Data-Driven Assessment of Adolescents' Mental Health During the COVID-19 Pandemic

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Objective: Adolescents' mental health was severely compromised during the COVID-19 pandemic. Longitudinal real-world studies on changes in the mental health of adolescents during the later phase of the pandemic are limited. We aimed to quantify the effect of COVID-19 pandemic on adolescents' mental health outcomes based on electronic health records.

Method: This was a retrospective cohort study using the computerized database of a 2.5 million members, state-mandated health organization in Israel. Rates of mental health diagnoses and psychiatric drug dispensations were measured among adolescents 12 to 17 years of age with and without pre-existing mental history, for the years 2017 to 2021. Relative risks were computed between the years, and interrupted time series (ITS) analyses evaluated changes in monthly incidence rates of psychiatric outcomes.

Results: The average population size was 218,146 in 2021. During the COVID-19 period, a 36% increase was observed in the incidence of depression (95% CI = 25-47), 31% in anxiety (95% CI = 23-39), 20% in stress (95% CI = 13-27), 50% in eating disorders (95% CI = 35-67), 25% in antidepressant use (95% CI = 25-33), and 28% in antipsychotic use (95% CI = 18-40). A decreased rate of 26% (95% CI = 0.80-0.88) was observed in ADHD diagnoses. The increase of the examined outcomes was most prominent among youth without psychiatric history, female youth, general secular Jewish population, youth with medium–high socioeconomic status, and those 14 to 15 years of age. ITS analysis confirmed a significantly higher growth in the incidence of psychiatric outcomes during the COVID-19 period, compared to those in previous years.

Conclusion: This real-world study highlights the deterioration of adolescents' mental health during the COVID-19 pandemic and suggests that youth mental health should be considered during health policy decision making.

Diversity & Inclusion Statement: We worked to ensure sex and gender balance in the recruitment of human participants. We worked to ensure race, ethnic, and/or other types of diversity in the recruitment of human participants. We actively worked to promote sex and gender balance in our author group. The author list of this paper includes contributors from the location and/or community where the research was conducted who participated in the data collection, design, analysis, and/or interpretation of the work.

Key words: mental health; COVID-19; cohort study

T he COVID-19 pandemic and measures taken to control its spread have transformed the lives of adolescents, raising concern for their mental health. Although children and adolescents mostly present a milder course of the virus compared to adults, their mental health and well-being have been negatively affected during the pandemic.[1,2] Recent reports have indicated that depression, anxiety, and eating disorders have increased significantly since the outbreak of COVID-19, with greater increases among female individuals[3,4] and a gradual association with increasing age.[5] However, information regarding the increase in adolescent mental health rates during COVID-19 is still limited and mostly not based on

longitudinal follow-up of real-world data population studies.[5] Most of the present studies are based on survey data collected during the early phase of the COVID-19 outbreak.[3,5] A large meta-analysis study concluded that quantitative study designs, based on real-world data, are needed to assess changes in mental health of children and adolescents during the COVID-19 pandemic more accurately and to compare these to previous years.[5]

The disruption caused by the pandemic was further exacerbated by the steps that were taken to mitigate it, such as 3 full lockdowns in Israel (Table S1, available online), social distancing policies, and quarantine instructions for those exposed and infected by the SARS-

CoV-2 virus[6] (hereafter referred to as COVID-19). The disruption to the education system affected millions of pupils worldwide despite significant efforts to deploy distance learning. Previous studies have shown that whenever children are not in their educational routine, they become physically less active, exposed to prolonged screen time, have irregular sleep schedules, and have less healthy diets.[7,8] Furthermore, pandemic stressors such as the threat of the disease, decreased peer interactions, lack of personal space at home, and family financial loss may have even more troublesome and enduring impacts on children's mental health.[7]

Adolescents with pre-existing mental health disorders might be especially vulnerable to the effects of COVID-19 containment measures including lockdowns, isolations, and social distancing. Those measures may increase loneliness that was found to be correlated with severity of future mental health outcomes, such as depression and anxiety.[9] However, few studies showed that young people with pre-existing depression experienced improvement during lockdowns.[10,11] Nevertheless, adolescents without pre-existing mental health symptoms showed a deterioration in mental health, which might represent a response to fear from uncertainty due to the COVID-19 pandemic.[10-12]

In this study, we quantified the effect of the COVID-19 pandemic on the incidence of Israeli youth mental health outcomes based on comprehensive electronic health record (EHR) data. In addition, this study explored the effect of the COVID-19 pandemic on adolescents with pre-existing mental health diagnoses or prescriptions.

METHOD
Study Design
We performed a retrospective cohort study design of adolescents 12 to 17 years of age (up to their 18th birthday) between November 1, 2016, and October 31, 2021.

Data in this study originated from Maccabi Healthcare Services (MHS), the second largest Health Maintenance Organization (HMO) in Israel, which includes 2.5 million insured citizens with longitudinal EHRs dating back to 1993. Israel has an advanced public health system, with a wide range of services and technologies available to all residents, mostly free of charge, through the National Health Insurance Law from 1994.[13] The Israeli national health insurance law guarantees a universal health care services basket to all Israeli citizens through 4 nationwide health funds.[13] Enrollment in a health fund is

mandatory, and every citizen is free to choose any of the 4 funds, without any limitations of preconditions or age. Each fund is both the provider and insurer of health care services to its members. Moreover, the data source used for this study is nationally representative as all 4 HMOs share a similar sociodemographic distribution. The data of Maccabi includes psychiatric outpatient visits within the HMO and does not include those who receive psychiatric treatment in private outpatient care, outside of the HMO. Furthermore, the data of this study do not include inpatient mental health treatments. This study was approved by Maccabi Health Services' institutional review board (MH6-0006-21), and informed consent was waived.

Outcomes
We examined incidence rates of several outcomes associated with mental distress. These included 5 categories of mental health diagnoses: depression (ICD10 F32, F34); anxiety and obsessive-compulsive disorders (ICD10 F41, F42); adjustment and emotional problems, stress-related conditions (ICD10 F43, F93; henceforth denoted as "stress"), eating disorders (ICD10 F50), and attention-deficit/hyperactivity disorder (ADHD) (ICD10 F90). Furthermore, we assessed 4 categories of drugs dispensed during those years: namely, antidepressants (ATC code N06A), anxiolytics (ATC code N05B), antipsychotics (ATC code N05A), and psychostimulants, agents used for ADHD, and nootropics (ATC code N06B; henceforth denoted as "ADHD agents"). These diagnoses and prescriptions were provided by physicians of various specializations in outpatient care clinics within the MHS (see Figure S8, available online). The rates of these mental health outcomes were also quantified in adolescents diagnosed or prescribed with the same outcomes during the 2 years before the index year. For brevity, we henceforth refer to this as "psychiatric history."

Demographic Variables
We examined trends in mental illness stratified by age subgroups (12-13, 14-15, and 16-17 years of age), sex assigned at birth (male, female), sector (general secular Jewish population, Israeli Arab, and ultra-orthodox Jewish) and socioeconomic status (SES) on a scale from 1 to 10 (categorized into 1-3 = low, 4-7 = medium, and 8-10 = high). SES and population sectors were determined by the participants' geo-statistical area of residence using Points Location Services Ltd (POINTS), which integrates information from the Israeli Central Bureau of Statistics with other socio-economic and demographic data sources.[14] The

POINTS scale is routinely used by the Israeli Ministry of Health and all 4 health maintenance organizations.

Individuals with missing sector information (less than 0.01%) and unlisted SES were excluded from the SES subanalysis (1.1%) but were included in all other analyses. Sex and age were listed for all members.

Statistical Analysis

Incidence was computed based on all MHS' members 12 to 17 years of age at the beginning of the year who did not previously receive a diagnosis or a medication of the type being considered ("cohort at risk"). The number of members who received the measured diagnosis or medication during the year was standardized via division by the size of the "cohort at risk." Relative risks (RRs) per 1,000 members, 95% CIs, and p values were computed to measure the annual changes in mental illness trends between each 2 consecutive years and between 2 time periods: pre−COVID-19 (year 2019 vs 2017) and during COVID-19 (year 2021 vs 2019). As the year 2020 included a pre-pandemic period in the beginning of the year, followed by the COVID-19 outbreak in March, a period when access to mental health services was severely disrupted, we considered 2021 as the COVID-19 period and 2019 as the pre-pandemic period. RRs were presented overall and stratified by age, sex, sector, and SES. Considering the large population size, the balance between the groups was assessed by standardized mean differences (SMD), and smaller than 0.1 was considered well balanced. Because our data extended to October 31, 2021, each analyzed year started on November 1 of the previous year and ended on October 31. To present the results of the RRs and 95% CIs, we used forest plots. In addition, similar analyses were conducted among adolescents with a psychiatric history.

We used an interrupted time series design (ITS)[15] to quantify changes in the level and growth in monthly incident rates before and during the COVID-19 pandemic. ITS is a quasi-experimental design in which the effects of an intervention or event are evaluated by comparing outcome measures obtained at several time intervals before and after the intervention/event occurred.[15] The interruption was defined on February 27, 2020, the day that the first case of COVID-19 was detected in Israel. We used linear regression models and included Fourier terms to model the seasonal factors, with a p value <.05 considered statistically significant. Fourier analysis resolves the time dimension variable and allows identification, quantification, and removal of the time-based cycles in the data.[15] Statistical analyses were conducted using Python version 3.7.1 and the statsmodels package version 0.12.

RESULTS

The average population of adolescents without psychiatric history was N = 200,824 in 2017, N = 207,703 in 2019, and N = 218,146 in 2021 and consisted of 50.4% male adolescents on average (Table 1, Table S2, available online). The cohorts slightly differed between outcomes because for each outcome we excluded individuals with a history of that specific outcome. The cohort consisted of 79.8% general secular Jewish population, 12.5% ultra-orthodox Jews, and 7.7% Israeli Arabs (Table S2, available online). Among adolescents with psychiatric history, the size of the population ranged from 1,478 for participants with eating disorders to 32,445 for participants with ADHD diagnoses in 2021 (Table 2).

First, we explored the yearly outlook of all the outcomes tested by plotting the monthly incidence rates of an outcome per 1,000 members for each year from 2017 to 2021. In the beginning of the COVID-19 pandemic (March-April 2020), we observed a drastic decrease in the rates of all diagnoses and medications, corresponding to the first, and strictest, lockdown. However, from May 2020, rates of most diagnoses and medications increased and were high throughout 2021 compared to the years before the pandemic (Figure 1). To quantify the pandemic's effect on adolescents' mental health, we compared the relative risk in the pre-COVID-19 period (2019 vs 2017) and during the COVID-19 period (2021 vs 2019) (Table S3, available online; Figure 2). Among adolescents without psychiatric history, the analysis of the COVID-19 period presented sharp rises in mental health outcomes such as a 36% increase in depression (RR = 1.36; 95% CI = 1.25-147), 31% in anxiety (RR = 1.31; 95% CI = 1.23-1.39), 20% in stress (RR = 1.20; 95% CI = 1.13-1.27), 50% in eating disorders (RR = 1.50; 95% CI = 1.35-1.67), 25% in antidepressants (RR = 1.25; 95% CI = 1.25-1.33), and 28% in antipsychotics (RR = 1.28; 95% CI = 1.18-1.40). We found a decrease in ADHD diagnoses (RR = 0.84; 95% CI = 0.80-0.88) and corresponding prescriptions of ADHD agents (RR = 0.90; 95% CI = 0.86-0.93). Among adolescents with psychiatric history (Table S4, available online) a significant increase during COVID-19 period was measured in anxiety (RR = 1.08; 95% CI = 1.01-1.15), eating disorders (RR = 1.34; 95% CI = 1.17-1.52) and antidepressants (RR = 1.09; 95% CI = 1.06-1.13). Significant decrease was measured in ADHD diagnoses (RR = 0.90; 95% CI = 0.89-0.92) and prescriptions of ADHD agents (RR = 0.87; 95% CI = 0.86-0.86).

In the sex-stratified analyses, most of the increase in incidence rates was associated with female participants, whereas male participants generally presented with risk rates that were not significantly different from previous years

TABLE 1 Study Population Characteristics and Incidence Rates of Mental Health Diagnoses and Medications by Year, Diagnoses, and Medications

Characteristics	Year	Depression N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	Anxiety N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	Eating disorder N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	Stress N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	ADHD N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p
Total																										
	2017	216,121	945	4.4			209,208	1,534	7.3			212,104	523	2.5			201,670	2,169	10.8			158,159	3,924	24.8		
	2018	220,668	1,005	4.6	1.04 (0.95-1.14)	.376	213,330	1,638	7.7	1.05 (0.97-1.12)	.193	216,109	559	2.6	1.05 (0.93-1.18)	.447	204,166	2,206	10.8	1.00 (0.94-1.07)	.879	159,974	3,654	22.8	0.92 (0.88-0.96)	<.001
	2019	224,552	978	4.4	0.96 (0.87-1.04)	.322	216,751	1,657	7.6	1.00 (0.93-1.07)	.903	219,590	567	2.6	1.00 (0.88-1.12)	1.000	205,791	2,132	10.4	0.96 (0.90-1.02)	.165	162,529	3,657	22.5	0.99 (0.94-1.03)	.523
	2020	230,517	1,081	4.7	1.08 (0.98-1.17)	.093	222,127	1,839	8.3	1.08 (1.01-1.16)	.018	225,047	721	3.2	1.24 (1.11-1.39)	<.001	209,333	2,284	10.9	1.05 (0.99-1.12)	.085	166,922	3,201	19.2	0.85 (0.81-0.89)	.000
	2021	236,291	1,398	5.9	1.26 (1.17-1.37)	<.001	227,311	2,275	10.0	1.21 (1.14-1.29)	<.001	230,499	894	3.9	1.21 (1.10-1.34)	<.001	212,331	2,632	12.4	1.14 (1.07-1.20)	<.001	172,073	3,262	19.0	0.99 (0.94-1.04)	.642
Sex																										
Male	2017	110,989	427	3.8			107,062	749	7.0			109,179	126	1.2			102,598	990	9.6			73,816	1,988	26.9		
	2018	113,307	443	3.9	1.02 (0.89-1.16)	.839	109,137	791	7.2	1.04 (0.93-1.14)	.490	111,185	144	1.3	1.12 (0.88-1.43)	.361	103,829	1,014	9.8	1.01 (0.92-1.10)	.788	74,664	1,846	24.7	0.92 (0.86-0.97)	.008
	2019	115,245	417	3.6	0.93 (0.81-1.06)	.260	110,750	723	6.5	0.90 (0.81-0.99)	.042	112,863	124	1.1	0.85 (0.66-1.08)	.179	104,505	885	8.5	0.87 (0.79-0.94)	.002	75,835	1,850	24.4	0.99 (0.92-1.05)	.689
	2020	118,088	429	3.6	1.00 (0.87-1.15)	.973	113,309	794	7.0	1.07 (0.97-1.19)	.172	115,454	150	1.3	1.18 (0.93-1.50)	.183	106,046	971	9.2	1.08 (0.98-1.18)	.093	77,803	1,552	19.9	0.82 (0.76-0.87)	<.001
	2021	120,988	447	3.7	1.02 (0.89-1.16)	.813	115,801	941	8.1	1.16 (1.06-1.27)	.002	118,174	153	1.3	1.00 (0.79-1.25)	1.000	107,329	991	9.2	1.01 (0.92-1.10)	.856	80,338	1,504	18.7	0.94 (0.87-1.01)	.079
Female	2017	105,132	518	4.9			102,146	785	7.7			102,925	397	3.9			99,072	1,179	11.9			84,343	1,936	23.0		
	2018	107,361	562	5.2	1.06 (0.94-1.20)	.329	104,193	847	8.1	1.06 (0.96-1.17)	.263	104,924	415	4.0	1.03 (0.89-1.18)	.725	100,337	1,192	11.9	1.00 (0.92-1.08)	.984	85,310	1,808	21.2	0.92 (0.86-0.98)	.014
	2019	109,307	561	5.1	0.98 (0.87-1.10)	.742	106,001	934	8.8	1.08 (0.98-1.19)	.091	106,727	443	4.2	1.05 (0.91-1.20)	.494	101,286	1,247	12.3	1.04 (0.95-1.12)	.381	86,694	1,807	20.8	0.98 (0.92-1.05)	.614
	2020	112,429	652	5.8	1.13 (1.01-1.26)	.036	108,818	1,045	9.6	1.09 (0.99-1.19)	.055	109,593	571	5.2	1.26 (1.11-1.42)	<.001	103,287	1,313	12.7	1.03 (0.95-1.12)	.426	89,119	1,649	18.5	0.89 (0.83-0.94)	<.001
	2021	115,303	951	8.2	1.42 (1.29-1.57)	<.001	111,510	1,334	12.0	1.25 (1.15-1.35)	<.001	112,325	741	6.6	1.27 (1.14-1.41)	<.001	105,002	1,641	15.6	1.23 (1.14-1.32)	<.001	91,735	1,758	19.2	1.04 (0.96-1.11)	.307
Age groups																										
12-13 years old	2017	74,563	219	2.9			72,386	450	6.2			72,594	188	2.6			69,296	833	12.0			55,799	1,603	28.7		
	2018	75,226	222	3.0	1.00 (0.83-1.21)	.962	72,962	483	6.6	1.06 (0.93-1.21)	.341	73,162	181	2.5	0.96 (0.77-1.17)	.677	69,227	820	11.8	0.99 (0.89-1.09)	.767	55,881	1,481	26.5	0.92 (0.86-0.99)	.024
	2019	75,907	214	2.8	0.96 (0.79-1.15)	.666	73,494	502	6.8	1.03 (0.91-1.17)	.632	73,804	181	2.5	0.99 (0.80-1.22)	.958	68,944	772	11.2	0.95 (0.85-1.04)	.267	56,567	1,375	24.3	0.92 (0.85-0.98)	.020
	2020	78,036	230	2.9	1.05 (0.86-1.26)	.669	75,369	539	7.2	1.05 (0.92-1.18)	.474	75,935	223	2.9	1.20 (0.98-1.46)	.073	70,082	777	11.1	0.99 (0.89-1.09)	.858	58,521	1,256	21.5	0.88 (0.81-0.95)	.001
	2021	81,247	338	4.2	1.41 (1.19-1.67)	<.001	78,300	667	8.5	1.19 (1.06-1.33)	.002	79,002	275	3.5	1.19 (0.99-1.41)	.059	72,176	936	13.0	1.17 (1.06-1.29)	.001	61,447	1,333	21.7	1.01 (0.93-1.09)	.796
14-15 years old	2017	71,692	300	4.2			69,327	487	7.0			70,374	206	2.9			66,829	687	10.3			52,167	1,449	27.8		
	2018	73,843	341	4.6	1.10 (0.94-1.29)	.220	71,306	558	7.8	1.11 (0.98-1.26)	.082	72,117	209	2.9	0.99 (0.81-1.20)	.922	68,283	700	10.3	1.00 (0.89-1.11)	.978	53,416	1,328	24.9	0.90 (0.83-0.96)	.003
	2019	75,910	317	4.2	0.90 (0.77-1.05)	.197	73,264	534	7.3	0.93 (0.82-1.05)	.248	74,070	216	2.9	1.01 (0.83-1.22)	.961	69,619	695	10.0	0.97 (0.87-1.08)	.628	54,742	1,440	26.3	1.06 (0.98-1.14)	.133
	2020	77,165	389	5.0	1.21 (1.04-1.40)	.013	74,396	600	8.1	1.11 (0.98-1.24)	.089	75,200	269	3.6	1.23 (1.03-1.47)	.026	70,163	770	11.0	1.10 (0.99-1.22)	.070	55,511	1,168	21.0	0.80 (0.74-0.86)	<.001
	2021	77,825	485	6.2	1.24 (1.08-1.41)	.002	74,891	751	10.0	1.24 (1.12-1.38)	<.001	75,807	354	4.7	1.31 (1.11-1.53)	.001	69,895	899	12.9	1.17 (1.06-1.29)	.001	56,428	1,217	21.6	1.03 (0.94-1.11)	.548
16-17 years old	2017	69,866	426	6.1			67,495	597	8.8			69,136	129	1.9			65,545	649	9.9			50,193	872	17.4		
	2018	71,599	442	6.2	1.01 (0.88-1.16)	.865	69,062	597	8.6	0.98 (0.87-1.09)	.706	70,830	169	2.4	1.28 (1.02-1.61)	.037	66,656	686	10.3	1.04 (0.93-1.16)	.492	50,677	845	16.7	0.96 (0.87-1.06)	.394
	2019	72,735	447	6.1	1.00 (0.87-1.14)	.973	69,993	621	8.9	1.03 (0.91-1.15)	.666	71,716	170	2.4	0.99 (0.80-1.23)	.957	67,228	665	9.9	0.96 (0.86-1.07)	.477	51,220	842	16.4	0.99 (0.89-1.08)	.787
	2020	75,316	462	6.1	1.00 (0.87-1.14)	1.000	72,362	700	9.7	1.09 (0.97-1.21)	.115	73,912	229	3.1	1.31 (1.07-1.59)	.008	69,088	737	10.7	1.08 (0.97-1.20)	.163	52,890	777	14.7	0.89 (0.81-0.98)	.024
	2021	77,219	575	7.4	1.21 (1.07-1.37)	.002	74,120	857	11.6	1.20 (1.08-1.32)	<.001	75,690	265	3.5	1.13 (0.94-1.35)	.177	70,260	797	11.3	1.06 (0.96-1.18)	.228	54,198	712	13.1	0.89 (0.80-0.99)	.030
Sector																										
General Jewish	2017	174,062	851	4.9			167,906	1,336	8.0			170,742	470	2.8			160,951	1,895	11.8			123,540	3,424	27.7		
	2018	177,600	900	5.1	1.04 (0.94-1.14)	.458	171,070	1,456	8.5	1.07 (0.99-1.15)	.077	173,872	506	2.9	1.06 (0.93-1.20)	.387	162,749	1,952	12.0	1.02 (0.95-1.09)	.570	124,945	3,187	25.5	0.92 (0.87-0.96)	.001
	2019	180,155	876	4.9	0.96 (0.87-1.05)	.392	173,174	1,500	8.7	1.02 (0.94-1.09)	.644	176,131	514	2.9	1.00 (0.88-1.13)	.975	163,327	1,860	11.4	0.95 (0.89-1.01)	.110	126,440	3,167	25.0	0.98 (0.93-1.03)	.469
	2020	185,019	979	5.3	1.09 (0.99-1.19)	.069	177,481	1,655	9.3	1.08 (1.00-1.15)	.038	180,607	682	3.8	1.29 (1.15-1.45)	<.001	166,137	1,987	12.0	1.05 (0.98-1.12)	.127	130,139	2,797	21.5	0.86 (0.81-0.90)	<.001
	2021	189,689	1,305	6.9	1.30 (1.20-1.41)	<.001	181,615	2,043	11.2	1.21 (1.13-1.29)	<.001	185,017	832	4.5	1.19 (1.08-1.32)	.001	168,472	2,312	13.7	1.15 (1.08-1.22)	<.001	134,397	2,776	20.7	0.96 (0.91-1.01)	.136

(continued)

TABLE 1 Continued

Characteristics	Year	Depression N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	Anxiety N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	Eating disorder N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	Stress N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p	ADHD N population	N incidence	Rate per 1,000	RR year/year 1 (95% CI)	p
Ultra-orthodox Jewish	2017	26,314	69	2.6			25,830	149	5.8			25,705	36	1.4			25,562	177	6.9			20,911	386	18.5		
	2018	27,045	76	2.8	1.07 (0.77-1.48)	.740	26,502	124	4.7	0.81 (0.63-1.03)	.089	26,313	43	1.6	1.17 (0.74-1.82)	.502	26,039	177	6.8	0.98 (0.79-1.21)	.873	21,163	384	18.1	0.98 (0.85-1.13)	.827
	2019	27,423	73	2.7	0.95 (0.68-1.31)	.744	26,852	114	4.2	0.91 (0.70-1.17)	.475	26,563	43	1.6	0.99 (0.64-1.51)	1.000	26,162	184	7.0	1.03 (0.84-1.27)	.752	21,207	387	18.2	1.01 (0.87-1.16)	.942
	2020	28,405	65	2.3	0.86 (0.61-1.20)	.395	27,790	141	5.1	1.20 (0.93-1.53)	.167	27,425	30	1.1	0.68 (0.42-1.08)	.102	26,824	213	7.9	1.13 (0.92-1.38)	.227	21,811	287	13.2	0.72 (0.61-0.84)	<.001
	2021	29,541	68	2.3	1.01 (0.71-1.41)	1.000	28,862	161	5.6	1.10 (0.87-1.38)	.420	28,499	41	1.4	1.32 (0.82-2.11)	.285	27,588	223	8.1	1.02 (0.84-1.23)	.885	22,728	383	16.9	1.28 (1.10-1.49)	.001
Arab	2017	15,745	25	1.6			15,472	49	3.2			15,657	17	1.1			15,157	97	6.4			13,708	114	8.3		
	2018	16,023	29	1.8	1.14 (0.66-1.95)	.684	15,758	58	3.7	1.16 (0.79-1.70)	.441	15,924	10	0.6	0.58 (0.26-1.26)	.181	15,378	77	5.0	0.78 (0.58-1.06)	.111	13,866	83	6.0	0.72 (0.54-0.95)	.022
	2019	16,974	29	1.7	0.94 (0.56-1.58)	.896	16,725	43	2.6	0.70 (0.47-1.04)	.074	16,896	10	0.6	0.94 (0.39-2.26)	1.000	16,302	88	5.4	1.08 (0.79-1.46)	.640	14,882	103	6.9	1.16 (0.86-1.54)	.339
	2020	17,093	37	2.2	1.27 (0.77-2.06)	.389	16,856	43	2.6	0.99 (0.65-1.51)	1.000	17,015	9	0.5	0.89 (0.36-2.20)	.823	16,372	84	5.1	0.95 (0.70-1.28)	.760	14,972	117	7.8	1.13 (0.86-1.47)	.380
	2021	17,061	25	1.5	0.68 (0.40-1.12)	.162	16,834	71	4.2	1.65 (1.13-2.41)	.009	16,983	21	1.2	2.34 (1.07-5.10)	.029	16,271	97	6.0	1.16 (0.86-1.56)	.333	14,948	103	6.9	0.88 (0.67-1.15)	.379
Socioeconomic status																										
Low (1-3)	2017	26,273	70	2.7			25,706	120	4.7			25,881	46	1.8			25,253	174	6.9			21,351	282	13.2		
	2018	27,015	72	2.7	1.00 (0.72-1.39)	1.000	26,448	115	4.3	0.93 (0.72-1.20)	.601	26,559	39	1.5	0.83 (0.53-1.27)	.387	25,836	193	7.5	1.08 (0.88-1.33)	.463	21,737	280	12.9	0.98 (0.82-1.15)	.767
	2019	28,143	64	2.3	0.85 (0.60-1.19)	.391	27,569	100	3.6	0.83 (0.63-1.09)	.194	27,643	29	1.0	0.71 (0.44-1.16)	.183	26,778	181	6.8	0.90 (0.73-1.11)	.350	22,745	278	12.2	0.95 (0.80-1.12)	.551
	2020	28,692	77	2.7	1.18 (0.84-1.64)	.354	28,099	130	4.6	1.28 (0.98-1.66)	.074	28,156	23	0.8	0.78 (0.45-1.35)	.407	27,149	227	8.4	1.24 (1.02-1.50)	.033	23,122	225	9.7	0.80 (0.66-0.94)	.011
	2021	29,215	76	2.6	0.97 (0.70-1.33)	.872	28,599	155	5.4	1.17 (0.92-1.48)	.191	28,674	37	1.3	1.58 (0.93-2.66)	.093	27,398	231	8.4	1.01 (0.84-1.21)	.963	23,584	264	11.2	1.15 (0.96-1.37)	.122
Medium (4-7)	2017	138,133	656	4.7			133,473	1,048	7.9			135,352	342	2.5			128,074	1,516	11.8			99,492	2,520	25.3		
	2018	140,250	672	4.8	1.01 (0.90-1.12)	.891	135,291	1,111	8.2	1.05 (0.96-1.14)	.300	137,122	383	2.8	1.11 (0.95-1.28)	.181	128,781	1,549	12.0	1.02 (0.94-1.09)	.663	99,946	2,284	22.9	0.90 (0.85-0.95)	<.001
	2019	141,445	641	4.5	0.95 (0.84-1.05)	.319	136,173	1,107	8.1	0.99 (0.91-1.08)	.815	138,060	378	2.7	0.98 (0.85-1.13)	.799	128,413	1,482	11.5	0.96 (0.89-1.03)	.257	100,311	2,336	23.3	1.02 (0.96-1.08)	.522
	2020	144,692	750	5.2	1.14 (1.03-1.27)	.012	139,033	1,239	8.9	1.10 (1.01-1.19)	.026	140,963	487	3.5	1.26 (1.10-1.44)	.001	129,947	1,539	11.8	1.03 (0.95-1.10)	.475	102,594	1,972	19.2	0.83 (0.77-0.87)	<.001
	2021	147,839	969	6.6	1.26 (1.15-1.39)	<.001	141,809	1,522	10.7	1.20 (1.12-1.30)	<.001	143,872	585	4.1	1.18 (1.04-1.33)	.008	131,243	1,794	13.7	1.15 (1.08-1.24)	<.001	105,323	1,952	18.5	0.96 (0.90-1.03)	.252
High (8-10)	2017	51,128	218	4.3			49,463	363	7.3			50,300	132	2.6			47,787	475	9.9			36,857	1,118	30.3		
	2018	52,743	258	4.9	1.15 (0.95-1.37)	.141	50,952	407	8.0	1.09 (0.94-1.25)	.247	51,783	137	2.6	1.01 (0.79-1.28)	.951	48,927	455	9.3	0.94 (0.82-1.06)	.323	37,767	1,080	28.6	0.94 (0.86-1.02)	.166
	2019	54,216	272	5.0	1.03 (0.86-1.22)	.794	52,282	444	8.5	1.06 (0.92-1.22)	.371	53,149	160	3.0	1.14 (0.90-1.43)	.270	49,898	463	9.3	1.00 (0.87-1.14)	1.000	38,859	1,033	26.6	0.93 (0.85-1.01)	.089
	2020	56,274	247	4.4	0.87 (0.73-1.04)	.135	54,159	463	8.5	1.01 (0.88-1.15)	.947	55,078	205	3.7	1.24 (1.01-1.52)	.046	51,433	507	9.9	1.06 (0.93-1.20)	.350	40,482	991	24.5	0.92 (0.84-1.00)	.062
	2021	58,247	348	6.0	1.36 (1.16-1.60)	<.001	55,934	583	10.4	1.22 (1.08-1.38)	.001	56,969	268	4.7	1.26 (1.05-1.52)	.011	52,765	593	11.2	1.14 (1.01-1.28)	.031	42,312	1,034	24.4	1.00 (0.91-1.09)	.982

Characteristics	Year	Antidepressant Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	Anxiolytic Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	Antipsychotic Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	ADHD agents Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value
Total	2017	212,163	1,787	8.4			215,824	539	2.5			212,741	850	4.0			169,423	4,886	28.8		
	2018	216,569	1,943	9.0	1.07 (0.99-1.14)	.054	220,652	488	2.2	0.89 (0.78-1.00)	.053	216,937	877	4.0	1.01 (0.92-1.11)	.810	171,754	4,734	27.6	0.96 (0.91-0.99)	.025
	2019	220,245	2,054	9.3	1.04 (0.97-1.11)	.221	224,870	509	2.3	1.02 (0.90-1.16)	.727	220,544	983	4.5	1.10 (1.01-1.21)	.036	174,454	4,677	26.8	0.97 (0.93-1.01)	.174
	2020	225,826	2,198	9.7	1.04 (0.98-1.11)	.165	231,124	497	2.2	0.95 (0.84-1.07)	.430	226,158	1,069	4.7	1.06 (0.97-1.16)	.184	179,053	4,193	23.4	0.87 (0.83-0.91)	<.001
	2021	231,381	2,706	11.7	1.20 (1.14-1.27)	<.001	237,292	572	2.4	1.12 (0.99-1.26)	.066	231,593	1,326	5.7	1.21 (1.12-1.31)	<.001	184,540	4,453	24.1	1.03 (0.98-1.07)	.160
Sex																					
Male	2017	108,504	832	7.7			110,806	241	2.2			107,907	498	4.6			81,001	2,474	30.5		
	2018	110,798	932	8.4	1.10 (0.99-1.20)	.053	113,272	208	1.8	0.84 (0.70-1.02)	.080	109,966	511	4.6	1.01 (0.89-1.14)	.925	82,071	2,357	28.7	0.94 (0.88-0.99)	.031
	2019	112,594	957	8.5	1.01 (0.92-1.11)	.835	115,366	207	1.8	0.98 (0.80-1.18)	.844	111,631	578	5.2	1.11 (0.98-1.26)	.078	83,246	2,295	27.6	0.96 (0.90-1.02)	.158
	2020	115,235	935	8.1	0.95 (0.87-1.04)	.321	118,310	238	2.0	1.12 (0.93-1.35)	.236	114,177	565	4.9	0.96 (0.85-1.07)	.458	85,409	1,918	22.5	0.81 (0.76-0.86)	<.001
	2021	118,047	1,086	9.2	1.13 (1.04-1.24)	.005	121,341	230	1.9	0.94 (0.78-1.13)	.548	116,821	618	5.3	1.07 (0.95-1.20)	.256	88,125	1,884	21.4	0.95 (0.89-1.01)	.127

(continued)

TABLE 1 Continued

Characteristics	Year	Antidepressant Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	Anxiolytic Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	Antipsychotic Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	ADHD agents Population N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value
Female	2017	103,659	955	9.2			105,018	298	2.8			104,834	352	3.4			88,422	2,412	27.3		
	2018	105,771	1,011	9.6	1.04 (0.95-1.13)	.415	107,380	280	2.6	0.92 (0.78-1.08)	.318	106,971	366	3.4	1.02 (0.88-1.18)	.823	89,683	2,377	26.5	0.97 (0.91-1.03)	.319
	2019	107,651	1,097	10.2	1.07 (0.97-1.16)	.142	109,504	302	2.8	1.06 (0.89-1.24)	.507	108,913	405	3.7	1.09 (0.94-1.25)	.249	91,208	2,382	26.1	0.99 (0.93-1.04)	.607
	2020	110,591	1,263	11.4	1.12 (1.03-1.22)	.006	112,814	259	2.3	0.83 (0.70-0.98)	.031	111,981	504	4.5	1.21 (1.06-1.38)	.004	93,644	2,275	24.3	0.93 (0.87-0.98)	.013
	2021	113,334	1,620	14.3	1.25 (1.16-1.35)	<.001	115,951	342	2.9	1.28 (1.09-1.51)	.002	114,772	708	6.2	1.37 (1.22-1.54)	<.001	96,415	2,569	26.6	1.10 (1.04-1.16)	.001
Age groups																					
12-13 years old	2017	73609	436	5.9			74,351	71	1.0			73,193	268	3.7			60,395	1,789	29.6		
	2018	74281	467	6.3	1.06 (0.93-1.21)	.385	75,109	74	1.0	1.03 (0.74-1.43)	.868	73,774	255	3.5	0.94 (0.79-1.12)	.512	60,738	1,698	28.0	0.94 (0.88-1.01)	.086
	2019	74974	537	7.2	1.14 (1.01-1.29)	.040	75,875	70	0.9	0.94 (0.67-1.30)	.739	74,360	294	4.0	1.14 (0.96-1.35)	.124	61,305	1,643	26.8	0.96 (0.89-1.03)	.219
	2020	76998	557	7.2	1.01 (0.89-1.14)	.879	78,081	63	0.8	0.87 (0.62-1.23)	.488	76,479	307	4.0	1.02 (0.86-1.19)	.870	63,206	1,416	22.4	0.84 (0.77-0.89)	<.001
	2021	80126	676	8.4	1.17 (1.04-1.30)	.007	81,363	83	1.0	1.26 (0.91-1.75)	.185	79,590	352	4.4	1.1 (0.94-1.28)	.226	66,260	1,496	22.6	1.01 (0.93-1.08)	.837
14-15 years old	2017	70412	576	8.2			71,562	158	2.2			70,550	289	4.1			56,031	1,718	30.7		
	2018	72479	700	9.7	1.18 (1.06-1.32)	.003	73,766	127	1.7	0.78 (0.61-0.98)	.038	72,521	313	4.3	1.05 (0.89-1.24)	.540	57,316	1,701	29.7	0.97 (0.90-1.04)	.339
	2019	74450	684	9.2	0.95 (0.85-1.06)	.358	76,027	128	1.7	0.98 (0.76-1.25)	.900	74,508	326	4.4	1.01 (0.86-1.18)	.874	58,836	1,723	29.3	0.99 (0.92-1.06)	.703
	2020	75628	696	9.2	1.00 (0.90-1.11)	.978	77,375	143	1.8	1.10 (0.86-1.39)	.466	75,631	347	4.6	1.05 (0.90-1.22)	.562	59,850	1,448	24.2	0.83 (0.77-0.88)	<.001
	2021	76253	928	12.2	1.32 (1.2-1.46)	<.001	78,170	141	1.8	0.98 (0.77-1.23)	.859	76,189	459	6.0	1.31 (1.14-1.51)	<.001	60,644	1,605	26.5	1.09 (1.02-1.17)	.013
16-17 years old	2017	68142	775	11.4			69,911	310	4.4			68,998	293	4.2			52,997	1,379	26.0		
	2018	69809	776	11.1	0.98 (0.88-1.08)	.664	71,777	287	4.0	0.90 (0.76-1.06)	.218	70,642	309	4.4	1.03 (0.87-1.21)	.744	53,700	1,335	24.9	0.96 (0.88-1.03)	.236
	2019	70821	833	11.8	1.06 (0.96-1.17)	.259	72,968	311	4.3	1.07 (0.90-1.25)	.437	71,676	363	5.1	1.16 (0.99-1.35)	.058	54,313	1,311	24.1	0.97 (0.90-1.05)	.443
	2020	73200	945	12.9	1.10 (1.00-1.20)	.050	75,668	291	3.8	0.90 (0.76-1.06)	.220	74,048	415	5.6	1.11 (0.96-1.27)	.161	55,997	1,329	23.7	0.98 (0.91-1.06)	.665
	2021	75002	1102	14.7	1.14 (1.04-1.24)	.003	77,759	348	4.5	1.16 (0.99-1.36)	.057	75,814	515	6.8	1.21 (1.07-1.38)	.003	57,636	1,352	23.5	0.99 (0.91-1.07)	.769
Sector																					
General Jewish	2017	170,748	1,582	9.3			173,941	461	2.7			171,296	659	3.8			133,344	4,168	30.9	0.96 (0.91-0.99)	.036
	2018	174,114	1,707	9.8	1.06 (0.98-1.13)	.107	177,737	409	2.3	0.87 (0.76-0.99)	.038	174,559	670	3.8	1.00 (0.89-1.11)	.978	135,086	4,064	29.7	0.96 (0.92-1.01)	.089
	2019	176,479	1,794	10.2	1.04 (0.97-1.11)	.285	180,585	431	2.4	1.04 (0.90-1.19)	.604	176,880	748	4.2	1.10 (0.99-1.22)	.070	136,686	3,692	26.3	0.88 (0.84-0.92)	<.001
	2020	181,047	1,951	10.8	1.06 (0.99-1.13)	.073	185,714	413	2.2	0.93 (0.81-1.07)	.318	181,497	851	4.7	1.11 (1.01-1.22)	.040	140,548	3,870	26.7	1.02 (0.97-1.06)	.499
	2021	185,511	2,432	13.1	1.22 (1.15-1.29)	<.001	190,761	499	2.6	1.18 (1.03-1.34)	.015	185,885	1,056	5.7	1.21 (1.11-1.33)	<.001	145,076				
Ultra-orthodox Jewish	2017	25,818	171	6.6			26,204	56	2.1			25,792	170	6.6			21,719	460	21.2		
	2018	26,549	206	7.8	1.17 (0.95-1.43)	.134	26,944	47	1.7	0.82 (0.55-1.20)	.325	26,456	185	7.0	1.06 (0.86-1.31)	.595	22,051	477	21.6	1.02 (0.89-1.16)	.766
	2019	26,884	221	8.2	1.06 (0.87-1.28)	.560	27,339	50	1.8	1.05 (0.70-1.56)	.839	26,771	214	8.0	1.14 (0.93-1.39)	.191	22,142	497	22.4	1.04 (0.91-1.18)	.582
	2020	27,769	192	6.9	0.84 (0.69-1.02)	.084	28,322	68	2.4	1.31 (0.91-1.89)	.167	27,654	189	6.8	0.85 (0.70-1.04)	.121	22,750	382	16.8	0.75 (0.65-0.85)	<.001
	2021	28,891	226	7.8	1.13 (0.93-1.37)	.220	29,464	52	1.8	0.74 (0.51-1.05)	.100	28,727	237	8.3	1.21 (0.99-1.46)	.058	23,697	463	19.5	1.16 (1.02-1.33)	.029
Arab	2017	15,597	34	2.2			15,679	22	1.4			15,653	21	1.3			14,360	122	8.5		
	2018	15,906	30	1.9	0.87 (0.53-1.41)	.617	15,971	32	2.0	1.43 (0.83-2.46)	.221	15,922	22	1.4	1.03 (0.56-1.87)	1.000	14,617	89	6.1	0.72 (0.54-0.94)	.019
	2019	16,882	39	2.3	1.22 (0.76-1.97)	.470	16,946	28	1.7	0.82 (0.49-1.37)	.519	16,893	21	1.2	0.90 (0.49-1.64)	.762	15,626	116	7.4	1.22 (0.92-1.61)	.161
	2020	17,010	55	3.2	1.40 (0.92-2.11)	.121	17,088	16	0.9	0.57 (0.30-1.05)	.071	17,007	29	1.7	1.37 (0.78-2.41)	.322	15,755	119	7.6	1.02 (0.78-1.31)	.896
	2021	16,979	48	2.8	0.87 (0.59-1.29)	.554	17,067	21	1.2	1.31 (0.68-2.52)	.417	16,981	33	1.9	1.14 (0.69-1.88)	.614	15,767	120	7.6	1.01 (0.78-1.30)	1.000

TABLE 1 Continued

Characteristics	Year	Antidepressant Popula-tion N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	Anxiolytic Popula-tion N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	Antipsychotic Popula-tion N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value	ADHD agents Popula-tion N	Incidence n	Rate per 1,000	RR year/year 1 (95% CI)	p Value
Socioeconomic status																					
Low (1-3)	2017	25,890	123	4.8			26,150	50	1.9			25,864	104	4.0			22,614	327	14.5		
	2018	26,669	149	5.6	1.18 (0.92-1.49)	.202	26,925	55	2.0	1.07 (0.72-1.57)	.770	26,563	114	4.3	1.07 (0.81-1.39)	.635	23,137	357	15.4	1.07 (0.91-1.24)	.397
	2019	27,785	155	5.6	1.00 (0.79-1.25)	1.000	28,085	51	1.8	0.89 (0.60-1.30)	.561	27,651	122	4.4	1.03 (0.79-1.33)	.845	24,141	377	15.6	1.01 (0.87-1.17)	.882
	2020	28,307	138	4.9	0.87 (0.69-1.10)	.266	28,662	59	2.1	1.13 (0.77-1.65)	.567	28,156	131	4.7	1.05 (0.82-1.35)	.705	24,568	283	11.5	0.74 (0.63-0.86)	<.001
	2021	28,860	159	5.5	1.13 (0.90-1.42)	.296	29,208	56	1.9	0.93 (0.64-1.34)	.710	28,659	140	4.9	1.05 (0.82-1.33)	.715	25,088	315	12.6	1.09 (0.92-1.28)	.304
Medium (4-7)	2017	135,607	1,200	8.8			137,997	365	2.6			135,797	548	4.0			107,325	3,108	29.0		
	2018	137,642	1,259	9.1	1.03 (0.95-1.12)	.418	140,272	294	2.1	0.79 (0.68-0.92)	.003	137,711	592	4.3	1.07 (0.94-1.20)	.286	108,151	2,988	27.6	0.95 (0.90-1.00)	.063
	2019	138,738	1,328	9.6	1.05 (0.96-1.13)	.252	141,723	328	2.3	1.10 (0.94-1.29)	.228	138,775	648	4.7	1.09 (0.97-1.21)	.147	108,595	2,917	26.9	0.97 (0.92-1.02)	.273
	2020	141,717	1,441	10.2	1.06 (0.98-1.14)	.113	145,151	330	2.3	0.98 (0.84-1.14)	.845	141,754	699	4.9	1.06 (0.94-1.18)	.325	110,998	2,617	23.6	0.88 (0.83-0.92)	<.001
	2021	144,750	1,778	12.3	1.21 (1.13-1.29)	<.001	148,576	369	2.5	1.09 (0.94-1.27)	.256	144,661	874	6.0	1.23 (1.11-1.35)	<.001	113,948	2,782	24.4	1.04 (0.98-1.09)	.195
High (8-10)	2017	50,092	461	9.2			51,089	123	2.4			50,499	195	3.9			39,003	1,443	37.0		
	2018	51,611	527	10.2	1.11 (0.97-1.26)	.103	52,794	138	2.6	1.09 (0.85-1.38)	.536	52,013	169	3.2	0.84 (0.68-1.03)	.104	39,922	1,373	34.4	0.93 (0.86-1.00)	.050
	2019	52,989	568	10.7	1.05 (0.93-1.18)	.430	54,309	128	2.4	0.90 (0.70-1.15)	.425	53,379	208	3.9	1.20 (0.97-1.47)	.080	41,085	1,375	33.5	0.97 (0.90-1.05)	.473
	2020	54,956	607	11.0	1.03 (0.91-1.16)	.618	56,447	107	1.9	0.80 (0.62-1.04)	.102	55,400	234	4.2	1.08 (0.89-1.31)	.418	42,745	1,272	29.8	0.89 (0.82-0.96)	.002
	2021	56,794	758	13.3	1.21 (1.09-1.34)	<.001	58,510	147	2.5	1.33 (1.03-1.70)	.028	57,294	308	5.4	1.27 (1.07-1.51)	.006	44,634	1,339	30.0	1.01 (0.93-1.09)	.842

ADHD = attention-deficit/hyperactivity disorder; RR = relative risk.

(see Table S3, available online; Figure 2A). Although in the pre−COVID-19 period a significant increase among female individuals was measured only in anxiety diagnoses (RR = 1.15; 95% CI = 1.04-1.26) and antidepressant dispensation (RR = 1.11; 95% CI = 1.01-1.21), during the COVID-19 period we observed significant increases in incidence rates of depression (RR = 1.61; 95% CI = 1.45-1.88), anxiety (RR = 1.36; 95% CI = 1.25-1.48), stress (RR = 1.27; 95% CI = 1.18-1.37), eating disorders (RR = 1.59; 95% CI = 1.41-1.79), antidepressant use (RR = 1.40; 95% CI = 1.3-1.51), and antipsychotic use (RR = 1.66; 95% CI = 1.47-1.80). The only significant increase diagnosis measured in male individuals during the COVID-19 period was 24% in anxiety (RR = 1.24; 95% CI = 1.13-1.37). Among adolescents with a psychiatric history, significant increases in rates of anxiety (RR = 1.11; 95% CI = 1.01-1.22) and eating disorders (RR = 1.31; 95% CI = 1.15-1.51) were observed only in female individuals (see Table S4, available online). Antidepressant dispensation was increased in both female (RR = 1.10; 95% CI = 1.05-1.15) and male (RR = 1.08; 95% CI = 1.03-1.14) individuals. ADHD diagnosis and medications dispensation were significantly decreased in both sexes.

Age-stratified incidence analyses have shown a significant increase during the COVID-19 period in diagnoses of depression, anxiety, stress, and eating disorders among all the groups, with the highest increase observed in 14- to 15-year-olds (see Table S3, available online; Figure 2B). This group presented significant increases in diagnoses of depression (RR = 1.49; 95% CI = 1. 1.30-1.72), anxiety (RR = 1.38; 95% CI = 1.23-1.54), stress (RR = 1.29; 95% CI = 1.17-1.42), and eating disorders (RR = 1.60; 95% CI = 1.35-1.90). Furthermore, the incidence rates of antidepressants and antipsychotics dispensation had the most pronounced increase among the same age group (RR = 1.32; 95% CI = 1.20-1.46 and RR = 1.38; 95% CI = 1.19-1.59, respectively). Among adolescents with a psychiatric history, significant increases in rates of depression (RR = 1.30; 95% CI = 1.04-1.63) and anxiety (RR = 1.14; 95% CI = 1.01-1.28) were found only in the 14- to 15-year-old age group (see Table S4, available online). Increased rates of eating disorders were found across all age groups, with the largest increase among 12- to 13-year-olds (RR = 1.72; 95% CI = 1.16-2.55).

The Israeli society is composed of different sectors that usually present with considerable disparities between them; therefore, we stratified the pandemic effect on mental health outcomes of adolescents by sector. The sector-stratified analyses showed that most of the increase in the incidence rates of psychiatric diagnoses and medications dispensation was associated with the general Israeli population. A single significant increase was observed in the Israeli Arab and

TABLE 2 Study Population Characteristics of Adolescents With a Psychiatric History and Rates of Mental Health Diagnoses and Medications by Years, Diagnoses, and Medications

		Depression					Anxiety					Eating disorder					Stress					ADHD				
Characteristics	Year	Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p
Total	2017	1,194	295	247.1			3,554	940	264.5			1,203	266	221.1			6,624	1,306	197.2			33,940	15,230	448.7		
	2018	1,260	328	260.3	1.05 (0.92-1.21)	.458	3,946	1,065	269.9	1.02 (0.95-1.10)	.601	1,311	272	207.5	0.94 (0.81-1.09)	.408	7,675	1,428	186.1	0.94 (0.88-1.01)	.096	35,219	14,962	424.8	0.95 (0.93-0.96)	<.001
	2019	1,418	372	262.3	1.01 (0.89-1.14)	.930	4,438	1,193	268.8	1.00 (0.93-1.07)	.921	1,387	295	212.7	1.03 (0.89-1.19)	.741	8,471	1,553	183.3	0.99 (0.92-1.05)	.670	35,787	14,316	400.0	0.94 (0.93-0.96)	<.001
	2020	1,486	407	273.9	1.04 (0.93-1.18)	.503	4,699	1,339	285.0	1.06 (0.99-1.13)	.088	1,374	343	249.6	1.17 (1.02-1.35)	.021	8,792	1,587	180.5	0.98 (0.92-1.05)	.636	35,099	12,928	368.3	0.92 (0.90-0.94)	<.001
	2021	1,607	449	279.4	1.02 (0.91-1.14)	.748	4,992	1,444	289.3	1.02 (0.95-1.08)	.653	1,478	420	284.2	1.14 (1.01-1.29)	.039	8,959	1,726	192.7	1.07 (1.00-1.13)	.039	32,445	11,739	361.8	0.98 (0.96-1.00)	.080
Sex																										
Female	2017	642	181	281.9			1,607	415	258.2			779	211	270.9			3,057	621	203.1			11,918	5012	420.5		
	2018	676	189	279.6	0.99 (0.83-1.18)	.951	1,776	450	253.4	0.98 (0.87-1.10)	.752	845	213	252.1	0.93 (0.79-1.10)	.397	3,549	702	197.8	0.97 (0.88-1.07)	.600	12,343	4,973	402.9	0.96 (0.93-0.99)	.005
	2019	779	238	305.5	1.09 (0.93-1.28)	.299	1,985	512	257.9	1.02 (0.91-1.14)	.765	913	244	267.3	1.06 (0.91-1.24)	.480	3,998	773	193.3	0.98 (0.89-1.07)	.642	12,703	4,852	382.0	0.95 (0.92-0.98)	.001
	2020	823	239	290.4	0.95 (0.82-1.10)	.512	2,100	588	280.0	1.09 (0.98-1.20)	.113	906	280	309.1	1.16 (1.00-1.34)	.049	4,219	776	183.9	0.95 (0.87-1.04)	.284	12,637	4,548	359.9	0.94 (0.91-0.97)	<.001
	2021	908	282	310.6	1.07 (0.93-1.24)	.373	2,314	662	286.1	1.02 (0.93-1.12)	.664	1,036	364	351.4	1.14 (1.00-1.29)	.053	4,389	898	204.6	1.11 (1.02-1.21)	.017	11,942	4,149	347.4	0.97 (0.93-1.00)	.041
Male	2017	552	114	206.5			1,947	525	269.6			424	55	129.7			3,567	685	192.0			22,022	10,218	464.0		
	2018	584	139	238.0	1.15 (0.93-1.43)	.225	2,170	615	283.4	1.05 (0.95-1.16)	.329	466	59	126.6	0.98 (0.69-1.38)	.920	4,126	726	176.0	0.92 (0.83-1.01)	.072	22,876	9,989	436.7	0.94 (0.92-0.96)	<.001
	2019	639	134	209.7	0.88 (0.71-1.09)	.243	2,453	681	277.6	0.98 (0.89-1.07)	.670	474	51	107.6	0.85 (0.60-1.21)	.417	4,473	780	174.4	0.99 (0.90-1.09)	.865	23,084	9,464	410.0	0.94 (0.92-0.96)	<.001
	2020	663	168	253.4	1.21 (0.99-1.47)	.066	2,599	751	289.0	1.04 (0.95-1.14)	.382	468	63	134.6	1.25 (0.88-1.77)	.231	4,573	811	177.3	1.02 (0.93-1.11)	.720	22,462	8,380	373.1	0.91 (0.89-0.93)	<.001
	2021	699	167	238.9	0.94 (0.78-1.14)	.571	2,678	782	292.0	1.01 (0.93-1.10)	.808	442	56	126.7	0.94 (0.67-1.32)	.768	4,570	828	181.2	1.02 (0.94-1.12)	.643	20,503	7,590	370.2	0.99 (0.97-1.02)	.542
Age, y																										
12-13	2017	185	36	194.6			1072	268	250.0			323	53	164.1			2582	522	202.2			11659	5670	486.3		
	2018	194	31	159.8	0.82 (0.53-1.27)	.420	1318	351	266.3	1.07 (0.93-1.22)	.373	354	63	178.0	1.08 (0.78-1.51)	.683	3147	575	182.7	0.90 (0.81-1.01)	.064	12016	5471	455.3	0.94 (0.91-0.96)	<.001
	2019	236	54	228.8	1.43 (0.96-2.13)	.088	1452	350	241.0	0.91 (0.80-1.03)	.137	347	35	100.9	0.57 (0.39-0.83)	.003	3514	622	177.0	0.97 (0.87-1.07)	.565	12283	5187	422.3	0.93 (0.90-0.95)	<.001
	2020	248	63	254.0	1.11 (0.81-1.52)	.526	1570	406	258.6	1.07 (0.95-1.21)	.275	333	42	126.1	1.25 (0.82-1.91)	.333	3699	649	175.5	0.99 (0.90-1.10)	.877	12158	4716	387.9	0.92 (0.89-0.95)	<.001
	2021	287	61	212.5	0.84 (0.61-1.14)	.261	1,642	441	268.6	1.04 (0.93-1.17)	.522	334	58	173.7	1.38 (0.95-1.99)	.103	3,768	706	187.4	1.07 (0.97-1.18)	.186	11,259	4272	379.4	0.98 (0.95-1.01)	.188
14-15	2017	335	81	241.8			1,219	323	265.0			371	87	234.5			2,168	405	186.8			11,452	5059	441.8		
	2018	432	108	250.0	1.03 (0.81-1.33)	.801	1,281	347	270.9	1.02 (0.90-1.16)	.752	442	89	201.4	0.86 (0.66-1.12)	.267	2,523	467	185.1	0.99 (0.88-1.12)	.880	12,145	5113	421.0	0.95 (0.93-0.98)	.001
	2019	445	97	218.0	0.87 (0.69-1.11)	.265	1,426	372	260.9	0.96 (0.85-1.09)	.571	475	116	244.2	1.21 (0.95-1.55)	.132	2,701	488	180.7	0.98 (0.87-1.09)	.694	12,060	4703	390.0	0.93 (0.90-0.96)	<.001
	2020	444	115	259.0	1.19 (0.94-1.50)	.157	1,474	420	284.9	1.09 (0.97-1.23)	.156	461	122	264.6	1.08 (0.87-1.35)	.500	2,756	480	174.2	0.96 (0.86-1.08)	.547	11,543	4101	355.3	0.91 (0.88-0.94)	<.001
	2021	484	137	283.1	1.09 (0.88-1.35)	.417	1,595	473	296.6	1.04 (0.93-1.16)	.499	459	143	311.5	1.18 (0.96-1.44)	.126	2,758	529	191.8	1.10 (0.98-1.23)	.095	10,743	3750	349.1	0.98 (0.95-1.02)	.333
16-17	2017	674	178	264.1			1,263	349	276.3			509	126	247.5			1,874	379	202.2			10,829	4501	415.6		
	2018	634	189	298.1	1.13 (0.95-1.34)	.176	1,347	367	272.5	0.99 (0.87-1.12)	.826	515	120	233.0	0.94 (0.76-1.17)	.609	2,005	386	192.5	0.95 (0.84-1.08)	.467	11,058	4378	395.9	0.95 (0.92-0.98)	.003
	2019	737	221	299.9	1.01 (0.85-1.18)	.953	1,560	471	301.9	1.11 (0.99-1.24)	.085	565	144	254.9	1.09 (0.89-1.35)	.436	2,256	443	196.4	1.02 (0.90-1.15)	.757	11,444	4,426	386.8	0.98 (0.95-1.01)	.159
	2020	794	229	288.4	0.96 (0.82-1.12)	.653	1,655	513	310.0	1.03 (0.93-1.14)	.646	580	179	308.6	1.21 (1.01-1.46)	.049	2,337	458	196.0	1.00 (0.89-1.12)	1.000	11,398	4,111	360.7	0.93 (0.90-0.96)	<.001
	2021	836	251	300.2	1.04 (0.90-1.21)	.625	1,755	530	302.0	0.97 (0.88-1.08)	.629	685	219	319.7	1.04 (0.88-1.22)	.715	2,433	491	201.8	1.03 (0.92-1.15)	.637	10,443	3,717	355.9	0.99 (0.95-1.02)	.471
Sector																										
General Jewish	2017	1,086	272	250.5			3,187	860	269.8			1,076	250	232.3			5,909	1,197	202.6			29,396	13,476	458.4		
	2018	1,137	304	267.4	1.07 (0.93-1.23)	.383	3,532	989	280.0	1.04 (0.96-1.12)	.353	1,155	255	220.8	0.95 (0.82-1.11)	.544	6,737	1,305	193.7	0.96 (0.89-1.03)	.219	30,588	13,270	433.8	0.95 (0.93-0.96)	<.001
	2019	1,290	340	263.6	0.99 (0.86-1.13)	.854	3,987	1,101	276.1	0.99 (0.92-1.06)	.718	1,241	279	224.8	1.02 (0.88-1.18)	.844	7,462	1,424	190.8	0.99 (0.92-1.05)	.670	31,049	12,628	406.7	0.94 (0.92-0.96)	<.001
	2020	1,360	385	283.1	1.07 (0.95-1.22)	.276	4,257	1,231	289.2	1.05 (0.98-1.12)	.195	1,250	321	256.8	1.14 (0.99-1.31)	.068	7,789	1,435	184.2	0.97 (0.90-1.03)	.299	30,429	11,348	372.9	0.92 (0.90-0.94)	<0.001

TABLE 2 Continued

Characteristics		Depression Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Anxiety Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Eating disorder Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Stress Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	ADHD Population, n	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p
	2021	1,479	421	284.7	1.01 (0.89-1.13)	.934	4,531	1,349	297.7	1.03 (0.96-1.10)	.386	1,360	402	295.6	1.15 (1.02-1.30)	.029	7,897	1,578	199.8	1.08 (1.02-1.16)	.013	28,029	10,127	361.3	0.97 (0.95-0.99)	0.004
Ultra-orthodox Jewish	2017	77	17	220.8			280	71	253.6			103	13	126.2			482	66	136.9			3635	1512	416.0		
	2018	80	14	175.0	0.79 (0.42-1.49)	.549	306	60	196.1	0.77 (0.57-1.05)	.112	124	14	112.9	0.89 (0.44-1.82)	.838	657	75	114.2	0.83 (0.61-1.14)	.275	3777	1466	388.1	0.93 (0.88-0.99)	.015
	2019	77	21	272.7	1.56 (0.86-2.84)	.180	341	79	231.7	1.18 (0.88-1.59)	.292	121	13	107.4	0.95 (0.47-1.94)	1.000	734	86	117.2	1.03 (0.77-1.37)	.867	3920	1457	371.7	0.96 (0.90-1.01)	.139
	2020	92	18	195.7	0.72 (0.41-1.25)	.273	348	91	261.5	1.13 (0.87-1.47)	.378	104	20	192.3	1.79 (0.94-3.42)	.089	747	113	151.3	1.29 (0.99-1.68)	.057	3912	1369	349.9	0.94 (0.89-1.00)	.046
	2021	93	18	193.5	0.99 (0.55-1.78)	1.000	377	80	212.2	0.81 (0.62-1.06)	.137	92	15	163.0	0.85 (0.46-1.56)	.709	831	105	126.4	0.84 (0.65-1.07)	.165	3710	1391	374.9	1.07 (1.01-1.14)	.024
Arab	2017	31	6	193.5			87	9	103.4			24	3	125.0			233	43	184.5			908	242	266.5		
	2018	43	10	232.6	1.20 (0.49-2.96)	.780	108	16	148.1	1.43 (0.67-3.08)	.395	32	3	93.8	0.75 (0.17-3.40)	1.000	281	48	170.8	0.93 (0.64-1.34)	.728	853	226	264.9	0.99 (0.85-1.16)	.957
	2019	51	11	215.7	0.93 (0.44-1.97)	1.000	110	13	118.2	0.80 (0.40-1.58)	.554	25	3	120.0	1.28 (0.28-5.81)	1.000	275	43	156.4	0.92 (0.63-1.33)	.649	817	231	282.7	1.07 (0.91-1.25)	.442
	2020	34	4	117.6	0.55 (0.19-1.57)	.384	94	17	180.9	1.53 (0.78-2.98)	.237	20	2	100.0	0.83 (0.15-4.52)	1.000	256	39	152.3	0.97 (0.65-1.45)	.905	758	211	278.4	0.98 (0.84-1.15)	.866
	2021	35	10	285.7	2.43 (0.84-7.00)	.133	84	15	178.6	0.99 (0.53-1.85)	1.000	26	3	115.4	1.15 (0.21-6.26)	1.000	231	43	186.1	1.22 (0.82-1.81)	.334	706	221	313.0	1.12 (0.96-1.32)	.152
Socio-economic status																										
Low	2017	65	15	230.8			243	44	181.1			81	8	98.8			491	91	185.3			2818	1117	396.4		
	2018	87	18	206.9	0.90 (0.49-1.64)	.843	287	56	195.1	1.08 (0.75-1.54)	.739	105	12	114.3	1.16 (0.50-2.70)	.814	606	83	137.0	0.74 (0.56-0.97)	.031	2908	1080	371.4	0.94 (0.88-1.00)	.054
	2019	97	20	206.2	1.00 (0.57-1.76)	1.000	306	68	222.2	1.14 (0.83-1.56)	.421	101	12	118.8	1.04 (0.49-2.21)	1.000	689	108	156.7	1.14 (0.88-1.49)	.346	2863	1009	352.4	0.95 (0.89-1.02)	.139
	2020	86	18	209.3	1.02 (0.58-1.79)	1.000	295	78	264.4	1.19 (0.90-1.58)	.254	77	14	181.8	1.53 (0.75-3.12)	.286	696	104	149.4	0.95 (0.74-1.22)	.710	2861	964	336.9	0.96 (0.89-1.03)	.221
	2021	92	16	173.9	0.83 (0.45-1.52)	.572	338	73	216.0	0.82 (0.62-1.08)	.162	70	12	171.4	0.94 (0.47-1.90)	1.000	747	122	163.3	1.09 (0.86-1.39)	.514	2716	987	363.4	1.08 (1.00-1.16)	.040
Medium	2017	834	201	241.0			2,407	647	268.8			795	165	207.5			4,608	883	191.6			22,419	10,026	447.2		
	2018	875	231	264.0	1.10 (0.93-1.29)	.290	2,665	739	277.3	1.03 (0.94-1.13)	.508	873	178	203.9	0.98 (0.81-1.19)	.856	5,352	994	185.7	0.97 (0.89-1.05)	.456	23,214	9,861	424.8	0.95 (0.93-0.97)	<.001
	2019	969	264	272.4	1.03 (0.89-1.2)	.713	3,003	836	278.4	1.00 (0.92-1.09)	.929	942	199	211.3	1.04 (0.87-1.24)	.728	5,898	1,059	179.6	0.97 (0.89-1.05)	.406	23,662	9,503	401.6	0.95 (0.93-0.97)	<.001
	2020	1,027	300	292.1	1.07 (0.93-1.23)	.345	3,197	949	296.8	1.07 (0.99-1.15)	.110	936	227	242.5	1.15 (0.97-1.36)	.110	6,167	1,115	180.8	1.01 (0.93-1.09)	.868	23,226	8,473	364.8	0.91 (0.89-0.93)	<.001
	2021	1,107	326	294.5	1.01 (0.88-1.15)	.924	3,322	979	294.7	0.99 (0.92-1.07)	.871	1,013	275	271.5	1.12 (0.96-1.30)	.147	6,253	1,219	194.9	1.08 (1.00-1.16)	.046	21,383	7,660	358.2	0.98 (0.96-1.01)	.150
High	2017	293	78	266.2			897	246	274.2			323	92	284.8			1,508	326	216.2			8,627	4047	469.1		
	2018	294	78	265.3	1.00 (0.76-1.30)	1.000	983	265	269.6	0.98 (0.85-1.14)	.836	326	82	251.5	0.88 (0.68-1.14)	.376	1,694	347	204.8	0.95 (0.83-1.08)	.435	9,014	3983	441.9	0.94 (0.91-0.97)	<.001
	2019	347	87	250.7	0.95 (0.73-1.23)	.717	1,116	284	254.5	0.94 (0.82-1.09)	.455	339	83	244.8	0.97 (0.75-1.27)	.858	1,854	384	207.1	1.01 (0.89-1.15)	.868	9,174	3773	411.3	0.93 (0.90-0.96)	<.001
	2020	370	89	240.5	0.96 (0.74-1.24)	.795	1,191	309	259.4	1.02 (0.89-1.17)	.812	360	102	283.3	1.16 (0.90-1.48)	.265	1,903	366	192.3	0.93 (0.82-1.06)	.270	8,921	3453	387.1	0.94 (0.91-0.98)	.001
	2021	403	107	265.5	1.10 (0.87-1.41)	.457	1,314	385	293.0	1.13 (0.99-1.28)	.067	391	131	335.0	1.18 (0.95-1.47)	.134	1,927	379	196.7	1.02 (0.90-1.16)	.744	8,253	3057	370.4	0.96 (0.92-0.99)	.025

Characteristics	Year	Antidepressant Population, N	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Anxiolytic Population, N	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Antipsychotics Population, N	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	ADHD agents Population, N	Event, n	Rate per 1,000	RR year/ Year 1 (95% CI)	p
Total																					
	2017	3,684	2,010	545.6			726	167	230.0			3,815	2,221	582.2			34,033	21,557	633.4		
	2018	3,826	2,154	563.0	1.03 (0.99-1.07)	.131	702	160	227.9	0.99 (0.82-1.20)	.950	4,050	2,467	609.1	1.05 (1.01-1.09)	.016	34,581	20,686	598.2	0.94 (0.93-0.96)	<.001
	2019	4,247	2,403	565.8	1.01 (0.97-1.04)	.805	659	167	253.4	1.11 (0.92-1.34)	.281	4,275	2,611	610.8	1.00 (0.97-1.04)	.893	34,223	19,922	582.1	0.97 (0.96-0.99)	<.001
	2020	4,624	2,724	589.1	1.04 (1.00-1.08)	.027	598	166	277.6	1.10 (0.91-1.32)	.338	4,617	2,785	603.2	0.99 (0.96-1.02)	.473	33,427	18,131	542.4	0.93 (0.92-0.94)	<.001
	2021	4,823	2,984	618.7	1.05 (1.02-1.09)	.003	601	179	297.8	1.07 (0.90-1.28)	.445	4,744	2,866	604.1	1.00 (0.97-1.03)	.933	30,782	15,669	509.0	0.94 (0.92-0.95)	<.001

(continued)

TABLE 2 Continued

Characteristics		Antidepressant Population, N	Event, n	Rate per 1,000	RR year/year 1 (95% CI)	p	Anxiolytic Population, N	Event, n	Rate per 1,000	RR year/year 1 (95% CI)	p	Antipsychotics Population, N	Event, n	Rate per 1,000	RR year/year 1 (95% CI)	p	ADHD agents Population, N	Event, n	Rate per 1,000	RR year/Year 1 (95% CI)	p
Sex																					
Female	2017	1,591	871	547.5			374	92	246.0			1,050	593	564.8			11,586	7,169	618.8		
	2018	1,658	947	571.2	1.04 (0.98-1.11)	.179	357	79	221.3	0.90 (0.69-1.17)	.433	1,079	662	613.5	1.09 (1.01-1.17)	.025	11,748	6,785	577.5	0.93 (0.91-0.95)	<.001
	2019	1,862	1,099	590.2	1.03 (0.98-1.09)	.259	331	87	262.8	1.19 (0.91-1.55)	.213	1,164	711	610.8	1.00 (0.93-1.06)	.897	11,721	6,658	568.0	0.98 (0.96-1.01)	.143
	2020	2,061	1,245	604.1	1.02 (0.97-1.08)	.379	300	78	260.0	0.99 (0.76-1.29)	1.000	1,256	783	623.4	1.02 (0.96-1.09)	.530	11,573	6,116	528.5	0.93 (0.91-0.95)	<.001
	2021	2,269	1,471	648.3	1.07 (1.02-1.12)	.003	307	89	289.9	1.12 (0.86-1.44)	.415	1,388	858	618.2	0.99 (0.93-1.05)	.810	10,809	5,381	497.8	0.94 (0.92-0.97)	<.001
Male	2017	2,093	1,139	544.2			352	75	213.1			2,765	1,628	588.8			22,447	14,388	641.0		
	2018	2,168	1,207	556.7	1.02 (0.97-1.08)	.423	345	81	234.8	1.1 (0.84-1.45)	.525	2,971	1,805	607.5	1.03 (0.99-1.08)	.153	22,833	13,901	608.8	0.95 (0.94-0.96)	<.001
	2019	2,385	1,304	546.8	0.98 (0.93-1.03)	.512	328	80	243.9	1.04 (0.79-1.36)	.787	3,111	1,900	610.7	1.01 (0.97-1.05)	.813	22,502	13,264	589.5	0.97 (0.95-0.98)	<.001
	2020	2,563	1,479	577.1	1.06 (1.00-1.11)	.034	298	88	295.3	1.21 (0.93-1.57)	.150	3,361	2,002	595.7	0.98 (0.94-1.01)	.222	21,854	12,015	549.8	0.93 (0.92-0.95)	<.001
	2021	2,554	1,513	592.4	1.03 (0.98-1.08)	.269	294	90	306.1	1.04 (0.81-1.33)	.789	3,356	2,008	598.3	1.00 (0.97-1.04)	.842	19,973	10,288	515.1	0.94 (0.92-0.95)	<.001
Age, y																					
12-13	2017	764	408	534.0			154	37	240.3			1227	732	596.6			10,829	7,250	669.5		
	2018	796	433	544.0	1.02 (0.93-1.12)	.722	134	38	283.6	1.18 (0.8-1.74)	.422	1323	828	625.9	1.05 (0.99-1.12)	.133	10,843	6,873	633.9	0.95 (0.93-0.97)	<.001
	2019	862	474	549.9	1.01 (0.93-1.10)	.843	134	30	223.9	0.79 (0.52-1.19)	.326	1369	874	638.4	1.02 (0.96-1.08)	.522	10,872	6,628	609.6	0.96 (0.94-0.98)	<.001
	2020	956	562	587.9	1.07 (0.99-1.16)	.107	109	41	376.1	1.68 (1.13-2.50)	.011	1454	901	619.7	0.97 (0.92-1.03)	.311	10,831	6,126	565.6	0.93 (0.91-0.95)	<.001
	2021	1,017	581	571.3	0.97 (0.90-1.05)	.466	122	48	393.4	1.05 (0.75-1.45)	.892	1,529	931	608.9	0.98 (0.93-1.04)	.547	9,961	5,259	528.0	0.93 (0.91-0.96)	<.001
14-15	2017	1,185	660	557.0			237	61	257.4			1,286	776	603.4			11,501	7,357	639.7		
	2018	1,303	753	577.9	1.04 (0.97-1.11)	.311	217	52	239.6	0.93 (0.68-1.28)	.666	1,387	843	607.8	1.01 (0.95-1.07)	.843	12,005	7,175	597.7	0.93 (0.92-0.95)	<.001
	2019	1,357	736	542.4	0.94 (0.88-1.00)	.066	185	62	335.1	1.4 (1.02-1.91)	.036	1,363	806	591.3	0.97 (0.92-1.03)	.392	11,558	6,715	581.0	0.97 (0.95-0.99)	.009
	2020	1,447	862	595.7	1.10 (1.03-1.17)	.005	176	50	284.1	0.85 (0.62-1.16)	.308	1,529	927	606.3	1.03 (0.97-1.09)	.425	11,051	5,946	538.1	0.93 (0.9-0.95)	<.001
	2021	1,586	996	628.0	1.05 (1.00-1.12)	.073	155	43	277.4	0.98 (0.69-1.38)	.903	1,578	974	617.2	1.02 (0.96-1.08)	.532	10,312	5,133	497.8	0.93 (0.9-0.95)	<.001
16-17	2017	1,735	942	542.9			335	69	206.0			1,302	713	547.6			11,703	6,950	593.9		
	2018	1,727	968	560.5	1.03 (0.97-1.10)	.305	351	70	199.4	0.97 (0.72-1.3)	.850	1,340	796	594.0	1.08 (1.02-1.16)	.017	11,733	6,638	565.8	0.95 (0.93-0.97)	<.001
	2019	2,028	1,193	588.3	1.05 (0.99-1.11)	.091	340	75	220.6	1.11 (0.83-1.48)	.514	1,543	931	603.4	1.02 (0.96-1.08)	.621	11,793	6,579	557.9	0.99 (0.96-1.01)	.227
	2020	2,221	1,300	585.3	0.99 (0.95-1.05)	.852	313	75	239.6	1.09 (0.82-1.44)	.577	1,634	957	585.7	0.97 (0.92-1.03)	.312	11,545	6,059	524.8	0.94 (0.92-0.96)	<.001
	2021	2,220	1,407	633.8	1.08 (1.03-1.14)	.001	324	88	271.6	1.13 (0.87-1.48)	.365	1,637	961	587.0	1.00 (0.95-1.06)	.943	10,509	5,277	502.1	0.96 (0.93-0.98)	.001
Sector																					
General Jewish	2017	3,217	1,788	555.8			585	125	213.7			3,216	1,865	579.9			29,393	18,661	634.9		
	2018	3,356	1,934	576.3	1.04 (0.99-1.08)	.095	577	116	201.0	0.94 (0.75-1.18)	.613	3,434	2,094	609.8	1.05 (1.01-1.09)	.013	29,825	17,895	600.0	0.95 (0.93-0.96)	<.001
	2019	3,717	2,157	580.3	1.01 (0.97-1.05)	.736	539	126	233.8	1.16 (0.93-1.45)	.191	3,597	2,205	613.0	1.01 (0.97-1.04)	.788	29,474	17,208	583.8	0.97 (0.96-0.99)	<.001
	2020	4,040	2,429	601.2	1.04 (1.00-1.08)	.061	484	123	254.1	1.09 (0.88-1.35)	.466	3,897	2,330	597.9	0.98 (0.94-1.01)	.185	28,756	15,587	542.0	0.93 (0.92-0.94)	<.001
	2021	4,246	2,687	632.8	1.05 (1.02-1.09)	.003	484	141	291.3	1.15 (0.93-1.41)	.220	3,997	2,404	601.5	1.01 (0.97-1.04)	.748	26,393	13,332	505.1	0.93 (0.92-0.95)	<.001
Ultra-orthodox Jewish	2017	401	195	486.3			98	28	285.7			489	291	595.1			3,855	2,552	662.0		
	2018	403	194	481.4	0.99 (0.86-1.14)	.944	84	30	357.1	1.25 (0.82-1.91)	.340	515	310	601.9	1.01 (0.91-1.12)	.847	4,013	2,470	615.5	0.93 (0.90-0.96)	<.001
	2019	464	221	476.3	0.99 (0.86-1.14)	.892	85	26	305.9	0.86 (0.56-1.32)	.516	570	338	593.0	0.99 (0.89-1.09)	.804	4,083	2,409	590.0	0.96 (0.93-0.99)	.019
	2020	519	266	512.5	1.08 (0.95-1.22)	.277	82	30	365.9	1.20 (0.78-1.84)	.419	624	395	633.0	1.07 (0.98-1.17)	.171	4,063	2,292	564.1	0.96 (0.92-0.99)	.019
	2021	510	272	533.3	1.04 (0.93-1.17)	.533	89	24	269.7	0.74 (0.47-1.15)	.191	652	407	624.2	0.99 (0.91-1.07)	.772	3,880	2,141	551.8	0.98 (0.94-1.02)	.278

TABLE 2 Continued

Characteristics		Antidepressant					Anxiolytic					Antipsychotics					ADHD agents				
		Popula-tion, N	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Popula-tion, N	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Popula-tion, N	Event, n	Rate per 1,000	RR year/ year 1 (95% CI)	p	Popula-tion, N	Event, n	Rate per 1,000	RR year/ Year 1 (95% CI)	p
Arab	2017	66	27	409.1			43	14	325.6			110	65	590.9			784	344	438.8		
	2018	67	26	388.1	0.95 (0.62-1.44)	.860	41	14	341.5	1.05 (0.57-1.92)	1.000	101	63	623.8	1.06 (0.85-1.31)	.673	742	321	432.6	0.99 (0.88-1.11)	.836
	2019	66	25	378.8	0.98 (0.63-1.50)	1.000	35	15	428.6	1.26 (0.71-2.22)	.484	108	68	629.6	1.01 (0.82-1.24)	1.000	666	305	458.0	1.06 (0.94-1.19)	.361
	2020	65	29	446.2	1.18 (0.78-1.78)	.480	32	13	406.3	0.95 (0.54-1.67)	1.000	96	60	625.0	0.99 (0.80-1.23)	1.000	608	252	414.5	0.91 (0.80-1.03)	.127
	2021	67	25	373.1	0.84 (0.55-1.26)	.479	28	14	500.0	1.23 (0.70-2.15)	.604	95	55	578.9	0.93 (0.74-1.17)	.556	509	196	385.1	0.93 (0.80-1.07)	.327
Socio-economic status																					
Low	2017	276	125	452.9			78	26	333.3			416	233	560.1			2,701	1,586	587.2		
	2018	271	146	538.7	1.19 (1.00-1.41)	.049	84	25	297.6	0.89 (0.57-1.41)	.735	439	249	567.2	1.01 (0.9-1.14)	.836	2,767	1,511	546.1	0.93 (0.89-0.97)	.002
	2019	303	153	505.0	0.94 (0.80-1.10)	.452	74	24	324.3	1.09 (0.68-1.73)	.733	460	287	623.9	1.10 (0.99-1.23)	.089	2,663	1,404	527.2	0.97 (0.92-1.01)	.165
	2020	336	168	500.0	0.99 (0.85-1.16)	.937	64	32	500.0	1.54 (1.02-2.32)	.039	473	296	625.8	1.00 (0.91-1.11)	1.000	2,602	1,292	496.5	0.94 (0.89-0.99)	.027
	2021	316	165	522.2	1.04 (0.90-1.21)	.584	75	26	346.7	0.69 (0.47-1.03)	.085	479	296	618.0	0.99 (0.89-1.09)	.841	2,389	1,180	493.9	0.99 (0.94-1.05)	.865
Medium	2017	2,378	1,265	532.0			482	100	207.5			2,587	1,516	586.0			22,481	14,206	631.9		
	2018	2,471	1,347	545.1	1.02 (0.97-1.08)	.372	457	100	218.8	1.05 (0.82-1.35)	.691	2,694	1,638	608.0	1.04 (0.99-1.08)	.104	22,702	13,457	592.8	0.94 (0.92-0.95)	<.001
	2019	2,725	1,503	551.6	1.01 (0.96-1.06)	.655	409	103	251.8	1.15 (0.90-1.46)	.261	2,877	1,740	604.8	0.99 (0.95-1.04)	.826	22,465	12,953	576.6	0.97 (0.96-0.99)	<.001
	2020	2,962	1,721	581.0	1.05 (1.01-1.10)	.026	379	100	263.9	1.05 (0.83-1.33)	.744	3,149	1,884	598.3	0.99 (0.95-1.03)	.617	21,839	11,774	539.1	0.94 (0.92-0.95)	<.001
	2021	3,106	1,876	604.0	1.04 (1.00-1.08)	.071	391	117	299.2	1.13 (0.90-1.42)	.298	3,200	1,953	610.3	1.02 (0.98-1.06)	.330	20,036	10,022	500.2	0.93 (0.91-0.95)	<.001
High	2017	1,017	614	603.7			164	41	250.0			798	463	580.2			8,765	5,706	651.0		
	2018	1,071	653	609.7	1.01 (0.94-1.08)	.788	160	35	218.8	0.88 (0.59-1.30)	.515	902	570	631.9	1.09 (1.01-1.18)	.032	9,029	5,670	628.0	0.96 (0.94-0.99)	.001
	2019	1,203	738	613.5	1.01 (0.94-1.07)	.863	174	40	229.9	1.05 (0.70-1.57)	.896	926	576	622.0	0.98 (0.92-1.06)	.664	9,008	5,513	612.0	0.97 (0.95-1.00)	.028
	2020	1,315	831	631.9	1.03 (0.97-1.09)	.344	153	34	222.2	0.97 (0.65-1.45)	.895	983	597	607.3	0.98 (0.91-1.05)	.511	8,909	5,023	563.8	0.92 (0.90-0.94)	<.001
	2021	1,385	932	672.9	1.06 (1.01-1.13)	.026	133	36	270.7	1.22 (0.81-1.83)	.408	1,046	607	580.3	0.96 (0.89-1.03)	.222	8,268	4,419	534.5	0.95 (0.92-0.97)	<.001

ADHD = attention-deficit/hyperactivity disorder; RR = relative risk.

FIGURE 1 Monthly Incidence Rates of Mental Health Diagnoses and Drug Dispensation, Comparison by Years
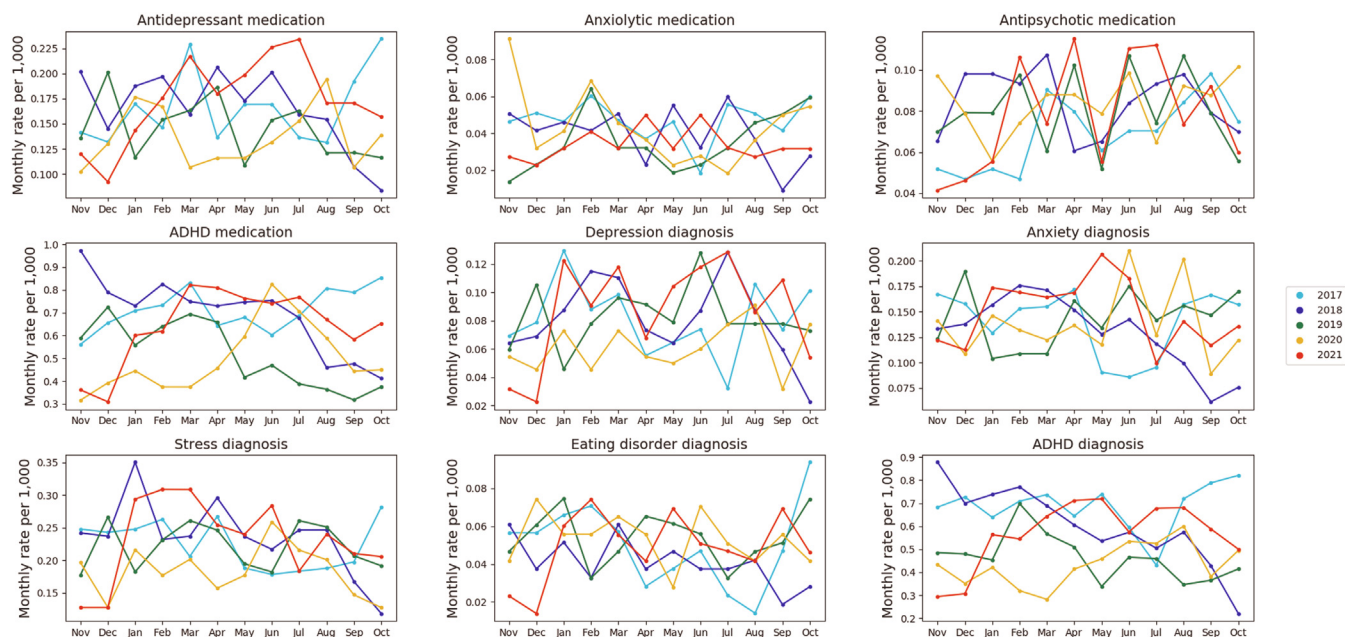
Note: ADHD = attention-deficit/hyperactivity disorder.

ultra-orthodox communities in anxiety diagnosis (see Table S3, available online; Figure 2C). The incidence rates of anxiety in the ultra-orthodox community increased by 31% during the pandemic period (RR = 1.31; 95% CI = 1.03-1.67) and among Israeli Arabs by 64% (RR = 1.64; 95% CI = 1.12-2.40). Among adolescents with a psychiatric history, a significant increase in rates of anxiety (RR = 1.08; 95% CI = 1.01-1.15), eating disorders (RR = 1.31; 95% CI = 1.15-1.50), and antidepressant (RR = 1.09; 95% CI = 1.05-1.13) and anxiolytic (RR = 1.25; 95% CI = 1.01-1.53) dispensations were observed only in the general Israeli population (see Table S4, available online).

Subgroup analysis by SES (Figure 2D) was done by stratifying the cohorts into 3 groups: low (12%), medium (60%), and high (25%) SES. The medium and high SES groups presented a more distinct change, showing significant incident increases in 6 outcomes: depression (RR = 1.45; 95% CI = 1.31-1.60; RR = 1.19; 95% CI = 1.02-1.40, respectively), anxiety (RR = 1.32; 95% CI = 1.22-1.43; RR = 1.23; 95% CI = 1.08-1.39), eating disorders (RR = 1.49; 95% CI = 1.30-1.69; RR = 1.56; 95% CI = 1.28-1.90), stress (RR = 1.18; 95% CI = 1.11-1.27; RR = 1.21; 95% CI = 1.07-1.37), antidepressants dispensation (RR = 1.28; 95% CI = 1.20-1.38; RR = 1.25; 95% CI = 1.12-1.39), and antipsychotics dispensation (RR = 1.29; 95% CI = 1.17-1.43; RR = 1.38; 95% CI = 1.16-1.64). In the low SES group, the increase was less visible, with only 2

significantly increased outcomes: anxiety (RR = 1.49; 95% CI = 1.16-1.92) and stress (RR = 1.25; 95% CI = 1.03-1.52). The decrease in ADHD agents was observed across all SES groups. Notably, we observed among the high SES group a significant increase in prescription of antidepressants (RR = 1.16; 95% CI = 1.03-1.32), and among the medium SES group a significant increase in prescription of antipsychotics (RR = 1.16; 95% CI = 1.03-1.30) for the pre-pandemic period. Adolescents with a psychiatric history had a significantly increased rate of anxiety in the high SES group (RR = 1.15; 95% CI = 1.01-1.31), increased rate of stress in the medium SES group (RR = 1.09; 95% CI = 1.01-1.17), and increased rates of eating disorders and antidepressants in the medium and high SES groups (Table S4, available online).

To enable a more refined analysis examining to what extent the trends during the COVID-19 era are continuations of past trends and to what extent they break away from them, we performed Interrupted Time Series (ITS) analysis. We evaluated 7 different models for this analysis that differed in the time periods used to fit the data and the number of interruption points (Figures S1-S7, available online). We observed that following a decline in incidence rates during the first lockdown (from mid-March to the end of April 2020), there was an increase in incidence rates of all diagnoses and medications dispensation, which was significantly higher than the trend in previous years (Figure 3). Varying the analysis by introducing a "gap" period during

FIGURE 2 Relative risks (RRs) and 95% CIs of Incidence Rates During Pre−COVID-19 and COVID-19 Periods

A Sex
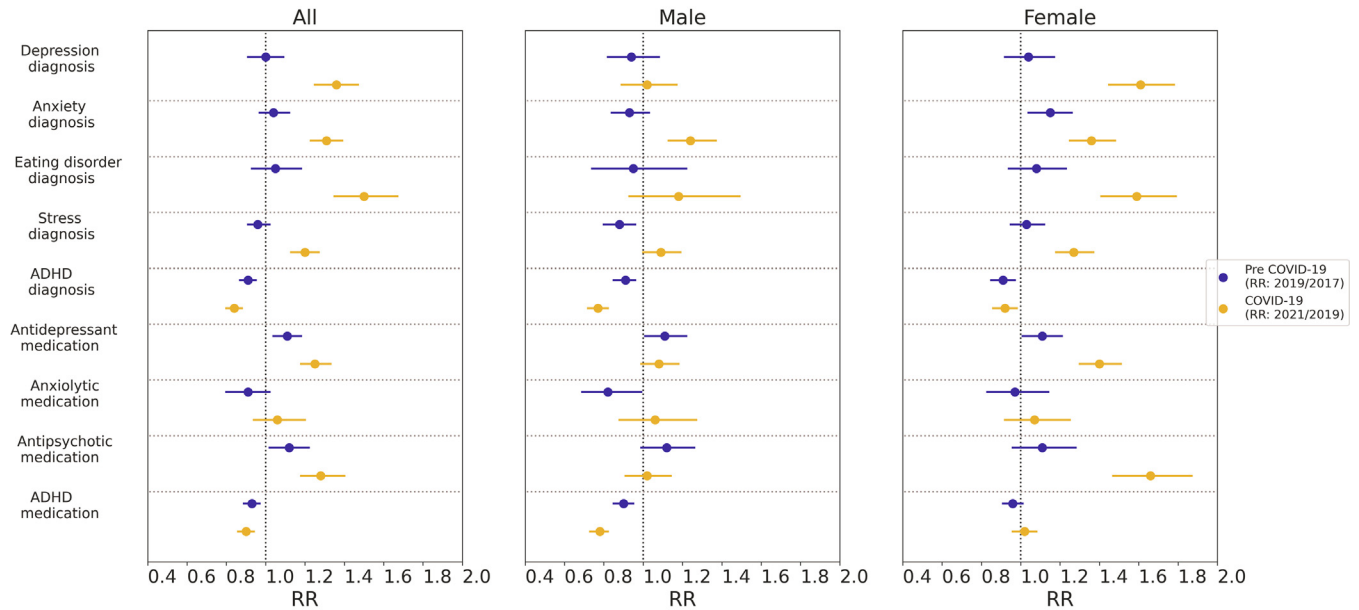
B Age groups
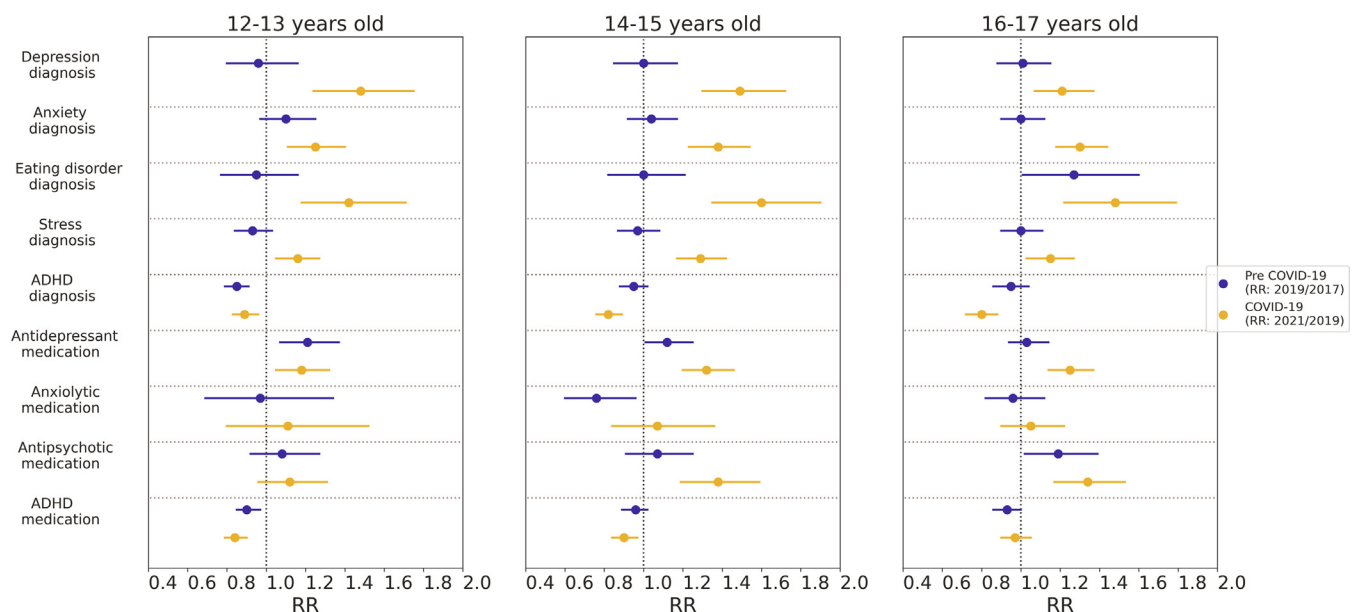
Note: (A) Sex; (B) age group; (C) population sector; (D) socioeconomic status. Blue lines indicate pre−COVID-19 period (RR: 2019 year rate/2017 year rate); orange lines indicate COVID-19 period (RR: 2021 year rate/2019 year rate). ADHD = attention-deficit/hyperactivity disorder.

this first lockdown period, and optionally also during the following month, so as not to be biased by the initial sharp decline, led to qualitatively comparable results (Figures S2-S5, available online). Introducing a second interruption point on March 7, 2021, the day that all schools were

opened following an extensive vaccination campaign, resulted in a significant decline following that point in the incidence of antidepressant and anxiolytic dispensation as well as of diagnoses of anxiety, stress, and eating disorders (Figure S6 and Table S5, available online). During May 2021, an

FIGURE 2 Continued

C Population sector
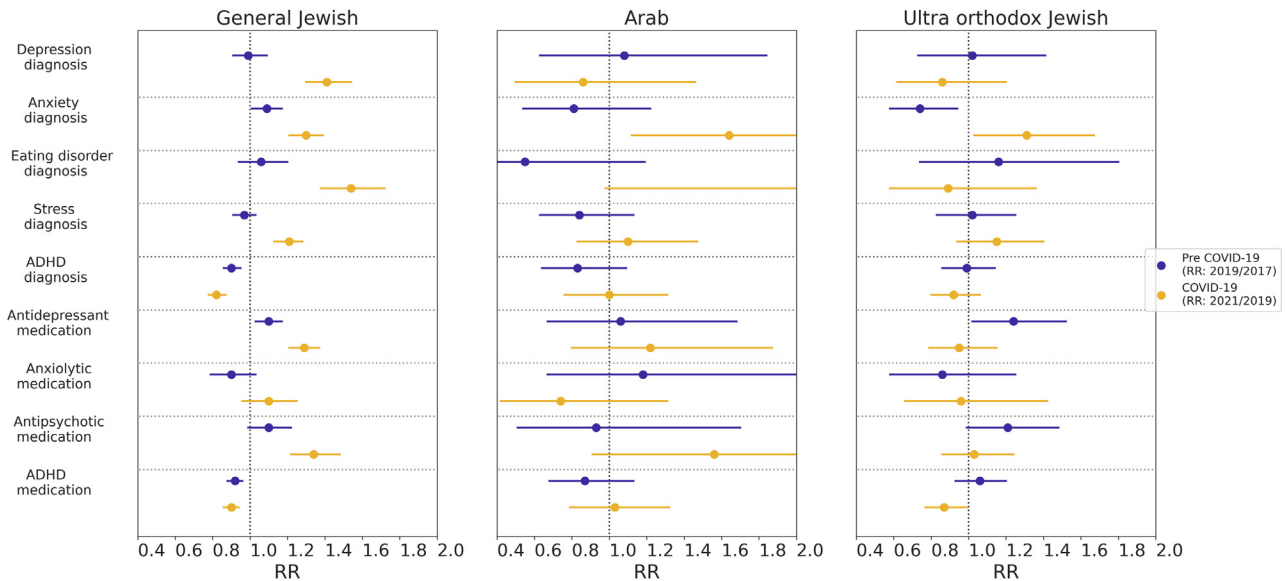
D Socioeconomic status (SES)
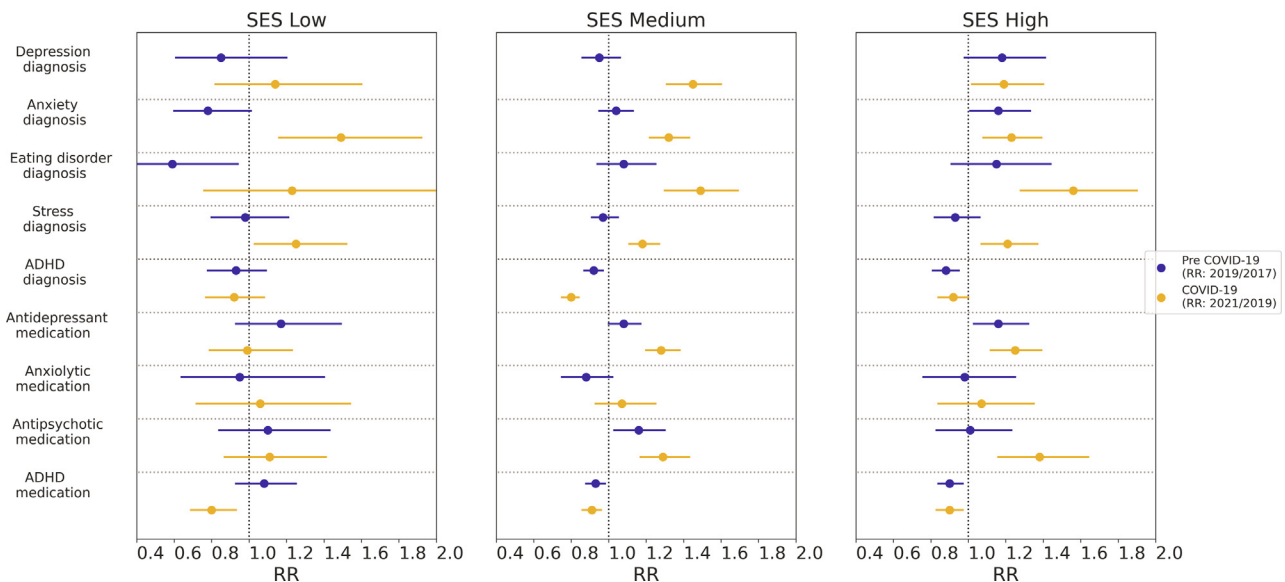
additional geo-political stressor unrelated to the COVID-19 pandemic appeared in Israel, where the Israeli–Palestinian conflict escalated into violent outbreaks throughout the country. Because this crisis may have further exacerbated the mental health situation is Israel, we analyzed data with the gap between May 6 and June 21. The results were nearly identical to those in the previous models, suggesting that the crisis did not have a direct effect on the underlying trend (Figure S7, available online).

DISCUSSION

The COVID-19 pandemic has taken a toll on the mental health and well-being of children and adolescents. Whereas most recent studies used surveys to assess the status of mental health in adolescents,[5] we approached the issue from a quantitative perspective and compared new psychiatric diagnoses and drug dispensation in adolescents with and without psychiatric history, before and during the COVID-19 pandemic, based on comprehensive EHR data. Consistent with published

FIGURE 3 Interrupted Times Series Analysis (ITS) for Mental Health Incidence for 5 Years
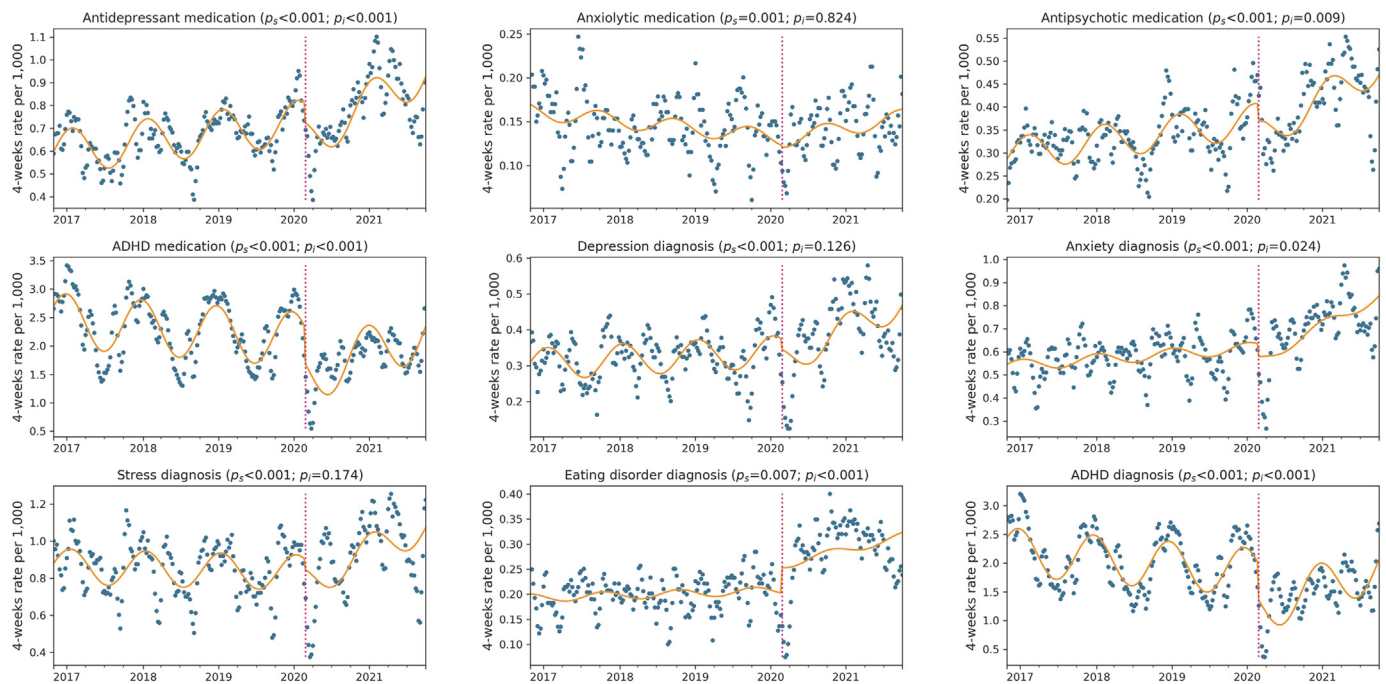
Note: Magenta line delineates February 27, the date of the first COVID-19 case in Israel. Orange lines depict ITS models with an interruption on this date. Blue dots represent incidence rates for a 4-week period. ADHD = attention-deficit/hyperactivity disorder.

surveys showing a sharp increase in mental health disorders,[5,16] we observed from EHR data a significant increase in diagnoses of depression, anxiety, stress, and eating disorders during the pandemic compared to previous years. Importantly, this study found a sharper increase in the incidence of psychiatric outcomes among youth without a psychiatric history compared to youth with a psychiatric history. Our study supports previous findings and shows that adolescents without a psychiatric history had a higher risk of developing mental health outcomes from the pre-pandemic to the pandemic period, whereas among adolescents with a psychiatric history this risk was moderate and mostly related to diagnoses of anxiety and eating disorders.

These observations of a rise in psychiatric diagnoses and dispensed medications can be attributed to a wide range of stressors that appeared during the pandemic. The increase in depression, anxiety, and stress might have been a result of the following: fear of morbidity and mortality (to self or loved ones) from the new unknown illness; excessive media exposure with alarming content; continuous changes in guidelines and restrictions that led to prolonged social isolation, loss of peer interactions, and support during school closures; reduced extracurricular and physical activity; disruption of daily routines; decreased hope for the future; and loss of pleasure in activities.[17,18] The introduction of new distance learning technologies imposed new challenges involving constant self-observation through cameras and different academic success evaluation, compromising adolescents' self-esteem.[19-21] Eating disorders are associated with body dissatisfaction, poor self-esteem, and depression.[22] In addition, eating disorders behaviors may arise as ways to gain control and compensate for the uncertainty of the new reality that was imposed by the pandemic.[23] Although the increase in psychiatric drug dispensation was mostly aligned with the corresponding diagnoses, the increase in antipsychotic drug dispensation was not associated with any specific diagnosis measured in this study. The latter, which was particularly pronounced in female individuals, might indicate incidences of self-harm and personality disorders.[24] However, there are limited data from which to draw conclusions about specific reasons for the increase in antipsychotic use, and further research is needed. Among the reasons for increased incidence of psychiatric outcomes, we should also consider the extended time periods that adolescents spent at home with their immediate family, which may have promoted enhanced parental awareness and increased legitimacy to discuss mental distress during these times.[25] Notably, the interrupted time series analysis, which included interruption points for the first closure and then the full reopening of schools, indicates that, at least for some mental health outcomes (antidepressant and anxiolytic *treatment,* as well as anxiety, stress, and eating disorder *diagnoses*), the "return to *normality*" was associated with

a *decrease in the incidence of these outcomes*. Although, in this study, the rates of depression and anxiety increased during the COVID-19 period, we observed a reduction in the incidence rates of ADHD diagnoses and prescription medications. As reports in recent years have shown an overall rise in ADHD diagnoses and medications,[26] one explanation of our findings might be the tight association between ADHD incidence and school activity.[27,28] Because the COVID-19 period was characterized by intermittent closure of schools, this observed reduction in diagnoses and drug use is in line with the decrease during a normal school year's summer break. Another reason for the decrease in ADHD diagnoses and prescription medications could be that psychiatric cases such as depression and anxiety seemed more urgent and were given priority in limited slots for patient care. These findings may suggest underdiagnosed and untreated ADHD in adolescents during school closures, putting them at risk for more serious outcomes, such as increased rates of criminal activity, accidents, as well as anxiety and depression.[28] However, a decrease in ADHD rates might be a temporary event and indicate a delay in evaluation or diagnosis, due to limited resources during the pandemic.

The most significant finding in this study is the greater risk among adolescent female compared with male individuals to be diagnosed with a variety of mental disorders for the first time during the pandemic. In this EHR analysis, risk for anxiety was the only significant mental outcome that was increased among male participants. These findings are consistent with previous studies that suggested that loneliness was associated with elevated depression symptoms in female individuals and with elevated social anxiety in male individuals.[29,30] Other studies found both increased depressive and anxiety symptoms among female participants.[3-5] Previous studies of pandemics have shown that such events often widen health inequalities in society and have a greater impact on socially disadvantaged groups.[31] A recent systematic review has shown that inequality factors such as female sex and young age were likely to increase risk for adverse mental health outcomes during the COVID-19 outbreak.[32] The World Health Organization (WHO) reported lower levels of mental health and life satisfaction among female compared to male individuals.[33] Gender differences in mental disorders are known and consistent in the field of psychiatry, but the reasons for these differences are still not clear enough.[34] The potential risk factors could be the influence of sex hormones, higher rates of interpersonal stressors, female individuals' lower baseline self-esteem and higher tendency toward a negative body image, exposure to stress associated with lack of gender equality and discrimination, and greater chance of experiencing interpersonal violence.[35] Importantly, mental distress among male adolescents may manifest in ways that

are not directly reported in the EHR, such as violence, dropout, and substance abuse.

Stratifying by age, our findings show that there was an increase in mental illness in all age groups that was more pronounced among 14- to 15-year-olds. Yet, as described in previous studies,[5] we found that the absolute incidence rates of depression, anxiety, and the associated medication were highest among 16- to 17-year-olds. High rates among older adolescents may be due to changes associated with puberty, a response to the stress of lockdowns and the global pandemic, and lack of socialization with peers, which is particularly important at this age. In younger children, increased anxiety and depression may be more readily attributed to changes in routine.[35]

Comparing the sectors in the Israeli population showed that different circumstances and lifestyle during the COVID-19 period are associated with different mental health outcomes in adolescents. In the ultra-orthodox community, we observed a significant increase only in the diagnosis of anxiety (31%). Ultra-orthodox Jews, accounting for 12% of the Israeli population, form closely-knit religious communities, living by strict Jewish laws and tradition.[36] In this sector, the pandemic caused tension between governmental instructions and instructions from prominent community leaders who advocated keeping schools open for holy studies.[37] Many media venues such as television, the Internet, and secular newspapers are not used in this sector, potentially buffering them from the exacerbating impact of reports and discussions in these venues. Moreover, although in recent years there is a growing openness and legitimacy for discussing mental health in this community, use of mental health services is still much lower than in the general Israeli population.[37] Similar to the ultra-orthodox sector, in the Israeli Arab sector we observed a significant increase only in the diagnosis of anxiety (64%). This sector, which accounts for 20% of the total Israeli population, uses mental health services at a much lower rate than the rest of the population, possibly due to lower access to health care services, as many persons reside in peripheral areas, as well as negative cultural perception and stigma associated with mental health problems.[38]

A significant increase in mental health diagnoses during the COVID-19 pandemic period was observed across different SES. In contrast to previous studies reporting that children and adolescents who grow up in families with lower SES have more symptoms of anxiety and depression,[39] the incidence rates of most diagnoses in this study increased with higher SES. Distinctly in Israel, the Israeli Arab and ultra-orthodox communities are associated with lower SES[37] and, as mentioned earlier, in these sectors the rates of mental health diagnoses are lower than in the rest of the

population for cultural, religious, and other reasons. Although lower SES is often associated with poor mental health, other mediators might affect this association. Social engagement with friends and family is linked to better mental health and affects the link between SES and mental health.[40] Ultra-orthodox communities in Israel are usually of lower SES; nevertheless, they are socially active environments that provide members with social and spiritual support.[41] The community settings offer psychosocial engagement and continuous assistance, which results in better health and mental health than would be expected based on their SES.[41]

Our study has several limitations. First, although the findings in this study are clear and consistent with those of other studies, the reported rates are probably an underestimation of the actual numbers. Some adolescents are diagnosed and treated by mental health professionals in private clinics outside their HMO, and such diagnoses and psychiatric drugs are not recorded in their EHR. However, most of those who receive private psychiatric treatment still contact a physician from the HMO to get a prescription for drugs and thus to receive a subsidy for the purchase. Data on the proportion of private treatments are not available, but purchases of prescription drugs were fully captured in this database. Furthermore, there is a long standby time for mental health services, starting at an average of 3 months before an initial assessment, and several additional months before receiving treatment[42]; therefore, not all those who seek and need help are included in this study. This information bias is likely nondifferential. Our analysis addressed this limitation by comparing the risk ratios of the outcomes, measuring the difference in rates of mental health diagnoses and dispensations within the HMO in different time periods. Second, some under-reporting is expected during the pandemic for non-fatal mental health events, which would bias our results towards the null. Nevertheless, a significant association was observed, although its magnitude may have been a conservative estimate.

In conclusion, this observational cohort study is the first data-driven quantitative estimation of the mental health burden on adolescents during the COVID-19 pandemic that showed a significant increase in mental health diagnoses and psychiatric drugs dispensation compared to the corresponding pre-COVID period. Our findings highlight the specific subpopulations that need to be considered when deciding on policies and promotion of adolescent resilience. These findings should warrant similar studies in other geographical areas and in other age groups. Policy makers should prioritize strategies to address the deteriorating mental health of adolescents during the COVID-19 pandemic and to prevent further escalation.

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