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**ABSTRACT.** *Objective.* To explore anxiety and self-isolation in patients with inflammatory rheumatic disease (IRD) 15 months into the coronavirus disease 2019 (COVID-19) pandemic, including attitudes toward and effects of SARS-CoV-2 vaccination.

*Methods.* A nationwide online survey was conducted at 3 timepoints: May 2020, November 2020, and May 2021. Patients with IRD followed in the Danish Rheumatology Quality Registry (DANBIO) were asked about the effects of the pandemic, including SARS-CoV-2 infection and their behavior, anxiety, and concerns. The May 2021 survey included attitudes toward SARS-CoV-2 and influenza vaccination. Characteristics associated with self-isolation in May 2021 were explored with adjusted logistic regression analyses that included patient characteristics and SARS-CoV-2 vaccination status.

*Results.* Respondents to surveys 1, 2, and 3 included 12,789; 14,755; and 13,921 patients, respectively; 64% had rheumatoid arthritis and 63% were female. Anxiety and concerns were highest in May 2020 and decreased to stable levels in November 2020 and May 2021; 86%, 50%, and 52% of respondents reported self-isolation, respectively. In May 2021, 4% of respondents self-reported previous SARS-CoV-2 infection. The SARS-CoV-2 vaccine acceptance rate was 86%, and the proportion of patients vaccinated against influenza had increased from 50% in winter 2019-2020 to 64% in winter 2020-2021. The proportion of patients with anxiety appeared similar among those vaccinated and unvaccinated against SARS-CoV-2. In multivariable analyses, being unvaccinated, female gender, receiving biologic drugs, and poor quality of life were independently associated with self-isolation.

*Conclusion.* Levels of anxiety and self-isolation decreased after the initial lockdown period in patients with IRD. Half of the patients reported self-isolation in May 2021, a phase that included widespread reopening of society and large-scale vaccination. The lack of prepandemic data prevented a full understanding of the long-term effects of the pandemic on anxiety and self-isolation in patients with IRD.

*Key Indexing Terms:* autoimmune diseases, disease outbreaks, registries, rheumatic diseases, vaccines

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The coronavirus disease (COVID-19) pandemic has been ongoing for 2 years, causing extensive changes in people's daily lives worldwide.<sup>1</sup> High levels of anxiety and behavioral changes during the first pandemic waves have previously been described in patients with inflammatory rheumatic disease (IRD).<sup>2-8</sup> However, regulatory frameworks and daily living are constantly shifting, with changing restrictions, closures and openings of institutions and businesses, and, very importantly, the ongoing implementation of SARS-CoV-2 vaccines being an important game changer. In addition, long-term restrictions and COVID-19 fatigue (ie, exhaustion as a result of pandemic challenges)<sup>9</sup> are also factors that could potentially push behavior toward normality. However, the impact of these factors has been poorly explored in patients with IRD, as previous studies have mainly had a cross-sectional design and were performed during the early months of the pandemic.<sup>3-5,10</sup>

In 2 previous nationwide surveys performed in 2020, we described anxiety, concerns, and widespread changes in behavior in patients with IRD.<sup>6,11,12</sup> More than 10,000 patients who were monitored in the Danish Rheumatology Quality Registry (DANBIO)<sup>13</sup> participated in each survey. In late spring 2021, a phase that included widespread reopening of society and implementation of large-scale SARS-CoV-2 vaccination programs, a third survey was performed that included additional questions regarding patients' attitudes toward vaccination.

Thus, the aim of the present study was to explore anxiety and self-isolation in patients with IRD 15 months into the COVID-19 pandemic, including attitudes toward and impact of SARS-CoV-2 vaccination. In addition, we investigated the

self-reported occurrence and consequences of SARS-CoV-2 infection.

## METHODS

The nationwide quality registry, DANBIO ([danbio-online.dk](http://danbio-online.dk)), covers over 95% of adults (age  $\geq 18$  yrs) with rheumatic diseases treated with biologic disease-modifying antirheumatic drugs (bDMARDs).<sup>13</sup> Further, patients with IRD (eg, rheumatoid arthritis [RA], psoriatic arthritis [PsA], and axial spondyloarthritis [axSpA]), regardless of treatment, have been included since 2005. We have previously described the results of 2 rounds of cross-sectional surveys (March and June 2020 [ie, survey 1] and November 2020 [ie, survey 2]).<sup>6,11,12</sup> Patients with IRD who were registered in DANBIO, were alive, and had ongoing contact with the clinic (ie,  $> 1$  visit in hospital or with rheumatology specialists in primary care up to 1 year prior to forwarding the questionnaire) were eligible for inclusion in the survey studies.<sup>6</sup> Patients were invited to answer the online survey "You and your rheumatic disease during times with coronavirus" at the secured website [patient.danbio.dk](http://patient.danbio.dk) (see Glinthorg et al<sup>6</sup> for details). Invitations were posted through e-Boks, the national electronic communication infrastructure ([e-boks.com/Danmark/da](http://e-boks.com/Danmark/da)). The e-Boks system is widely used for electronic communication between citizens and private and public institutions, including healthcare authorities. The system is accessed online after secure log-on. Use of the e-Boks system is mandatory, and only citizens with poor digital skills, lack of access to a computer, language limitations, and poor physical or cognitive health or similar are exempt. As previously shown, 93% of eligible patients with IRD have access to e-Boks.<sup>6</sup>

During April and May 2021, a third survey (ie, survey 3) was sent out to patients currently monitored in DANBIO (by April 2021). The patients were invited regardless of participation in the prior surveys, but patients who replied no to participation in survey 1 or 2 were excluded. The deadline for reply was June 7, 2021. Survey 3 was posted during a phase when Danish restrictions were lifted and society was reopening as a result of low SARS-CoV-2 infection rates. On the other hand, survey 1 (March 2020) was administered during a period of the pandemic with nationwide lockdowns.

All 3 surveys had a similar structure<sup>6</sup> and included questions regarding current disease activity, study consent, background information (ie, number of persons in the household, education, and occupational status), comorbidities, self-reported COVID-19 infection, effect of the COVID-19 pandemic on behavior, self-isolation strategies, anxiety, and quality of life (ie, EuroQol-5 Dimension questionnaire [EQ-5D]). In surveys 2 and 3, details regarding respondents' work situations were added.<sup>11</sup> Survey 3 further inquired about ongoing SARS-CoV-2 infection symptoms ( $> 4$  weeks and/or up to the current date) and, thus, a potential post-COVID-19 condition (ie, symptoms at the time of survey response<sup>14</sup> and attitudes toward SARS-CoV-2 and influenza vaccination).

All surveys were developed in close collaboration with patient representatives, and full questionnaire texts are available at <https://danbio-online.dk/research> (in Danish). From the clinical quality registry DANBIO, we obtained information regarding rheumatic diagnosis (International Classification of Diseases, 10th revision). Further, we identified the use of disease-modifying antirheumatic drugs (DMARDs) and smoking status (ie, current, previous, or never) according to the latest visit before April 2020.

**Statistics.** All data were analyzed in the statistical software package R (version 4.1.0; The R Foundation).

Questions and the corresponding answers from the surveys are presented. Patient characteristics are reported as numbers and percentages as well as median (IQR) as appropriate. All data are reported as observed with no imputation of missing data.

When the patients participated in survey 3, not all patients had yet been offered SARS-CoV-2 vaccination. Thus, the effect of vaccination status was investigated in (1) all respondents of survey 3 who answered yes to being

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vaccinated at least once vs all other respondents, and (2) the subgroup of respondents who had been offered vaccination (ie, yes vs no to SARS-CoV-2 vaccination).

Self-isolation was explored with the question “I stay at home and avoid others as much as possible,” which was converted to a binary outcome: yes (“completely agree” or “mostly agree”) or no (“neither nor,” “mostly disagree,” “completely disagree,” or “do not know”). For survey 3, clinical factors associated with self-isolation were explored with multivariable logistic regression analyses. These analyses included covariables that were identified a priori to be clinically relevant in either all respondents or in the subcohort having been offered vaccination: gender; age ( $\leq 39$ , 40–59, 60–79, or  $\geq 80$  yrs); diagnosis (RA, PsA, axSpA, or other IRD);  $\geq 1$  previous comorbidity (yes or no); occupational status (working or nonworking); education (longer vs none or lower); cohabiting (yes or no); currently vaccinated against SARS-CoV-2 (answering yes to  $\geq 1$  injection according to the definition described above); smoking status (current, previous, never, or missing); current use of bDMARDs, including targeted synthetic DMARDs (yes or no); and EQ-5D score (continuous variable, 1 = best score).

**Ethics.** Ethical approval was not required according to Danish legislation for research projects using online surveys (Komitélovens §14, stk. 2, [www.nvk.dk](http://www.nvk.dk)). The project was approved by the regional data protection agency (P-2020-543) on May 14, 2020. Patients gave online consent for participation, but patient consent for publication was not required.

**Patient and public involvement.** Patients and/or the public were involved in the design, conduct, reporting, and dissemination plans of this research.

## RESULTS

The numbers of participants in surveys 1, 2, and 3 were largely similar, and 13,921 patients participated in survey 3. Overall, 23,311 patients responded to at least 1 survey, and 5503 patients had responded to all 3 of them (Table 1 and Supplementary Figure S1, available with the online version of this article). In survey 1, 64% of patients had RA, 65% were female, and 19% lived alone. For surveys 2 and 3, characteristics of participating

Table 1. Characteristics of patients participating in surveys 1, 2, and 3.<sup>a</sup>

	Survey and Timepoint		
	Survey 1: June 2020	Survey 2: Nov 2020	Survey 3: May 2021
Total participants, n	12,789	14,755	13,921
Diagnosis in DANBIO			
Rheumatoid arthritis	8168 (64)	9370 (64)	8862 (64)
Psoriatic arthritis	2068 (16)	2357 (16)	2207 (16)
Axial spondyloarthritis	1758 (14)	1910 (13)	1726 (12)
Other	795 (6)	1118 (8)	1126 (8)
Gender, female	8366 (65)	9396 (64)	8827 (63)
Age, yrs			
$\leq 39$	996 (8)	1014 (7)	932 (7)
40–59	4436 (35)	4829 (33)	4562 (33)
60–79	6799 (53)	8084 (55)	7695 (55)
$\geq 80$	558 (4)	828 (6)	732 (5)
From the questionnaire: self-reported characteristics			
Living alone (yes)	2422 (19)	3031 (21)	2881 (21)
Highest education (medium/long) <sup>b</sup>	5996 (47)	6754 (46)	6446 (48)
Current occupational status (working) <sup>b</sup>	6076 (48)	5950 (40)	5517 (41)
No. of self-reported comorbidities ( $\geq 1$ ) <sup>c</sup>	7760 (61)	8788 (65)	8382 (65)
Information captured from DANBIO: patient and disease characteristics <sup>d</sup>			
Smoking status			
Current	2266 (18)	2275 (18)	1998 (17)
Previous or never	10,374 (81)	10,479 (82)	9752 (83)
Current medication <sup>e</sup>			
bDMARD	4652 (36)	4274 (29)	3817 (27)
csDMARD	6574 (51)	9000 (61)	8082 (58)

Data are in n (%) unless otherwise indicated. Percentages are calculated among patients with available data (surveys: 93–100% complete; previous information in DANBIO: 70–100% complete). <sup>a</sup> For overlap between survey participants, see Supplementary Figure S1 (available with the online version of this article). <sup>b</sup> Status before COVID-19 lockdown; the categories for education include lower (blue collar, short courses, or no education) and medium/long (2–3 years, 3–4 years, or  $> 4$  years); the categories for occupational status include working (student, full-time employee, part-time employee, self-employed, or other) and not working (unemployed, retired, or on sick leave). <sup>c</sup> Comorbidities include self-reported lung disease, asthma, diabetes, heart disease, cancer, hypertension, obesity, psychiatric disorder, and other. <sup>d</sup> Smoking status is according to latest registration in DANBIO before March 11, 2020; values do not add up to column totals because of missingness. <sup>e</sup> bDMARD is irrespective of concomitant csDMARD; csDMARD group excludes patients on concomitant bDMARD. bDMARD: biologic disease-modifying antirheumatic drug; csDMARD: conventional synthetic disease-modifying antirheumatic drug; DANBIO: Danish Rheumatology Quality Registry.



patients appeared similar, with 64% having RA; 64% and 63% being female, respectively; and 21% living alone (Table 1).

In surveys 1 to 3, the proportion of patients who had been tested for SARS-CoV-2 increased from 14% (survey 1) to 79% (survey 3), and in survey 3, 48% of patients had been tested more than 5 times. Among the 424 of 10,961 patients (4%) with a self-reported positive SARS-CoV-2 test, 281 (66%) had ongoing symptoms (> 4 weeks after infection; primarily tiredness, shortness of breath, and reduced sense of smell) and 152 (36%) still had symptoms when they answered survey 3, indicating a post-COVID-19 condition (Table 2).

As shown in Table 3, the proportions of patients reporting major life changes showed a decreasing tendency following the initial lockdown period, but these changes were still reported by 25% of respondents in survey 3. In surveys 2 and 3, approximately 1 in 20 patients did not see others at a close distance, whereas the proportion was 26% for survey 1 respondents. There

seemed to be long-lasting changes in behavior, with 45% to 46% of patients reporting shopping less frequently, whereas the proportions using public transportation increased from 4% in survey 1 to 15% in survey 2 and 14% in survey 3. Following lockdown, anxiety and self-isolation strategies decreased to stable lower levels in November 2020 and May 2021, with similar proportions of patients reporting staying at home and avoiding others as much as possible (86% in survey 1, 50% in survey 2, and 52% in survey 3) and self-isolating more than others their age (51% in survey 1, 37% in survey 2, and 34% in survey 3; Figures 1A,B). Similar patterns were seen for work-related concerns (Supplementary Figure S2, available with the online version of this article). In May 2021, a nationwide, voluntary vaccination program for SARS-CoV-2 had been rolled out in Denmark. Citizens were invited in a stepwise approach, prioritizing older adults and persons with severe immunodeficiencies. Among the 72% of responders in survey 3 who had been invited to receive vaccination, 86% had accepted (Table 4). The main reason for not wanting SARS-CoV-2 vaccination was fear of side effects (68%) or preference of one vaccine over another (41%). The absolute number of patients who were not vaccinated against SARS-CoV-2 was highest among the 60- to 80-year-olds (717/6631, 11%), whereas the highest relative numbers (728/2737, 27%) were seen in patients below 60 years of age (Supplementary Figure S3, available with the online version of this article). From winter 2019-2020 to winter 2020-2021, the percentage of patients who had received influenza vaccination increased from 50% to 64%. Fear of side effects was the reason for not wanting influenza vaccination in 6% of patients (Table 4).

Anxiety and self-isolation strategies appeared unaffected by vaccination status, with similar proportions of respondents answering "agree" to statements such as "I stay at home and avoid others as much as possible." However, absolute numbers were lower in the vaccination group because of high vaccine implementation (shown in Figure 2 for the subgroup of patients who had been offered SARS-CoV-2 vaccination; similar results were seen for all respondents [data not shown]). On the other hand, in multivariable logistic regression analyses (Supplementary Table S1, available with the online version of this article) exploring self-isolation (ie, staying at home: agree vs disagree), not being vaccinated against SARS-CoV-2 was among associated factors for staying at home along with female gender, age > 40 years, cohabiting, having a comorbidity, being treated with bDMARDs, and high EQ-5D score. Results were similar regardless of whether the analysis was performed with all respondents or only with the subgroup who had been offered vaccination (Supplementary Table S1).

## DISCUSSION

This study represents the largest reported ongoing COVID-19 survey in a nationwide cohort of patients with IRD, to our knowledge. Patients followed in the DANBIO clinical registry were recruited. In each of the 3 surveys that were sent out during the first year of the pandemic, more than 12,000 patients participated, representing approximately one-third of invited patients,

Table 2. Self-reported SARS-CoV-2 testing and test results.

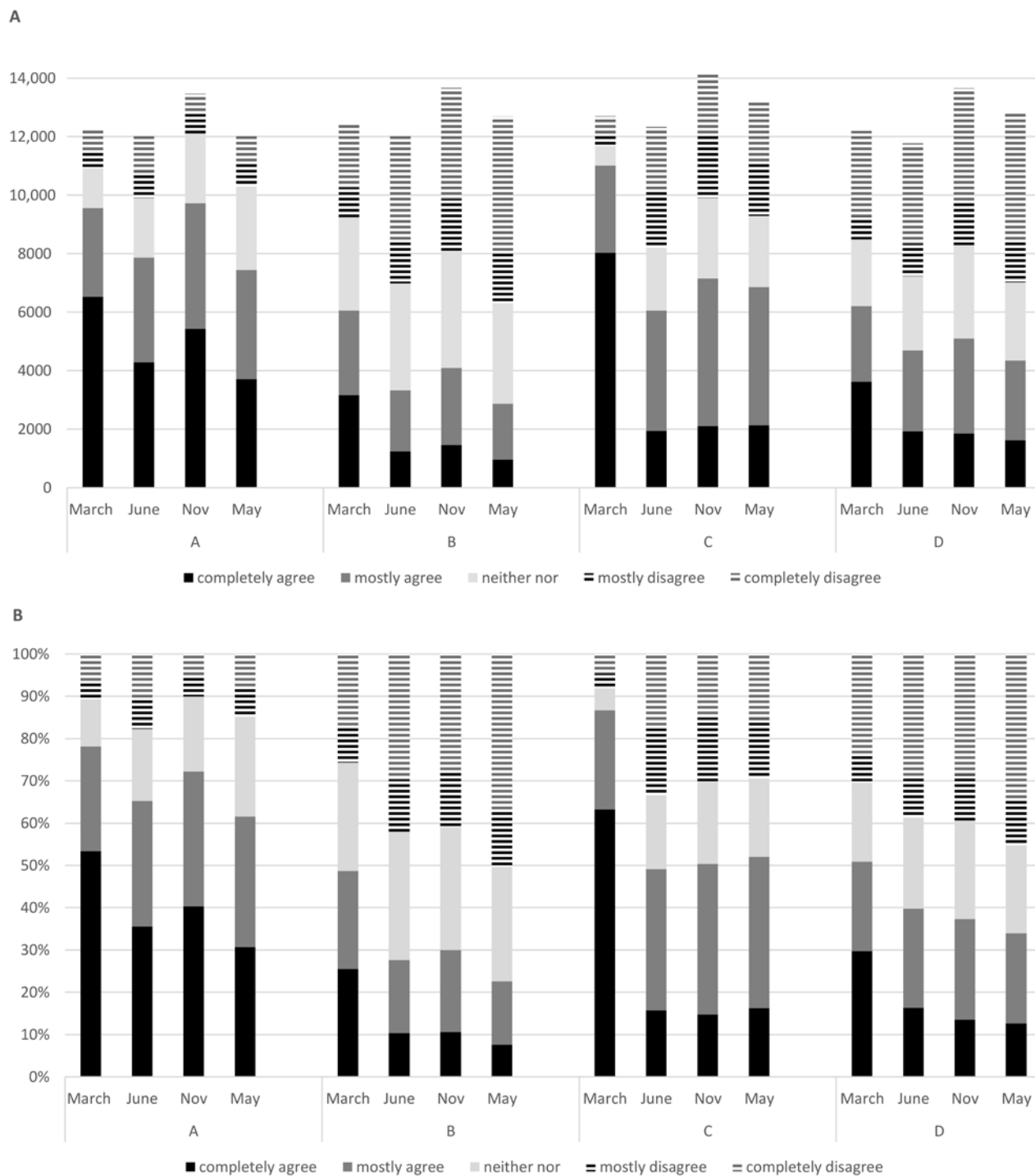
Question and Answer Options	Survey and Timepoint		
	Survey 1: June 2020	Survey 2: Nov 2020	Survey 3: May 2021
Total participants, n	12,789	14,755	13,921
Have you been tested for SARS-CoV-2 (COVID-19)?			
Yes	1809 (14)	6927 (47)	10,961 (79)
No	10,949 (86)	7416 (50)	2604 (19)
Do not know	31 (0)	99 (1)	57 (0)
Missing/no reply	0 (0)	313 (2)	299 (2)
If yes, how many times?			
Total	1809 (100)	6927 (100)	10,961 (100)
1	–	3736 (54)	1294 (12)
2	–	1773 (26)	1286 (12)
3	–	845 (12)	1212 (11)
4	–	312 (5)	1000 (9)
5	–	113 (2)	885 (8)
> 5	–	138 (2)	5276 (48)
Missing/no reply	0 (0)	10 (0)	8 (0)
If yes, was the test positive?			
Total	1809 (100)	6927 (100)	10,961 (100)
Yes	40 (2)	101 (1)	424 (4) <sup>b</sup>
No	1668 (93)	6671 (96)	10,493 (96)
Do not know	94 (5)	37 (1)	21 (0)
Waiting for result	0 (0)	106 (2)	17 (0)
Missing/no reply	7 (0)	12 (0)	6 (0)

Data are in n (%) unless otherwise indicated. <sup>a</sup> Survey 1 did not include questions regarding the number of SARS-CoV-2 tests. <sup>b</sup> If answering yes to having a positive test (n = 424), what were the consequences?: admitted to hospital (n = 40), quarantine at home (n = 362), other (n = 9), do not know (n = 8), or missing (n = 5); if answering yes to positive test (n = 424), did you still have symptoms > 4 weeks after testing (> 1 answer allowed)?: no (n = 105), tiredness (n = 204), reduced/loss of smell (n = 138), shortness of breath (n = 108), headache (n = 107), arthralgia (n = 103), muscle pain (n = 94), concentration reduced (n = 92), altered sensation (n = 16), heart disease (n = 7), blood clots (n = 3), do not know (n = 24), or not relevant (n = 14); if answering yes to symptoms > 4 weeks after testing (n = 281), what is the current status?: recovered (n = 121), still some problems (n = 114), still many problems (n = 38), not relevant (n = 4), do not know (n = 2), or missing (n = 2). COVID-19: coronavirus disease 2019.

Table 3. Self-isolation strategies according to surveys 1, 2, and 3.

Question and Answer Options	Survey and Timepoint		
	Survey 1: March 2020	Survey 2: Nov 2020	Survey 3: May 2021
Total participants, n	12,789	14,755	13,921
How would you describe your current situation?			
Life goes on as usual	761 (6)	1112 (8)	1666 (12)
Life goes on with slight changes	4347 (34)	7847 (53)	7828 (56)
Life goes on with major changes	4784 (37)	4948 (34)	3528 (25)
Isolation at hospital or other	30 (0)	2 (0)	5 (0)
Self-isolation (at home)	2765 (22)	474 (3)	546 (4)
Other	69 (1)	23 (0)	28 (0)
Missing	33 (0)	349 (2)	320 (2)
How many persons are you typically in contact with per day (> 2-m distance)?			
None	1807 (14)	1579 (11)	1633 (12)
1-5	8881 (70)	9908 (67)	9668 (69)
6-10	1090 (9)	1566 (11)	1155 (8)
11-20	553 (4)	754 (5)	629 (5)
21-50	292 (2)	384 (3)	332 (2)
> 50	132 (1)	160 (1)	131 (1)
Missing	34 (0)	404 (3)	373 (3)
How many persons are you typically in face-to-face contact with per day (< 2-m distance)?			
None	3365 (26)	579 (4)	691 (5)
1-5	8542 (67)	7641 (52)	8094 (58)
6-10	474 (4)	2688 (18)	2120 (15)
11-20	196 (2)	1823 (12)	1406 (10)
21-50	81 (1)	1060 (7)	843 (6)
> 50	53 (0)	587 (4)	415 (3)
Missing	78 (1)	377 (3)	352 (3)
Do you leave the home for shopping?			
Yes	9039 (71)	13,508 (92)	12,798 (92)
No	3688 (29)	851 (6)	774 (6)
Do not know	31 (0)	44 (0)	25 (0)
Missing	31 (0)	352 (2)	324 (2)
If yes to above, how often do you leave home for shopping?			
Total	9039 (100)	13,508 (100)	12,798 (100)
Several times a day	152 (2)	322 (2)	327 (3)
Once a day	1104 (12)	1854 (14)	1727 (13)
Several times a week	3748 (41)	7870 (58)	7149 (56)
Once a week	3652 (40)	3134 (23)	3188 (25)
Less than weekly	381 (4)	321 (2)	400 (3)
Missing/not relevant	2 (0)	7 (0)	7 (0)
Have you changed your physical shopping habits compared to before COVID-19?			
Yes, shop less frequently	5745 (45)	6603 (45)	6368 (46)
Yes, shop more frequently	817 (6)	584 (4)	506 (4)
Shop online	1055 (8)	680 (5)	849 (6)
Others shop for me	2690 (21)	708 (5)	591 (4)
No	2313 (18)	5499 (37)	4955 (36)
Do not know	137 (1)	317 (2)	318 (2)
Missing	32 (0)	364 (2)	334 (2)
Do you currently use public transportation?			
Yes	470 (4)	2164 (15)	1970 (14)
No	12,255 (96)	12,182 (83)	11,583 (83)
Do not know	32 (0)	51 (0)	44 (0)
Missing	32 (0)	358 (2)	324 (2)
If you currently use public transportation, how often do you use it?			
Total	470 (100)	2164 (100)	1970 (100)
Several times a day	69 (15)	187 (8)	127 (6)
Once a day	32 (7)	64 (3)	60 (3)
Several times a week	89 (19)	457 (21)	391 (20)
Once a week	88 (19)	381 (18)	317 (16)
Less than weekly	190 (41)	1070 (49)	1072 (54)
Missing	2 (0)	5 (0)	3 (0)

Data are in n (%) unless otherwise indicated. Percentages are based on all patients included per survey, unless otherwise stated (ie, "Total"). COVID-19: coronavirus disease 2019.



**Figure 1.** Self-isolation strategies and anxiety at 4 timepoints during the COVID-19 pandemic in patients who responded to survey 1 (repeated questions regarding behavior in March and June 2020; for details see Grintborg et al<sup>6</sup>), survey 2 (behavior in November 2020), and/or survey 3 (May 2021). Statement A: “I consider myself at high risk of COVID-19 infection,” B: “I worry more about COVID-19 than about my rheumatic disease,” C: “I stay at home and avoid others as much as possible,” and D: “My arthritis causes me to self-isolate more than others my age.” (A) Number of respondents and (B) percentage of respondents.

with 23,311 patients contributing to at least 1 survey. The surveys explored the effect of the first 15 months of the pandemic on anxiety and self-isolation and, most recently, included the topic of vaccinations. Whereas the first survey was conducted during a lockdown period, the third survey was posted during a phase

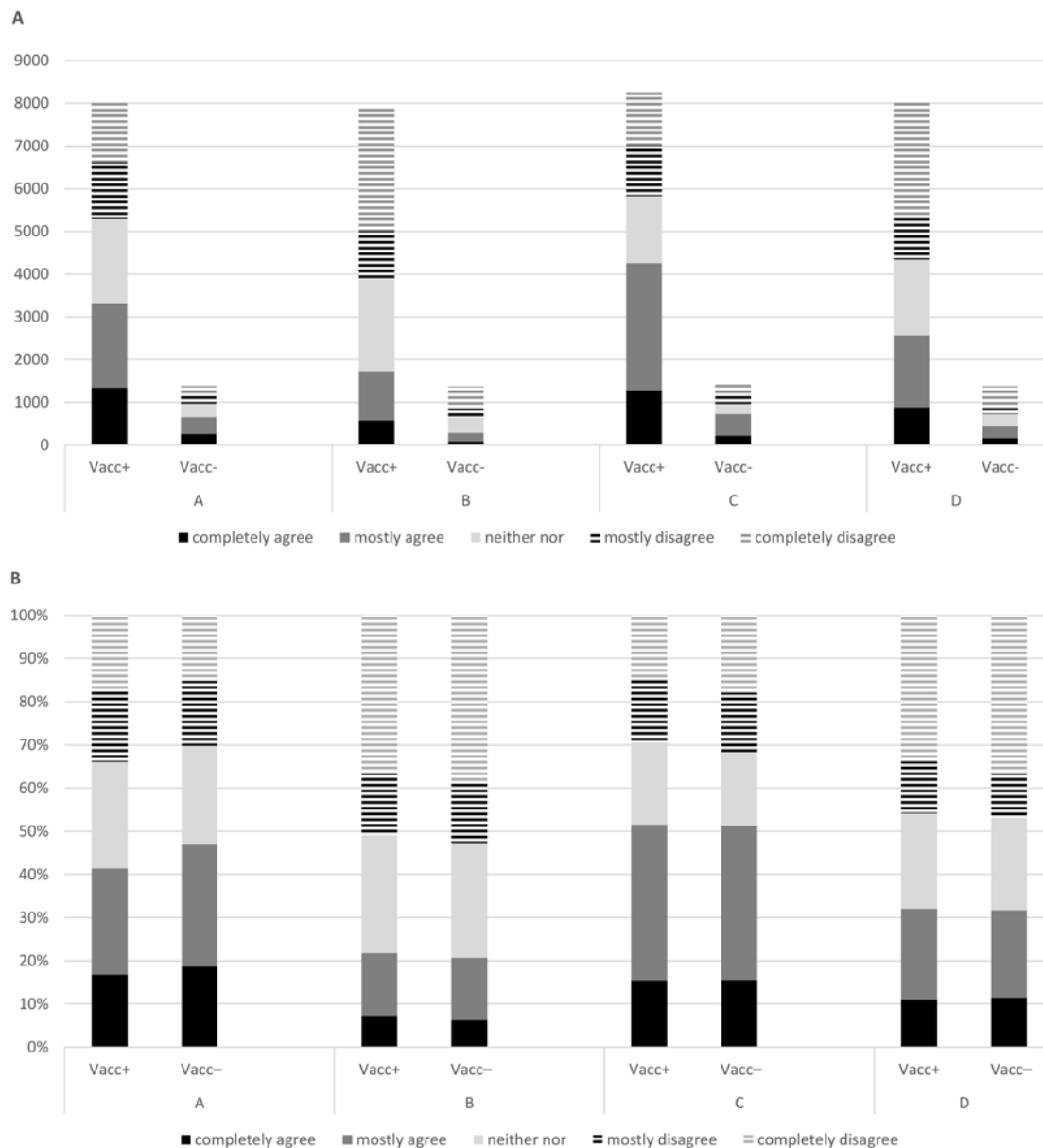
of Danish reopening of society and a minimum of national restrictions.

In May 2021, few patients reported prior SARS-CoV-2 infection, which is in agreement with international results<sup>15,16</sup> and corresponds to or is lower than that of the Danish general

Table 4. Attitudes toward SARS-CoV-2 and influenza vaccination in survey 3 (n = 13,921).

Vaccine	Question and Answer Options	Participants
SARS-CoV-2 vaccination	Have you been offered COVID-19 vaccination?	
	Yes	10,070 (72)
	No	3544 (25)
	Do not know	9 (0)
	Missing/no reply	298 (2)
	If yes, have you been vaccinated (at least one injection)? n = 10,070	
	Yes	8612 (86)
	No	1449 (14)
	Do not know	1 (0)
	Missing/no reply	8 (0)
	If yes, with which vaccine? n = 8612	
	Pfizer-BioNTech	7512 (87)
	Moderna	571 (7)
	AstraZeneca	312 (4)
	Other	4 (0)
	Combinations of the above	117 (1)
	Do not know	87 (1)
	Missing/no reply	9 (0)
	If no to being offered vaccination, do you wish to be vaccinated? n = 3544	
	Yes	3213 (91)
	No	87 (2)
	Do not know	241 (7)
	Missing/no reply	3 (0)
	If no/do not know to wishing to be vaccinated, why not (more than one answer allowed)? n = 328	
	Fear of side effects	222 (68)
	Vaccines are not effective	29 (9)
	It depends on which vaccine I am being offered	136 (41)
	I do not tolerate vaccines	6 (2)
	I do not like vaccines	50 (15)
	I fear vaccination will decrease effect of my medications	51 (16)
	I fear vaccination will cause arthritis flare	80 (24)
	I have heard that I should stop my medication before vaccination, and I do not wish to do so	14 (4)
	It is unpractical for me	4 (1)
	Other	77 (23)
	Do not know	18 (5)
Influenza vaccination	Did you receive influenza vaccination in winter 2020/2021?	
	Yes	8853 (64)
	No	4725 (34)
	Do not know	40 (0)
	Missing/no reply	303 (2)
	If no, why not (more than one answer allowed)? n = 4725	
	Fear of side effects	306 (6)
	Vaccines are not effective	53 (1)
	It depends on which vaccine I am being offered	53 (1)
	I do not tolerate vaccines	311 (7)
	I do not like vaccines	71 (2)
	I fear vaccination will decrease effect of my medications	115 (2)
	I fear vaccination will cause arthritis flare	57 (1)
	I have heard that I should stop my medication before vaccination, and I do not wish to do so	74 (2)
	It is unpractical for me	0 (0)
	The vaccine was out of stock	506 (11)
	Other	1953 (41)
	Do not know	1546 (33)
	Missing	55 (1)
	Did you receive influenza vaccination in winter 2019/2020?	
	Yes	6966 (50)
	No	6474 (47)
	Do not know	127 (1)
	Missing/no reply	354 (3)

Data are in n (%). COVID-19: coronavirus disease 2019.



**Figure 2.** Self-isolation strategies and anxiety by vaccination status during the COVID-19 pandemic in patients who responded to survey 3. Stratification was performed according to vaccination status, and results show the subgroup of patients who had been offered vaccination ( $n = 10,070$ ). Statement A: "I consider myself at high risk of COVID-19 infection," B: "I worry more about COVID-19 than about my rheumatic disease," C: "I stay at home and avoid others as much as possible," and D: "My arthritis causes me to self-isolate more than others my age." (A) Number of respondents and (B) percentage of respondents. Vacc+: SARS-CoV-2 vaccinated; Vacc-: not vaccinated.

population.<sup>17</sup> However, nearly half of patients who were previously infected reported ongoing symptoms, with approximately one-third having problems that indicated a potential post-COVID-19 condition. A high occurrence of postinfection symptoms, mainly fatigue and dyspnea, has also been observed in non-IRD cohorts,<sup>18-20</sup> seemingly most prevalent in women, patients with comorbidities, or patients following longer hospital admissions.<sup>18,21</sup> To our knowledge, no previous studies have focused on post-COVID-19 conditions in patients with IRD. However, because of few events, our data did not allow for detailed analyses. Further, the recent World Health

Organization definition that uses the time frame of more than 4 months of post-COVID-19 symptoms for evaluation<sup>14</sup> was not incorporated fully into our survey, which focused on symptoms lasting more than 4 weeks and/or until the present day.

Not all patients who participated in survey 3 had been offered SARS-CoV-2 vaccination, which was in line with recommendations from the Danish health authorities. However, the vaccination acceptance rate was high (86%), in line with a previous study, which showed potential acceptance in 82% of patients before the vaccines became available.<sup>22</sup> The main reason for not wanting to be vaccinated was fear of side effects. This



might be the result of the rapid marketing and authorization of the SARS-CoV-2 vaccine. Fear of side effects might also be the result of the Danish media debate during early 2021 regarding the safety of the AstraZeneca and Johnson & Johnson vaccines, which were both withdrawn from use in Denmark by health authorities in March 2021 as a result of thrombosis and thrombocytopenia.<sup>23</sup> Thus, some studies have shown that the type of SARS-CoV-2 vaccine offered can affect acceptance rates.<sup>24-26</sup> Our results should be interpreted in light of Denmark being in the top 10 regarding SARS-CoV-2 vaccination rates worldwide (87% of Danes over 12 years of age were vaccinated by October 2021).<sup>17</sup> SARS-CoV-2 vaccine availability and vaccination strategies vary widely between countries.<sup>27</sup> Further, in some populations, vaccination hesitancy and skepticism are huge barriers to implementation.<sup>28-30</sup>

Our data suggest an apparent effect of the pandemic on the attitude toward influenza vaccination. Although influenza vaccination in Denmark is recommended routinely to patients with IRD and provided free of charge to at-risk groups, including those with IRD, penetration has been low, as seen in other countries.<sup>31-34</sup> Interestingly, we found higher influenza vaccination rates during winter 2020-2021 compared to the previous year. Skepticism of influenza vaccination because of side effects was considerably lower than that of SARS-CoV-2 vaccination. This positive attitude could be due to the anticipated negative synergy of contracting SARS-CoV-2 and influenza simultaneously<sup>35</sup> and the fact that influenza vaccines have been available for decades.

Anxiety and self-isolation were highest during the initial lockdown period (survey 1), with decreased and stable rates in November 2020 (survey 2) and May 2021 (survey 3). Initially, half of the patients stayed at home and avoided others as much as possible, but this behavior had declined sharply during the later surveys. Our results indicate that the widely accessible SARS-CoV-2 vaccine had only a limited additional effect on that behavior. However, fully understanding respondents' behaviors would have required prepandemic data, which, unfortunately, were not available. Factors associated with self-isolation included female gender and the use of bDMARDs. This is in accordance with previous, mainly cross-sectional studies regarding anxiety and depression in patients with IRD, which showed that the use of bDMARDs, previous depression, anxiety, or poor quality of life seem to be associated with the tendency to self-isolate.<sup>3-5,8,10</sup> Our findings mirror those in the general population showing that psychological distress gradually normalizes after lockdown periods<sup>36</sup> and anxiety declines in periods with lower SARS-CoV-2 infection rates.<sup>37</sup> Similarly, an ongoing Danish nationwide survey that included more than 300,000 Danish citizens showed reduced avoidance of physical contact during spring and summer 2021 compared to levels during winter.<sup>38</sup> To truly benchmark the results in patients with IRD in relation to the general population, comparative study designs would be necessary (eg, gender- and age-matched groups or taking comorbidities into account), which was beyond the scope of the current study. In the initial phases of the pandemic, it could be hypothesized that patients with IRD reduced their risk of COVID-19 by extensive shielding. This potentially challenges the current

understanding of why there appears to be no increased risk in patients with IRD<sup>39</sup>: perhaps they are more susceptible, but their self-isolating coping strategies protected them. Our study design did not allow us to explore this further.

Our study has additional limitations to consider. We presented the results from 3 surveys, but only 5503 patients participated in all 3 of them (ie, most patients participated in only 1 or 2 surveys). However, the baseline characteristics of participants in each survey appeared to be similar; therefore, we presented the results for the overlapping cohorts side by side. We have previously shown that nonparticipants were younger than participants and that those over 80 years old had less frequent access to the e-Boks system, which may have biased our results.<sup>6</sup> Further, we cannot rule out a selection bias toward completion of multiple surveys by more anxious or self-isolated patients.

In conclusion, these 3 nationwide surveys performed during the first 15 months of the COVID-19 pandemic showed decreased levels of anxiety and self-isolation after initial high levels during lockdown. Despite free access to and high rates of SARS-CoV-2 vaccination, half of the patients reported self-isolation in May 2021. However, the lack of prepandemic data prevented a full understanding of the long-term effects of the pandemic in patients with IRD.

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## ONLINE SUPPLEMENT

Supplementary material accompanies the online version of this article.

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