (0.92, 0.99) and 0.94 (0.91, 0.97) for men and women, respectively. No other receptive activities the women attended seemed to lower the rate of GP consultations. Men attending 'concert, theatre and film' and 'sports events' had a lower rate ratio of GP consultations with 0.95 (0.91, 0.98) and 0.90 (0.87, 0.93), respectively, compared with those who did not attend. Among the individual creative activities, 'association or club meeting activities' and 'outdoor activities' lower the rate ratio of GP consultations. 'Association or club meeting activities' were attributable to both genders, with a lower rate ratio of 0.91 (0.88, 0.94) among men and 0.96 (0.93, 0.99) among women, respectively, than those reported to not participated. However, outdoor activity participation was associated with a lower rate ratio of GP consultations among engaged with 0.87 (0.83, 0.91) compared with non-engaged men. The other estimates showed the rate ratios of GP consultations were similar or lower among the non-exposed compared with those exposed.

## DISCUSSION

The associations between engagement in a wide range of cultural activities, including receptive and creative engagement, both separately and combined, were explored with

the number of GP visits. Men, but not women, who were involved in a variety of one to five creative activities had a lower rate of GP consultations. Men who engaged in both receptive and creative activities had a lower rate of GP consultations with an increasing number of activities compared with non-engaged men. The same pattern among the genders also emerged for weekly frequency estimates of engagement.

An increasing level of activity engagement among the women, measured by amount or weekly frequency, did not further add to this effect. The study findings also provide evidence to support that creative activities may affect the utilisation of GP consultations among men. Furthermore, the combination of receptive and creative activities proved to have a stronger effect attributable to engaged men.

Few studies have examined if culturally active individuals use fewer primary healthcare services. Brown *et al* found that high life satisfaction depended more on the number of different cultural activities participated in than the frequency of participation associated with each individual activity.[31] They included a mix of 78 activities. Therefore, a comparison with the present findings is challenging. However, the results indicate that, in particular, the creative engagement, regardless of variety or frequency, had implications for GP consultations. Nonetheless, increased number of activities, especially when receptive and creative activities were combined, had a greater association with GP consultations. Similarly, the findings indicated that the associations depended more on the number of activities respondents were engaged in, compared with the frequency of participation. As the number of activities increases, so does the frequency. Consequently, these two measures are not completely separated. Moreover, high frequency level does not have to be the same as a variety of activities. There is a lack of studies that can confirm our findings.

In relation to lower utilisation of GP consultations, men were most advantaged by being engaged. Previous research using the HUNT3 cohort, as used in this study, explored gender differences[4 15 32] and revealed gender-dependent association between engagement and both physical[4 32] and mental health aspects.[15] Cuypers *et al* showed an association between engagement in cultural life and better self-reported health, quality of life, and lower levels of anxiety and depression symptoms.[15] The findings showed that men who engaged in receptive activities rather than creative ones reported better mental health-related outcomes. In contrast, the present results do not support receptive attendance among men and associations with lower demand for GP consultations. However, it is not necessary that men consult their GP for mental illness only, and different health determinants are not comparable. Therefore, the reason for this disparity is unknown. This study's dataset contains all GP consultations, including pregnancy-related controls, a set programme offered to all pregnant women, which is less affected by or dependent on cultural activity engagement. Hence, consultation may be overestimated for women within this age group. Based on the findings, it may seem that women consult GPs more independently of cultural activity engagement. Given the dearth of knowledge, further research is needed to explore gender differences.

Several recent studies have attached great importance to individual activities focused on volunteering, museums, art exhibitions and outdoor activities with various health outcomes. An increasing number of publications confirm volunteering or club meeting activity as a health-promoting intervention.[33] A systematic review and meta-analysis performed by Jenkinson *et al* revealed evidence that volunteering may benefit mental health and survival.[34] Likewise, studies have found evidence of a connection between museums and art galleries and population health.[35 36] In addition to mentioning the social role of museums, Carmic *et al* attributed it to being a conduit for public health interventions, facilitating health promotion.[35] Outdoor activity engagement is related to an active lifestyle that counteracts both inactivity and sedentary behaviour, which increases the risk of several chronic diseases.[37–39] Exercise can delay the onset of chronic disease and is the primary prevention for many chronic[40] and mental diseases,[7 41] including anxiety[42] and depression.[43] Physical activity out in nature is assumed to influence healthcare costs.[44] Several dimensions may be involved in the individual activities' nature or the mixed pattern of engagement. Unlike the variety and weekly frequency activity quantifiers, the individual measures do not consider that the participants may, at the same time, be engaged in other cultural activities.

Engagement in cultural activities has been mentioned to be multimodal and may positively affect psychological and physiological health and social factors as well as the health-related behaviour, thereby increasing public health interest.[1 45] A multitude of risk factors that are outside of the health sector system determine health and social well-being.[46] The perception of the participants' health condition is important. A study by Meulenkamp *et al* has shown that people with activity limitations participate less in society, and if their limitation is long-lasting, they are more likely to participate in volunteer and club activities.[47] Fancourt *et al* revealed findings that show that poor mental health is a barriers for engagement in arts activities.[48] The presence of mental health disorders increases with the increase of physical morbidities and challenges utilisation[49] and has been linked to increases in healthcare utilisation.[50] Multimorbidity is common[49] and increases with age. Barnett *et al* found evidence that indicates an increased prevalence for those above 65 years.[49] However, whether our findings of lower demand of GP consultation associated with engagement are related to physical or mental health challenges to a larger extent or a combination of both, is unknown. Thus, it is well documented that creative activity participation has a positive therapeutic effect on mental health diseases.[15 18 51] Some studies involving clinical patients revealed that different cultural activities are important

for patients' health and well-being[1 2 52] and can assist with managing communicable diseases.[1 45] Further research should be done to explore this aspect within the same sample. Our findings point out the possible link between engagement in cultural activities as a potential element in health promotion.

### Strengths and weaknesses of this study

The study has several strengths. The HUNT study is a large representative cohort with the inclusion of a variety of cultural activities measured and a linkage to national registers, which allowed the investigation of longitudinal associations between cultural participation and GP consultation.[24] HUNT data also include information on several health-related covariates, enabling to adjust for several confounding factors.[25] Participants were blinded to future research questions when the HUNT3 survey was carried out and during follow-up. Another advantage is the ability to link national health registry data to use GP consultations, covering both general primary care daytime consultations and out-of-hours services consultations in the evenings. High completeness in the GP's reporting of consultations is assumed because the system is economically incentivised to submit data.

Among the limitations are possible changes in engagement pattern or frequency of cultural activity participation and disease incidence during the follow-up period. The possible joint effect of several risk factors or clusters of risk factors within each individual was also not accounted for. Another limitation may be a relatively poor adjustment of socioeconomic conditions, as adjustments were made only for occupation and not income and education. Although adjustments were made for a range of confounders, residual confounding is possible, as there is a social gradient in engagement in cultural activities and GP consultation. It remains difficult to disentangle whether the association between cultural engagement and GP consultation is because of self-selection, reverse causality, or because these activities have the potential to reduce GP consultations. The number of consultations is overestimated for women of childbearing age because of pregnancy-related consultations being included in the data set. As this was an observational study, the present findings cannot infer causality. Reverse causation is of importance in this type of study, and a bidirectional relationship may be the case, as poor health may be the cause of inactivity. The healthier people are, the greater the extent to which they may engage compared with those who are less healthy. More regular engagement and higher intensity may be the case among the healthiest,[53] and they may have the opportunity to be engaged in several different activities. Reverse causality was not addressed. Therefore, residual confounding may remain. Further investigation is required, and studies performed to confirm possible mechanisms and causal direction to prove and conclude causality is necessary.

## CONCLUSIONS

The findings indicate that engagement as a creative participant, or combining both receptive attendance and creative activity participation, may lower the rate of GP consultations compared with those non-engaged over a 7-year follow-up period. The associations seem to be most evident for men engaged in both receptive and creative activities, compared with those non-engaged. The study also revealed that a higher participation frequency was associated with a lower rate of GP consultations. However, no statistical evidence was found for an association between cultural activities (frequency or type of activity) and healthcare use among women. The observational nature of this study cannot support statements of causation. Further studies are needed to explore the possible positive health benefits, which may be associated with the engagement and lower use of GP consultations, whether it applies to consulting their GP for physical and mental health reasons or comorbidity. Cultural activity participation is free of side effects and can be based on already existing services. Therefore, facilitating increased engagement in the population can potentially be cost-effective for the demand for primary healthcare.

**Author affiliations**
[1]Faculty of Nursing and Health Sciences, Nord Universitet - Levanger Campus, Levanger, Norway
[2]Department of Public Health and Nursing, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology, Trondheim, Norway
[3]HUNT Research Centre, Department of Public Health and Nursing, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology, Levanger, Norway
[4]Levanger Hospital, Nord-Trøndelag Hospital Trust, Levanger, Norway
[5]Department of Mental Health, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology, Trondheim, Norway

**Twitter** Steinar Krokstad @steinak

**Contributors** BIL, ERS, OB, SK and VR designed the study. ERS and BIL conducted the statistical analysis. BIL and VR wrote the first draft of the manuscript. BIL is responsible for the overall content as the guarantor. All authors approved the final manuscript. BIL is author guarantor.

**Funding** BIL was founded by Nord university. The Norwegian Resource Centre for Arts and Health founded all aspects of the data.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants and was approved by Regional Committee for Ethics in Medical Research and Health Research (REC). ID 2016/282/REK midt.HUNT3 Study: ID 4.2006.250. Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data may be obtained from a third party and are not publicly available. The Trøndelag Health Study (HUNT) is a collaboration between HUNT Research Centre (Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology NTNU), Trøndelag County Council, Central Norway Regional Health Authority, and the Norwegian Institute of Public Health.

**ORCID iDs**
Bente Irene Løkken http://orcid.org/0000-0002-3791-4653
Steinar Krokstad http://orcid.org/0000-0002-2932-6675

## REFERENCES

1 Fancourt D, Finn S. What is the evidence on the role of the arts in improving health and well-being? A Scoping review. Copenhagen WHO Regional Office for Europe: WHO Regional Office for Europe; 2019.
2 Staricoff RL. Arts in health: a review of the medical literature; 2004, Research report 36. Arts Council England
3 Fancourt D, Steptoe A. The art of life and death: 14 year follow-up analyses of associations between arts engagement and mortality in the English longitudinal study of ageing. *BMJ* 2019;367:l6377.
4 Løkken BI, Merom D, Sund ER, *et al*. Cultural participation and all-cause mortality, with possible gender differences: an 8-year follow-up in the HUNT study, Norway. *J Epidemiol Community Health* 2020;74:624–30.
5 Dietz WH, Douglas CE, Brownson RC. Chronic disease prevention: tobacco avoidance, physical activity, and nutrition for a healthy start. *JAMA* 2016;316:1645–6.
6 Storeng SH, Krokstad S, Westin S, *et al*. Decennial trends and inequalities in healthy life expectancy: the HUNT study, Norway. Scand J Public Health 2018;46:124–31.
7 Donovan RJ, Koushede VJ, Drane CF, *et al*. Twenty-One Reasons for Implementing the Act-Belong-Commit—'ABCs of Mental Health' Campaign. Int J Environ Res Public Health 2021;18:21.
8 Frankish CJ, Milligan CD, Reid C. A review of relationships between active living and determinants of health. Soc Sci Med 1998;47:287–301.
9 World health Organization (WHO). Social determinants of health. Report No. Eb132/14. Geneva (WHO); 2012.
10 Aaron W. Doing better and feeling worse: the political pathology of health policy. Daedalus 1977;106:105–23.
11 Fraser KD, al Sayah F. Arts-based methods in health research: a systematic review of the literature. *Arts Health* 2011;3:110–45.
12 Hjort PF. Society, community and Marginalization. Report No. 82–7172–011–2. The countermeasures and health; 1996.
13 Campagna D, Caperna G, Montalto V. Does culture make a better citizen? exploring the relationship between cultural and civic participation in Italy. *Soc Indic Res* 2020;149:657–86.
14 Davies C, Pescud M, Anwar-McHenry J, *et al*. Arts, public health and the National arts and health framework: a lexicon for health professionals. *Aust N Z J Public Health* 2016;40:304–6.
15 Cuypers K, Krokstad S, Holmen TL, *et al*. 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. *J Epidemiol Community Health* 2012;66:698–703.
16 Association of the compendium of cultural policies and trends. *Cultural Access and Participation* 2019. Available https://www.culturalpolicies.net/web/cultural-participation.php
17 Cuypers KF, Knudtsen MS, Sandgren M, *et al*. Cultural activities and public health: research in Norway and Sweden. An overview. *Arts Health* 2011;3:6–26.
18 Davies CR, Rosenberg M, Knuiman M, *et al*. Defining arts engagement for population-based health research: art forms, activities and level of engagement. *Arts Health* 2012;4:203–16.
19 Downward P, Dawson P. Is it Pleasure or health from leisure that we benefit from most? an analysis of well-being alternatives and implications for policy. *Soc Indic Res* 2016;126:443–65.
20 Węziak-Białowolska D. Attendance of cultural events and involvement with the arts-impact evaluation on health and well-being from a Swiss household panel survey. *Public Health* 2016;139:161–9.
21 Wheatley D, Bickerton C. Subjective well-being and engagement in arts, culture and sport. *J Cult Econ* 2017;41:23–45.
22 Tymoszuk U, Spiro N, Perkins R, *et al*. Arts engagement trends in the United Kingdom and their mental and social wellbeing implications: hearts survey. *PLoS One* 2021;16:e0246078.
23 Wang S, Mak HW, Fancourt D. Arts, mental distress, mental health functioning & life satisfaction: fixed-effects analyses of a nationally-representative panel study. *BMC Public Health* 2020;20:208.
24 Holmen J, Nguyen C, Haapnes O, *et al*. Culture and health in the HUNT Study - A method evaluationKultur og helse i HUNT - En metodeevaluering. Nor J Epidemiol 2016;26:139–44.
25 Krokstad S, Langhammer A, Hveem K, *et al*. Cohort profile: the HUNT study, Norway. *Int J Epidemiol* 2013;42:968–77.
26 Forskrift Om stønad TIL dekning AV utgifter TIL undersøkelse OG behandling HOS lege 2020.
27 International Labour Organization (IOL). *ISOC-88: International Labour Organization (IOL)*. 2004. Available: http://www.ilo.org/public/english/bureau/stat/isco/isco88/index.htm
28 Pedersen AG, Ellingsen CL. Data quality in the causes of death registry. Tidskr Nor Lægeforen 2015;8:768–70.
29 Date S. Negative binomial regression: a step by step guide 2019.
30 Vandenbroucke JP, von Elm E, Altman DG, *et al*. Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration. *Ann Intern Med* 2007;147:W163–94.
31 Brown JL, MacDonald R, Mitchell R. Are people who participate in cultural activities more satisfied with life? *Soc Indic Res* 2015;122:135–46.
32 Løkken BI, Merom D, Sund ER, *et al*. Association of engagement in cultural activities with cause-specific mortality determined through an eight-year follow up: the HUNT study, Norway. *PLoS One* 2021;16:e0248332.
33 Han SH, Kim K, Burr JA. Stress-buffering effects of volunteering on salivary cortisol: results from a daily diary study. *Soc Sci Med* 2018;201:120–6.
34 Jenkinson CE, Dickens AP, Jones K, *et al*. Is volunteering a public health intervention? A systematic review and meta-analysis of the health and survival of volunteers. *BMC Public Health* 2013;13:773.
35 Camic PM, Chatterjee HJ. Museums and art galleries as partners for public health interventions. *Perspect Public Health* 2013;133:66–71.
36 Chatterjee HJ, Camic PM. The health and well-being potential of museums and art galleries. *Arts Health* 2015;7:183–6.
37 Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: the evidence. *CMAJ* 2006;174:801–9.
38 Mora S, Cook N, Buring JE, *et al*. Physical activity and reduced risk of cardiovascular events: potential mediating mechanisms. Circulation 2007;116:2110–8.
39 Lavie CJ, Ozemek C, Carbone S, *et al*. Sedentary behavior, exercise, and cardiovascular health. Circ Res 2019;124:799–815.
40 Booth FW, Roberts CK, Laye MJ. Lack of exercise is a major cause of chronic diseases. Compr Physiol 2012;2:1143–211.
41 Stubbs B, Vancampfort D, Smith L, *et al*. Physical activity and mental health. *Lancet Psychiatry* 2018;5:873.
42 Schuch FB, Stubbs B, Meyer J, *et al*. Physical activity protects from incident anxiety: A meta-analysis of prospective cohort studies. *Depress Anxiety* 2019;36:846–58.
43 Schuch F, Vancampfort D, Firth J, *et al*. Physical activity and sedentary behavior in people with major depressive disorder: a systematic review and meta-analysis. *J Affect Disord* 2017;210:139–50.
44 Lauwers L, Bastiaens H, Remmen R, *et al*. Nature's contributions to human health: a missing link to primary health care? A Scoping review of international overview reports and scientific evidence. *Front Public Health* 2020;8:52.
45 Fancourt D, Aughterson H, Finn S, *et al*. How leisure activities affect health: a narrative review and multi-level theoretical framework of mechanisms of action. *Lancet Psychiatry* 2021;8:329–39.
46 Kumar S, Preetha G. Health promotion: an effective tool for global health. *Indian J Community Med* 2012;37:5.
47 Meulenkamp T, Rijken M, Cardol M, *et al*. People with activity limitations' perceptions of their health condition and their relationships with social participation and experienced autonomy. *BMC Public Health* 2019;19:1536.
48 Fancourt D, Baxter L, Lorencatto F. Barriers and enablers to engagement in participatory arts activities amongst individuals with depression and anxiety: quantitative analyses using a behaviour change framework. *BMC Public Health* 2020;20:272.
49 Barnett K, Mercer SW, Norbury M, *et al*. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012;380:37–43.
50 Prior A, Vestergaard M, Larsen KK, *et al*. Association between perceived stress, multimorbidity and primary care health services: a Danish population-based cohort study. *BMJ Open* 2018;8:e018323.
51 Leckey J. The therapeutic effectiveness of creative activities on mental well-being: a systematic review of the literature. *J Psychiatr Ment Health Nurs* 2011;18:501–9.
52 World Health organization (WHO). What is the evidence on the role of the arts in improving health and well-being? A Scoping review. Geneva, Available: http://www.euro.who.int/en/publications/abstracts/what-is-the-evidence-on-the-role-of-the-arts-in-improving-health-and-well-being-a-scoping-review-2019
53 Rizzuto D, Fratiglioni L. Lifestyle factors related to mortality and survival: a mini-review. *Gerontology* 2014;60:327–35.

54 Langhammer A, Krokstad S, Romundstad P, *et al*. The HUNT study: participation is associated with survival and depends on socioeconomic status, diseases and symptoms. *BMC Med Res Methodol* 2012;12:143:1–14.:.