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Research article

Quality of life, psychological distress, and physical activity in people with asthma or sleep apnoea during the COVID-19 pandemic from a Finnish national survey

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ABSTRACT

Background: Individuals with respiratory diseases were considered at increased risk for severe COVID-19 and were advised to self-isolate early in the pandemic. This study examined the impact of these measures on quality of life, psychological distress, and physical activity among Finnish individuals with asthma or obstructive sleep apnoea (OSA).

Patients and methods: Data were drawn from the National FinHealth 2017 study and its 2020 follow-up. In addition to COVID-19-related questions, responses concerning quality of life, psychological well-being, and physical activity were analysed. The sample (N = 4814; 2674 females, 2140 males) was stratified by sex and age. Diagnostic information on asthma and OSA was obtained from national health registers.

Results: Pandemic-related concerns were common across all participants. Those with asthma or OSA reported significantly poorer quality of life ($p < .001$), greater psychological distress ($p = .001$ for asthma; $p < .001$ for OSA), and lower physical activity ($p = .001$ for asthma; $p = .002$ for OSA) compared to individuals without these conditions. These differences were evident prior to the pandemic. During follow-up, psychological distress increased ($p = .001$ for asthma; $p < .001$ for OSA) and physical activity declined further ($p < .001$ for both).

Conclusions: Individuals with asthma or OSA had poorer quality of life, greater psychological distress, and lower physical activity than those without these conditions—even before the pandemic. While psychological distress and physical activity worsened during the pandemic, changes in quality of life were not significantly different compared to the general population. These findings highlight the need for targeted, multidisciplinary support, especially for younger individuals and women.

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1. Introduction

COVID-19, caused by the novel SARS-CoV-2 virus, has permanently changed the lives of many people since the beginning of the pandemic in 2020 [1,2]. The uncertainty of the future, rapidly changing restrictions on normal life and concern of one's health and employment have collectively created an increased socioeconomic burden [3]. Since the early days of the pandemic, it has been known that certain patient groups are more susceptible to having a more severe form of COVID-19. Therefore, the most stringent restrictions were directed at these groups [4]. In Finland, patients with respiratory diseases are considered to have an increased risk of severe COVID-19 [5]. Although accumulating international data indicate that obstructive sleep apnoea (OSA) is a risk factor for more severe COVID-19 [6,7], data are less conclusive for asthma [8,9]. Some studies even suggest that asthma with Th2 cell type inflammation may be a protective factor against severe COVID-19 [10]. The mechanisms that lead to a more severe COVID-19 have been studied vigorously since the disease appeared. Regarding the lungs, there have been suggestions of multiple pathways involved in more severe disease or rapid progression, such as Wnt5a, sonic hedgehog, IL-6, and plasma cytokines [11–13]. However, especially in the early days of the pandemic, patients with pulmonary diseases were advised to isolate themselves, and this recommendation continued until the beginning of the year 2022.

The quality of life among patients with confirmed SARS-CoV-2 infection and the effects of the pandemic and isolation have been studied to some extent [14,15]. To our knowledge, there have been no studies that focused specifically on patients with respiratory diseases. Population studies have indicated that the pandemic, especially the lockdown periods, influenced quality of life. Women, the elderly, and people with chronic diseases were particularly affected by these restrictions [14,16].

Numerous studies indicate that psychological distress increased during the pandemic. Many factors are associated with a higher risk of increased psychological distress, such as female sex and age $<$40 years [17,18]. Due to the overwhelming influence of COVID-19 globally on physical health, economic situations, and social environments, the challenge of facing the uncertainties of this new era affected not only patients with COVID-19 but people from all walks of life.

Particularly in the early pandemic, strict home isolation was advised in most parts of the world, leading to a substantial decrease in physical activity [19]. However, in contrast to many other countries, citizens were encouraged to walk and exercise outdoors regularly in Finland, where nature is vast and the population density is low. While this may have maintained the Finnish population's physical activity through the strictest isolation period, to our knowledge, no international comparisons have yet been published.

Our aim was to study the effect of the COVID-19 pandemic on quality of life, psychological health, and change in physical activity among patients with asthma or OSA and to compare these to individuals without these diseases in a resurvey in 2020 (during the pandemic) to a national health examination survey in 2017 (before the pandemic) representing the Finnish adult population.

2. Participants and methods

Data were derived from the National FinHealth 2017 Study (conducted in spring 2017) and its follow-up study (conducted October 2020 to January 2021). For the FinHealth 2017 Study, the sample was randomly selected from the Finnish population aged $\geq$18 years to represent the Finnish adult population [20]. The study included questionnaires and physical examination. All participants from the original sample (N = 10,305) in 2017 who were alive, living in Finland, and had not refused or withdrawn their consent to further contacts were invited to the follow-up study in 2020 (N = 9580). For the FinHealth 2017 Study, the participants were randomly selected from the Finnish population. Inclusion criteria included age $>$18 years and living in Finland. Minors were excluded. The follow-up study in 2020 (n = 9580) inclusion criteria were: age 25 years or over, responded in both 2017 and 2020, alive, living in Finland, and had not refused or withdrawn their consent to further contacts. Exclusion criteria included death, moved abroad, unknown address, or refused further contact in 2017. The follow-up study included selected items from the questionnaires used in 2017 together with some new questions regarding the COVID-19 pandemic. No physical examination was performed. The Ethics Committee at the Hospital District of Helsinki and Uusimaa (37/13/03/00/16 on 22.3.2016 and HUS/2391/2020 on 20.10.2020) approved both data collections. A separate written informed consent form was obtained only during the initial data collection in 2017. Participants in the original 2017 study were informed that their response constituted consent for the use of their data. In the 2017 study, the consent form was sent to participants together with the invitation letter to their home address. Participants had the option to complete the consent form either at the study site or at home and return it by mail. In addition, an electronic option was available, allowing participants to complete the consent form online.

Identification numbers were created for each participant that enabled the linkage of all research materials during the data collection and also for later analyses, without using names or birth dates. Each person in the sample received an identification code, personalized bar code numbers for questionnaires, and a password to access the electronic portal for questionnaires. In these ways the data were pseudonymized in line with the General Data Protection Regulation (GDPR 2019), so that the personal data could no longer be attributed to a specific participant without the use of additional information, which is kept separately at the Finnish Institute for Health and Welfare and available only to a few data managers.

In this study, we analysed responses to the questions regarding quality of life, psychological health, and physical activity in FinHealth 2017 and 2020. In addition, new questions regarding the COVID-19 pandemic were included from the 2020 study. Data for persons who had responded in both 2017 and 2020 and were aged $\geq$25 years were included in the analysis. The response rate was 51% (N = 4814). Age groups were defined according to the classification of risk groups [5].

Data on diagnosis of asthma, OSA, or both were derived from the Care Register for Health Care (HILMO) [21], including International Classification of Diseases ICD-10 codes J45 (asthma), J46 (status asthmaticus), G47.3 (obstructive sleep apnoea) and International Classification of Primary Care © Wonca 2005-2014 ICPC-2 code R96 (asthma), and Social Insurance Institution of Finland

for data on special reimbursement for medicine expenses for asthma [22]. The participant was considered to have the disease if the diagnosis was found in either database during the previous 5 years prior to the baseline survey in 2017. It should be noted that registry-based disease identification may be subject to limitations, such as undiagnosed or misclassified cases. There were not enough participants with chronic obstructive pulmonary disease (COPD, ICD-10 code J43-J44 and ICPC-2 code R95) (N = 49, Table 1, Fig. 1) to perform reliable analyses.

Smoking was categorized as 1) current smoker, 2) former smoker, or 3) never smoker. Current smokers included all participants who reported smoking at least one cigarette, cigar, snus, e-cigarette, or pipe daily or almost daily during the last year preceding the survey. Former smokers had quit smoking at least 1 month prior to the survey.

2.1. Variables

Participants responded to either mailed paper questionnaires or to an electronic survey.

The questions regarding concerns over COVID-19 focused on a) distress of being infected with COVID-19, b) financial insecurity during the pandemic, c) accessibility of health care, and d) worries regarding friends and family. The answer options were 1) never, 2) a little, 3) somewhat, 4) quite a bit, and 5) a lot of worries. If the participant answered 3 to 5 (somewhat, quite a bit, or a lot of) to one of these four questions, they were considered as having a little concern burden. If they answered 3 to 5 in two or more of these four questions, they were considered as having a high concern burden.

Quality of life was assessed with EuroHIS-QoL 8-item index [23]. The final score is the sum of the scores in each answer to eight questions. Each answer scale has a 5-point response format on a Likert scale; the higher the score, the better the quality of life. A binary categorization of the EuroHIS-QoL 8-item index was created to represent low or high quality of life. The cut-off index was set to 4 points, where 4 points or more illustrate a high quality of life and 3 points or less indicate low quality of life. To identify change, the following four-category item was created: good at both (in 2017 and 2020), bad at both, change for better (bad in 2017, good in 2020), and change for worse (good in 2017, bad in 2020).

Psychological distress was assessed with the Mental Health Inventory questionnaire (MHI-5) [24]. MHI-5 includes five questions on mood and anxiety during the previous 4 weeks. The possible answers were a) all the time, b) most of the time, c) a fair amount of time, d) some time, e) a little, f) not at all. The score is calculated by ranking these answers from 1 to 6 after switching answers c and e in the third and in the fifth question. This result is converted to a scale from 0 to 100. In this study, being psychologically distressed was defined as having MHI-5 score $\leq$52. To identify change, the following four-category item was created: good, not distressed at both (in 2017 and 2020), bad, distressed at both, change for better (bad/distressed in 2017, good/not distressed in 2020), and change for worse (good in 2017, bad in 2020).

Physical exercise was evaluated with a question 'How much do you exercise and stress yourself physically in your leisure time?' The answers were 1) In my leisure time I read, watch TV, and do other activities in which I do not move much, and which do not strain me physically; 2) In my leisure time I walk, cycle, and move in other ways several hours a week. This includes walking, fishing, and hunting, and light home gardening; 3) In my leisure time I exercise several hours a week. This includes running, jogging, cross-country skiing, fitness training, swimming, ball games, and strenuous garden work; 4) In my leisure time I regularly practice strenuous sport several times per week. This includes competitive sports such as running, orienteering, cross-country skiing, swimming, and ball games. Categories 2-4 were considered as physically active, category 1 as inactive. To identify change, the following four-category item was created: active at both (in 2017 and 2020), inactive at both, change for better (inactive in 2017, active in 2020), change for worse (active in 2017, inactive in 2020).

We asked about the most common symptoms to evaluate if participants have had COVID-19, including loss of smell and taste, headache, cough, fever, dyspnoea, and pain in the middle of chest while breathing. The participants were categorized as 'COVID-19 infected' if they had had a loss of smell and taste and additionally one, or two or more other symptoms during the last 6 months prior to the study.

Table 1
Baseline characteristics of the study population.

	Asthma, N = 334	COPD, N = 49	OSA, N = 237
Gender, N (%)			
Men	99 (30)	26 (53)	146 (62)
Women	235 (70)	23 (47)	91 (38)
Smoking, N (%)			
Current	24 (7)	21 (44)	26 (11)
Former/quit smoking	13 (4)	1 (2)	9 (4)
Never	287 (89)	26 (54)	196 (85)
Age, N (%)			
25-49 years	84 (25)	2 (4)	43 (18)
50-64 years	111 (33)	17 (35)	114 (48)
$\geq$65 years	139 (42)	30 (61)	80 (34)

COPD Chronic Obstructive Pulmonary Disease, OSA Obstructive Sleep Apnoea.

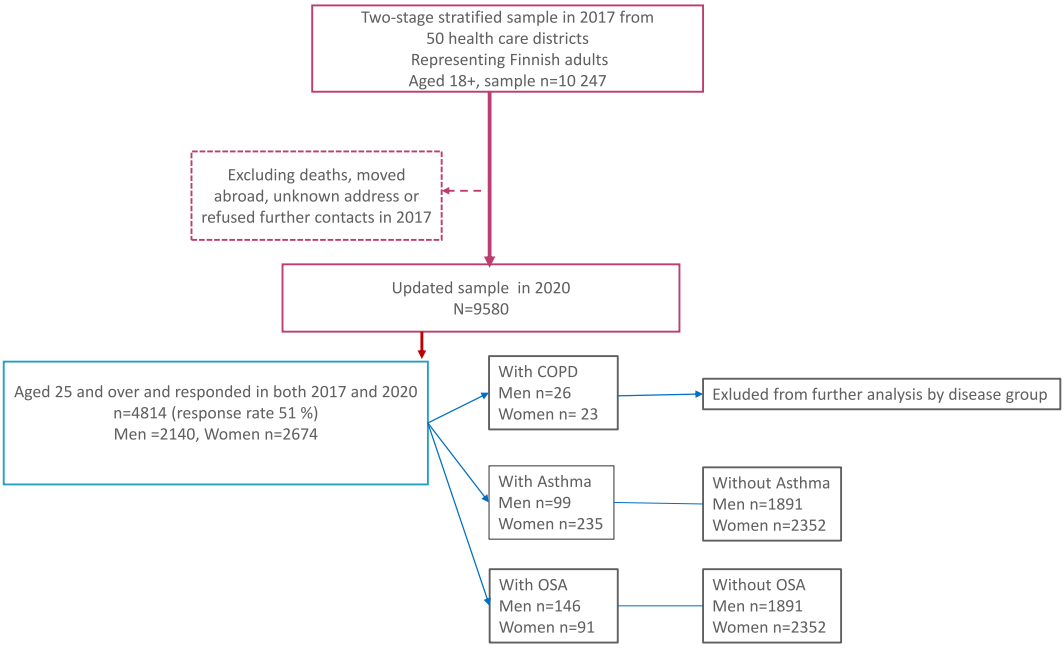

Fig. 1. Flowchart of the participant selection.

2.2. Statistical analysis

Statistical analyses were performed using Stata 16 considering the sampling design and using inverse probability weights to reduce bias due to non-participation [25]. We analysed the age- and sex-stratified prevalence with 95% confidence intervals (CI) to changes in quality of life, psychological distress, and physical activity between 2017 and 2020 by multinomial logistic regression using predictive margins. The dependent variables were concerns over COVID, quality of life, psychological distress, and physical exercise. Statistically significant differences between those with or without asthma or OSA was analysed using the Wald test. We analysed differences across all four possible categories of changes and separately only in categories where changes were good or bad between 2017 and 2020. All

Table 2
Burden of concerns regarding COVID-19 and its effects.

Concerns (%, SD)	Participants with Asthma (%, 95% CI)	Participants without Asthma (%, 95% CI)	p-value	Participants with OSA (%, 95% CI)	Participants without OSA (%, 95% CI)	p-value
All						
none	13.9 (10.0-19.1)	19.7 (18.2-21.4)		17.3 (13.3-22.0)	19.7 (18.2-21.4)	
little	17.4 (12.4-23.9)	20.3 (18.8-21.8)		17.3 (13.0-22.7)	20.3 (18.8-21.8)	
high	68.7 (61.5-75.1)	60.0 (58.3-61.6)	0.026	65.5 (59.3-71.2)	60.0 (58.3-61.7)	0.222
Age 25-49 years						
none	11.9 (5.7-23.2)	19.0 (16.6-21.6)		18.7 (10.0-32.2)	19.0 (16.6-21.6)	
little	20.2 (11.6-33.0)	21.4 (19.1-23.9)		14.3 (6.1-30.2)	21.5 (19.2-24.0)	
high	67.8 (55.9-77.7)	59.6 (56.9-62.3)	0.263	67.0 (53.6-78.1)	59.5 (56.8-62.2)	0.5
Aged 50-64 years						
none	13.2 (7.7-21.7)	20.7 (18.5-23.2)		18.3 (12.8-25.5)	20.8 (18.5-23.3)	
little	17.6 (11.0-26.9)	19.5 (17.2-22.0)		16.4 (10.5-24.6)	19.6 (17.4-22.1)	
high	69.2 (57.4-78.9)	59.8 (57.5-62.0)	0.183	65.3 (55.5-74.0)	59.6 (57.2-61.8)	0.53
Aged ≥65 years						
none	18.7 (10.8-26.6)	20.0 (17.6-22.4)		12.5 (6.2-23.5)	20.1 (17.8-22.6)	
little	14.7 (7.2-22.1)	18.8 (16.6-21.1)		17.5 (11.5-25.7)	18.8 (16.7-21.1)	
high	66.6 (56.9-76.3)	61.2 (58.3-64.1)	0.527	70.0 (57.8-79.9)	61.1 (58.2-64.0)	0.32
Men						
none	12.8 (7.2-21.6)	22.0 (19.7-24.5)		18.7 (13.2-25.6)	22.0 (19.7-24.5)	
little	22.7 (15.3-32.4)	22.1 (19.8-24.5)		21.1 (14.8-29.3)	22.0 (19.8-24.4)	
high	64.5 (51.9-75.4)	55.9 (53.2-58.6)	0.117	60.2 (51.2-68.6)	55.9 (53.2-58.6)	0.58
Women						
none	14.3 (9.5-21.0)	17.6 (15.8-19.6)		14.4 (9.1-22.0)	17.6 (15.7-19.6)	
little	15.1 (10.0-22.3)	18.7 (17.1-20.4)		10.6 (5.7-18.9)	18.7 (17.1-20.3)	0.07
high	70.6 (63.0-77.1)	63.7 (61.7-65.7)	0.176	75.0 (65.5-82.6)	63.7 (61.7-65.7)	

p indicates differences between participants with and without asthma or OSA.

analyses were adjusted for smoking. Analyses concerning all participants were additionally adjusted for age and/or sex. Multinomial logistic regression models were used when the outcome variable was categorical with more than two levels. In cases where the outcome variable was binary, standard logistic regression models were applied. To avoid negative confidence intervals for small proportions we applied a logit-scale delta method transformation when calculating the confidence intervals. Interaction effects between age and sex were not tested, as the analyses were conducted separately by age group and sex. Also, the group sizes were quite small for interaction testing in some cases.

3. Results

There were 4814 participants; 2674 (56%) were women and 2140 (44%) were men. Typical COVID-19 symptoms were reported by 253 (5.3%) participants; 146 had loss of taste and smell and two additional symptoms, and 107 had one additional symptom. Baseline characteristics are shown in Table 1 and patient selection in Fig. 1. In total, there were 334 (5.9%) participants with asthma and 237

Table 3
Quality of life in 2017 and 2020 among participants with and without asthma or OSA.

Quality of life	Participants with Asthma (%, 95% CI)	Participants without Asthma (%, 95% CI))	p-value	Participants with OSA (%, 95% CI)	Participants without OSA (%, 95% CI)	p-value
All						
Good at both	35.5 (29.9-41.5)	51.3 (49.4-53.2)		32.8 (27.2-39.0)	51.2 (49.4-53.1)	
Bad at both	35.7 (29.2-42.7)	23.6 (22.2-25.1)		41.2 (34.0-48.8)	23.7 (22.2-25.2)	
Change for better	15.5 (11.8-20.1)	11.3 (10.2-12.4)	0.168[a]	12.5 (8.3-18.2)	11.3 (10.2-12.4)	0.175[a]
Change for worse	13.4 (9.3-18.9)	13.8 (12.5-15.2)	<0.001[#]	13.5 (8.4-21.0)	13.8 (12.5-15.2)	<0.001[#]
Aged 25-49 years						
Good at both	28.6 (17.7-42.6)	51.3 (48.2-54.4)		26.5 (13.1-46.4)	51.3 (48.1-54.4)	
Bad at both	43.4 (30.7-56.9)	23.2 (20.9-25.7)		52.4 (32.2-71.9)	23.2 (20.9-25.7)	
Change for better	14.6 (7.2-27.3)	11.1 (9.2-13.3)	0.224[a]	5.1 (1.4-17.0)	11.1 (9.2-13.3)	0.203[a]
Change for worse	13.5 (7.3-23.8)	14.4 (12.5-16.7)	0.004[#]	15.9 (5.9-36.5)	14.4 (12.4-16.7)	0.003[#]
Aged 50-64 years						
Good at both	38.3 (30.2-47.0)	52.8 (49.5-56.1)		35.7 (27.5-45.0)	52.9 (49.7-56.2)	
Bad at both	28.0 (19.4-38.6)	23.1 (20.6-25.8)		37.9 (30.0-46.5)	23.0 (20.5-25.7)	
Change for better	15.4 (9.3-24.5)	11.5 (9.7-13.5)	0.777[a]	15.5 (8.8-26.0)	11.5 (9.7-13.6)	0.373[a]
Change for worse	18.3 (11.4-28.3)	12.6 (10.6-14.9)	0.023[#]	10.9 (6.2-18.3)	12.6 (10.6-14.9)	0.001[#]
Aged ≥65 years						
Good at both	41.8 (33.0-50.7)	49.5 (46.5-52.5)		29.3 (18.7-42.8)	49.5 (46.5-52.6)	
Bad at both	33.4 (24.9-42.0)	25.1 (22.4-27.9)		42.2 (28.7-56.9)	25.1 (22.5-27.9)	
Change for better	17.0 (9.7-24.3)	11.4 (9.7-13.0)	0.275[a]	14.0 (6.8-26.5)	11.3 (9.8-13.1)	<0.001[a]
Change for worse	7.7 (2.0-13.4)	14.0 (11.8-16.2)	0.062[#]	14.5 (8.1-24.7)	14.0 (11.9-16.4)	0.031[#]
Men						
Good at both	32.7 (22.7-44.7)	53.5 (50.7-56.2)		42.5 (34.4-51.0)	53.4 (50.7-56.1)	
Bad at both	42.5 (29.2-57.0)	22.4 (20.5-24.4)		31.4 (22.1-42.4)	22.4 (20.5-24.5)	
Change for better	15.8 (8.7-27.1)	11.3 (9.7-13.1)	0.683[a]	12.0 (6.9-19.9)	11.3 (9.7-13.1)	0.844[a]
Change for worse	9.0 (4.0-19.0)	12.9 (11.0-15.0)	<0.001[#]	14.2 (7.2-26.0)	12.9 (11.0-15.0)	0.077[#]
Women						
Good at both	36.7 (30.4-43.6)	49.4 (47.2-51.6)		17.1 (9.5-28.7)	49.3 (47.1-51.6)	
Bad at both	32.8 (26.1-40.2)	24.7 (22.6-27.0)		57.0 (46.2-67.3)	24.8 (22.6-27.1)	
Change for better	15.3 (11.3-20.4)	11.3 (9.9-12.7)	0.079[a]	13.4 (7.7-22.2)	11.3 (9.9-12.7)	0.062[a]
Change for worse	15.2 (10.6-21.2)	14.6 (12.9-16.5)	0.002[#]	12.5 (6.6-22.5)	14.6 (12.9-16.5)	<0.001[#]

[a] *p value including groups 'Change for better' and 'Change for worse'; #p value including all four groups. To identify change in questionnaire points indicating quality of life, the following four-category item was created: good quality of life at both (in 2017 and 2020), bad at both, change for better (bad in 2017, good in 2020), and change for worse (good in 2017, bad in 2020).*

(4.8%) with OSA.

3.1. Concerns regarding COVID-19 and effects of the pandemic

Participants with asthma had more concerns regarding COVID-19 than those without asthma. However, there were no differences after adjustment for age. In participants with OSA, there were more concerns in women, but other subgroups did not differ. In general, a lot of concerns were reported in all age groups and in both sexes (Table 2).

3.2. Quality of life

Quality of life was more impaired in participants with asthma than without asthma, regardless of sex. There was no difference in the change in quality of life. Lower quality of life was found in both surveys in participants with asthma when compared with participants without asthma in the age group 25-49 years (p = .004) and in the age group 50-64 years (p = .023); there were no significant differences in the change. In participants aged ≥65 years, there were no differences between the participants with asthma and without asthma.

Quality of life was significantly poorer in participants with OSA than participants without OSA in all age groups and among women; this was the case even before the pandemic. The change in the quality of life differed significantly only among the participants with OSA aged ≥65 when compared to participants without OSA. There were no differences between participants with or without OSA among men (Table 3).

Table 4
Psychological distress in 2017 and 2020 among participants with and without asthma or OSA.

Psychological distress	Participants with Asthma (%, 95% CI)	Participants without Asthma (%, 95% CI)	p-value	Participants with OSA (%, 95% CI))	Participants without OSA (%, 95% CI)	p-value
All						
Good at both	78.6 (72.2-83.9)	88.6 (87.5-89.7)		73.8 (67.5-79.2)	88.6 (87.5-89.7)	
Bad at both	5.5 (3.0- 9.9)	2.7 (2.2- 3.2)		8.6 (5.2-13.9)	2.7 (2.2- 3.2)	
Change for better	6.7 (4.0-10.9)	3.4 (2.8- 4.1)	0.001[a]	4.7 (2.2- 9.8)	3.4 (2.8- 4.1)	<0.001[a]
Change for worse	9.2 (5.9-13.9)	5.3 (4.6- 6.1)	0.001[#]	12.9 (9.2-17.8)	5.3 (4.6- 6.1)	<0.001[#]
Aged 25-49 years						
Good at both	74.3 (64.0-82.5)	85.9 (83.8-87.7)		67.4 (51.4-80.1)	85.9 (83.9-87.8)	
Bad at both	8.5 (3.8-17.7)	3.2 (2.4- 4.2)		8.7 (2.9-23.5)	3.2 (2.4- 4.2)	
Change for better	7.3 (3.0-16.7)	4.0 (3.1- 5.2)	0.02[a]	2.9 (0.4- 18.4)	4.0 (3.0- 5.2)	0.004[a]
Change for worse	9.9 (5.0-18.8)	7.0 (5.7- 8.5)	0.02[#]	21.0 (10.8-36.9)	6.9 (5.7- 8.4)	0.003[#]
Aged 50-64 years						
Good at both	88.2 (79.6-93.5)	90.5 (88.8-92.0)		79.2 (70.1-86.2)	90.6 (89.0-92.1)	
Bad at both	1.2 (0.2- 7.5)	2.4 (1.7- 3.4)		7.6 (3.9-14.3)	2.4 (1.7- 3.4)	
Change for better	7.5 (3.7-14.4)	3.8 (2.8- 5.2)	<0001[a]	4.7 (1.8- 12.0)	3.7 (2.7- 5.1)	<0.001[a]
Change for worse	3.1 (1.0- 9.1)	3.3 (2.4- 4.5)	0.208[#]	8.4 (4.2-16.2)	3.2 (2.3- 4.4)	0.001[#]
Aged ≥65 years						
Good at both	82.9 (71.7-90.2)	92.3 (90.4-93.8)		75.7 (62.2-85.5)	92.3 (90.4-93.8)	
Bad at both	4.5 (1.2-14.8)	1.9 (1.2- 2.8)		7.4 (3.1-16.9)	1.9 (1.2- 2.9)	
Change for better	2.1 (0.5- 7.9)	1.6 (1.0- 2.6)	<0.001[a]	6.6 (2.5-16.3)	1.6 (1.0- 2.6)	<0.001[a]
Change for worse	10.6 (5.1-20.7)	4.3 (3.1- 5.8)	0.06[#]	10.3 (5.1-19.6)	4.3 (3.1- 5.8)	0.001[#]
Men						
Good at both	78.2 (65.2-87.3)	90.7 (88.9-92.3)		73.9 (66.2-80.4)	90.7 (88.9-92.3)	
Bad at both	7.3 (2.5-19.7)	2.6 (1.9- 3.5)		6.9 (3.5-13.0)	2.6 (1.9- 3.5)	
Change for better	10.0 (4.1-22.5)	2.5 (1.9- 3.4)	0.062[a]	4.3 (1.5- 11.7)	2.5 (1.9- 3.4)	0.011[a]
Change for worse	4.5 (1.5- 12.5)	4.2 (3.2- 5.5)	0.01[#]	14.9 (9.9-21.8)	4.2 (3.1- 5.5)	<0.001[#]
Women						
Good at both	78.9 (71.1-85.0)	86.7 (85.3-88.1)		72.8 (60.2-82.5)	86.7 (85.3-88.1)	
Bad at both	4.8 (2.3-9.9)	2.7 (2.1- 3.5)		12.6 (5.8-25.4)	2.7 (2.1- 3.5)	
Change for better	5.2 (2.7- 9.8)	4.2 (3.3- 5.2)	0.012[a]	5.5 (2.0-14.4)	4.2 (3.3- 5.2)	0.097[a]
Change for worse	11.1 (6.9-17.2)	6.4 (5.4- 7.5)	0.069[#]	9.1 (4.5-17.5)	6.4 (5.4- 7.5)	0.001#

[a] *p value including groups 'Change for better' and 'Change for worse'; #p value including all four groups.*

3.3. Psychological distress

In general, psychological distress in this study was low in all subgroups studied but was somewhat higher among participants with asthma than in those without. Of note, psychological distress differed in younger participants with asthma in the age group 25-49 and in men when compared with participants without asthma. There were no differences in other age groups or among women. Moreover, the change in psychological distress differed significantly between the participants with asthma and without asthma in all groups except in men.

In participants with OSA, the psychological distress was greater in all age groups and both sexes than in participants without OSA. However, the change in psychological distress in women was similar in participants with or without OSA (Table 4).

Table 5
Physical activity in 2017 and 2020 among participants with and without asthma or OSA.

Physical activity	Participants with Asthma (%, 95% CI)	Participants without Asthma (%, 95% CI)	p-value	Participants with OSA (%, 95% CI)	Participants without OSA (%, 95% CI)	p-value
All						
Active at both	59.2 (53.7-64.4)	68.6 (67.1-70.1)		54.2 (46.4-61.9)	68.5 (67.0-70.0)	
Non-active at both	21.6 (17.1-26.9)	14.0 (12.9-15.2)		24.1 (17.6-32.0)	14.0 (12.9-15.2)	
Change for better	6.8 (4.2-10.9)	7.7 (6.9- 8.6)	<0.001[a]	9.3 (5.6-15.1)	7.7 (6.9- 8.6)	<0.001[a]
Change for worse	12.5 (8.8-17.4)	9.7 (8.8-10.7)	0.001	12.3 (8.5-17.5)	9.8 (8.8-10.8)	0.002
Aged 25-49 years						
Active at both	65.5 (53.4-75.9)	70.2 (67.6-72.6)		50.1 (34.4-65.7)	70.2 (67.6-72.7)	
Non-active at both	14.7 (7.3-27.5)	12.5 (10.9-14.4)		25.2 (12.7-43.7)	12.6 (10.9-14.5)	
Change for better	7.4 (2.9-17.9)	7.9 (6.7- 9.3)	0.203[a]	8.7 (2.8-24.4)	7.9 (6.7- 9.2)	0.104[a]
Change for worse	12.4 (6.7-21.6)	9.4 (7.8-11.3)	0.744	16.1 (7.3-31.7)	9.4 (7.8-11.2)	0.039
Aged 50-64 years						
Active at both	62.5 (53.3-70.9)	69.5 (66.7-72.1)		56.0 (46.0-65.5)	69.6 (66.8-72.2)	
Non-active at both	18.9 (12.1-28.3)	12.1 (10.3-14.0)		23.0 (15.3-32.9)	12.0 (10.3-14.0)	
Change for better	4.5 (1.8- 10.5)	8.9 (7.4-10.8)	0.048[a]	11.1 (6.4-18.7)	8.9 (7.4-10.7)	0.171[a]
Change for worse	14.1 (8.1-23.5)	9.5 (8.0-11.4)	0.017	10.0 (5.4-17.6)	9.5 (7.9-11.3)	0.021
Aged ≥65 years						
Active at both	50.5 (41.9-59.1)	64.2 (61.4-66.9)		45.8 (35.5-56.6)	64.3 (61.6-67.0)	
Non-active at both	32.8 (23.9-43.2)	19.0 (16.8-21.4)		32.8 (23.4-43.9)	18.9 (16.7-21.3)	
Change for better	7.1 (3.7-13.4)	6.1 (4.8- 7.6)	0.002[a]	5.9 (2.1-15.6)	6.1 (4.8- 7.6)	0.001[a]
Change for worse	9.5 (4.9-17.6)	10.7 (8.9-12.9)	0.003	15.5 (9.9-23.4)	10.7 (8.9-12.8)	0.006
Men						
Active at both	55.9 (45.1-66.2)	72.1 (69.7-74.4)		54.7 (45.3-63.9)	72.0 (69.7-74.3)	
Non-active at both	24.6 (15.0-37.6)	12.4 (10.7-14.3)		23.2 (15.5-33.1)	12.4 (10.7-14.4)	
Change for better	5.7 (1.8-16.6)	7.2 (6.2- 8.4)	0.111[a]	9.5 (4.6-18.6)	7.2 (6.2- 8.4)	0.15[a]
Change for worse	13.8 (7.1-22.1)	8.3 (7.1- 9.6)	0.003	12.5 (8.0-19.1)	8.3 (7.2- 9.7)	0.001
Women						
Active at both	60.7 (54.1-66.9)	65.3 (63.6-67.1)		53.1 (42.7-63.1)	65.3 (63.5-67.1)	
Non-active at both	20.3 (15.3-26.5)	15.5 (14.1-16.9)		25.9 (18.1-35.6)	15.5 (14.1-16.9)	
Change for better	7.3 (4.4-11.8)	8.1 (7.1- 9.3)	0.005[a]	9.0 (4.5-17.3)	8.1 (7.1- 9.3)	0.004[a]
Change for worse	11.7 (7.5-17.8)	11.1 (9.8-12.5)	0.309	12.0 (6.7-20.5)	11.1 (9.8-12.5)	0.046

[a] *p value including groups 'Change for better' and 'Change for worse'; #p value including all four groups.*

3.4. Physical activity

Overall, physical activity decreased in 13% of participants with asthma and 12% of participants with OSA from 2017 to 2020. When compared with participants without asthma, there were no differences in physical activity in age group 25-49 years or among women with asthma in this time period. Physical activity differed significantly in both surveys in both age groups 50-64 and ≥ 65 years old and among men. Physical activity declined during the follow-up period when all participants with asthma were considered ($p < .001$). This was also the case in the age group 25-49 years and in women. In contrast to this finding, physical activity declined more in participants without asthma than with asthma in the age group ≥65 years.

In participants with OSA, physical activity was lower in all age groups and in both sexes than in participants without OSA. On the other hand, physical activity decreased significantly more among the age group ≥65 years but not in any of the other subgroups. In women, among participants with OSA, the change for both active and inactive direction was seen more often than in participants without OSA (Table 5).

4. Discussion

The main finding of this study was that individuals with asthma or OSA had poorer quality of life, greater psychological distress, and lower physical activity than those without these conditions, even prior to the COVID-19 pandemic. While psychological distress increased and physical activity declined further during the pandemic, changes in quality of life did not differ significantly between groups.

Previous international studies have reported a general decline in quality of life during the pandemic [26], but fewer have focused specifically on individuals with respiratory diseases, even though COVID-19 pneumonitis is the most severe form of the disease, causing morbidity and mortality. Our findings align with a small-scale study comparing asthma patients and controls, which found no pandemic-related reduction in quality of life among asthma patients [27]. Notably, our data show that quality of life was already reduced in asthma patients in 2017, particularly among younger adults (25–49 years), contrasting with earlier findings that emphasized older age groups [28]. However, in Finland asthma is usually managed quite well and symptoms of asthma patients have decreased in recent years [29].

Psychological distress in our study was relatively low overall but higher among individuals with asthma or OSA. This increase was most pronounced in women with asthma (11%). These findings are consistent with international data showing elevated mental distress during the early pandemic phase, especially among women and younger adults. In the United Kingdom, the prevalence of mental distress in the general population increased from 18.9% in 2019 to 27.3% in April 2020, one month after the start of lockdown in the UK [30]. However, most participants maintained good mental health or recovered by October 2020 [31]. Framing these results within mental health trajectories, our data reflect the acute phase of psychological response, with potential for chronic stress effects emerging later [32]. Higbee et al. also reported a decline in mental health among young adults with asthma during lockdown [33].

Studies on psychological distress in OSA populations remain limited. Some evidence suggests increased hospitalization risk in OSA patients with comorbid depression [34], while Spicuzza et al. found high anxiety levels in both OSA patients and controls during strict lockdown [35]. The Spicuzza study was conducted in June-July 2020 during a strict lockdown in Italy, whereas in Finland the restrictions were less strict at the time of our 2020 study, which may explain the differences between the overall level of psychological distress. Differences in national restrictions and measurement tools may explain variation across studies.

Physical activity was consistently lower in individuals with asthma or OSA, with further declines during the pandemic, particularly among older adults and women. These findings are in line with international surveys showing reduced activity in respiratory patients during lockdown. In a Spanish online survey conducted during the lockdown in Spain, physical activity decreased in participants with asthma by 26 min per day on average. The reduction was 16 min for obese participants. Of note, the reduction was 102 min for participants with chronic bronchitis [36].

The prevalence of asthma (5.9%) in our study was lower than in the general Finnish population (approximately 9%) [29]. The prevalence of OSA was similar to the general Finnish population (4.8% vs. 4%) [37,38]. In a previous study comparing self-reported and register data for FinHealth 2017 study participants, the 9% prevalence for asthma was quite similar based on register data only and self-reported data from the survey. However, only 59% of asthma cases were identified by both survey and register data. This disparity may be explained by the fact that asthma patients had less health care contact during the COVID-19 pandemic, thus resulting in under coverage in the register data.

In many earlier studies, women have been suggested to experience more adverse consequences of the pandemic than men [18]. Our study suggests that men with asthma or OSA have also experienced profound consequences. Our study population was sex balanced, thus illustrating comprehensively both sexes.

There are some limitations to our study. First, the diseases were identified using registry data; therefore, the general limitations associated with such data apply [39]. Some patients may be undiagnosed or misclassified in the registers. Second, despite our moderate size study population, some subgroups were small. In addition, we were not able to identify enough participants with COPD for further analysis. Thirdly, the questionnaire on concerns of COVID-19 were not validated. Finally, the pandemic has changed due to vaccinations and new variants of the virus, possibly making our results from the early days of pandemic different from the current situation. However, our results illustrate an overall reaction to national guidelines and lockdown periods more than the effects of the actual virus. Moreover, another study has had similar conclusions that poorer health before the pandemic was associated with an unfavourable change in health-related lifestyle [40].

5. Conclusions

This Finnish population-based study suggests that individuals with asthma or OSA may have experienced greater psychological and physical burden during the early phase of the COVID-19 pandemic compared to the general population. These findings highlight the importance of ensuring access to multidisciplinary care, including psychological support, for these groups. Our results reflect the acute phase of the pandemic in late 2020, and are limited to short-term impacts observed during that period. Although more profound psychological effects often emerge after the acute phase [32], our data do not allow conclusions about long-term trajectories. Nevertheless, these findings may offer valuable context for future research on the prolonged consequences of the pandemic.

CRediT authorship contribution statement

Miia Aro: Writing – review & editing, Writing – original draft, Visualization, Resources, Methodology, Investigation, Conceptualization. **Tiina Mattila:** Writing – review & editing, Visualization, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Heidi Avellan-Hietanen:** Writing – review & editing, Visualization, Supervision, Funding acquisition, Conceptualization. **Päivikki Koponen:** Writing – review & editing, Visualization, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization. **Seppo Koskinen:** Writing – review & editing, Visualization, Validation, Supervision, Methodology, Conceptualization. **Arto Pietilä:** Writing – review & editing, Software, Investigation, Formal analysis, Data curation, Conceptualization. **Tuula Vasankari:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Investigation, Conceptualization.

Ethics

This study was reviewed and approved by Coordinating Ethics Committee at the Hospital District of Helsinki and Uusimaa, with the approval number: 37/13/03/00/2016 and HUS/2391/2020. All participants provided informed consent to participate in the study.

Data availability

The data used in this study are available from the Finnish Institute for Health and Welfare, but restrictions apply to the availability of these data. Data are, however, available from the authors upon reasonable request and with permission from the Finnish Institute for Health and Welfare. The questionnaires used are available at https://thl.fi/en/web/thlfi-en/research-and-development/research-and-projects/national-finhealth-study/questionnaires.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2026.e45239.

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