

Supplementary Appendix to:

“Racial/ethnic differences in post-acute sequelae of SARS-CoV-2 in children and adolescents in the United States”

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Section S1 Supplemental Methods

A. Description of electronic health records (EHR) data

The real-world data utilized in our analysis is derived from electronic health records (EHRs), covering a wide range of healthcare interaction information routinely collected and stored by hospitals. This includes clinical data such as diagnoses and treatments, laboratory and test results, and administrative data including patient demographics and billing information. The hospital-based EHR data from the Researching COVID to Enhance Recovery (RECOVER) Initiative COVID-19 Database served as the basis for defining and determining exposure, outcomes, and covariates. Unlike General Practitioner (GP) data, self-reported data, or external data sources, our study used the structured, standardized EHR entries made by healthcare providers within hospital settings. EHR data provides a more detailed and integrated view of a patient's health status, medical history, and healthcare interactions across various providers and settings.

B. RECOVER population and generalizability

The National Institutions of Health (NIH) launched the new RECOVER initiative in 2021 to leverage electronic health record (EHR) data to better identify and characterize patients with post-acute sequelae of SARS-CoV-2 infection (PASC). RECOVER obtains EHRs from three large national healthcare networks within the United States, covering regional catchment areas across 41 states. These networks collectively hold the EHRs of over 60 million patients, including records from more than 7 million individuals who have been affected by COVID-19. RECOVER collaborates with the National Institutes of Health's (NIH) All of Us Research Program, which contributes additional health records to this vast database. Together, these sources comprise one of the world's largest collections of EHRs.

C. Modeling strategy for the difference-in-difference analyses

For each minor racial/ethnic group (AAPI, NHB, or Hispanic) matched with NHW cohort, we use a binary indicator R to denote racial/ethnic groups ($R = 0$ for NHW, $R = 1$ for NHB, Hispanic, or AAPI). We define T as the time period, where $T = 1$ represents the post-infection period (28 to 179 days after COVID-19 infection) and $T = 0$ represents the pre-infection period (28 to 179 days before COVID-19 infection). Y is a binary indicator denoting the occurrence of PASC symptoms and conditions, where $Y = 1$ indicates the patient has been diagnosed with the specific PASC symptoms and conditions, and $Y = 0$ indicates the absence of such diagnosis. For each participant, we observed the outcome Y in both pre-infection ($T = 0$) and post-infection ($T = 1$) periods.

We fitted a Poisson regression model by regressing the PASC symptoms and conditions on racial/ethnic groups, time period, and the interaction between racial/ethnic groups and time period:

$$\log(E[Y|R, T]) = \beta_0 + \beta_1 R + \beta_2 T + \beta_3 R \times T$$

where $\log(\cdot)$ is the log link function. The coefficient of the interaction term, β_3 , represents the differential increase in racial/ethnic differences attributable to COVID-19.

D. Difference-in-differences analyses equipped with negative control outcomes

The difference-in-differences analysis is a quasi-experimental design that uses observational data from intervention groups to control groups. To estimate the effect of a specific intervention, this methodology contrasts changes in outcomes before and after the intervention between the group receiving the intervention and those without it. However, the difference-in-differences analyses rely on the *parallel trends* assumption, that is, in the absence of intervention, the outcome difference between the intervention and control groups remains constant over time. In other words, the effect of the unmeasured confounders or the unmeasured confounder bias is constant over time. Essentially, this assumes that the effect of unmeasured confounders or the bias from such confounders remains consistent over time. It is crucial to acknowledge that this assumption may not always hold in observational studies, potentially introducing inaccuracies in difference-in-differences analyses and undermining their validity.

To address potential systematic bias between the pre-infection and post-infection periods in our study, we developed a novel approach to difference-in-differences analysis, incorporating calibration using negative control outcomes. Specifically, we first conducted the difference-in-differences analyses for 31 negative control outcomes. We believe that there is no effect of race/ethnicity on the increased prevalence of negative control outcomes after COVID-19. To estimate the empirical null distribution, we subsequently utilized the estimated effects from these negative control outcome analyses. This distribution was then employed to calibrate the estimates of race/ethnicity impact on the increased prevalence of PASC symptoms and conditions via difference-in-differences analyses.

E. List of negative control outcomes

Table S1. The 31 Negative control outcomes were used in the analysis.

Health Condition
Acne
Closed fracture of distal end of radius
Closed injury of head
Concussion
Contact dermatitis
Diaper rash
Displacements - bone
Falls
Foreign body in ear
Impetigo
Inguinal hernia
Injury of finger
Injury of free lower limb
Injury of head
Injury of left leg
Injury of right foot

Injury of right hand
Injury of right leg
Injury of upper extremity
Insect bite
Plagiocephaly
Scoliosis
Snoring/Obstructive sleep apnea
Speech delay
Speech dysfunction
Sprain of ankle
Tinea capitis
Tinea corporis
Tongue tie
Umbilical hernia
Wax in ear/impacted cerumen

F. Study Variables

Table S2. Confounding Variables used in the propensity model and other variables for eligible criteria.

Variables	Functional form	Values	Detail	Codes/references
Age (years)	Linear	Numerical	Based on records in the person domain.	Age is defined as the integer of (date – birth date)/365.25
Sex	Indicator	Male/Female	Based on records in the person domain.	NA
Obesity	Indicator	Yes/No	Based on records in the measurement domain. If measured at age < 24*30.5 days, NHANES weight z score > 1.64 If measured at 24*30.5 < age < 240*30.5, NHANES BMI z score > 1.64 If measured at age ≥ 240*30.5, BMI kg/m2 > 30	NA
PMCA (Pediatric Medical Complexity Algorithm)	3 categories	No chronic condition (PMCA = 0) Non-complex chronic condition (PMCA = 1) Complex chronic condition comorbidities (PMCA = 2)	Based on the condition occurrence and visit occurrence domains.	Simon, T. D., Haaland, W., Hawley, K., Lambka, K., & Mangione-Smith, R. (2018). Development and validation of the Pediatric Medical Complexity Algorithm (PMCA) version 3.0. <i>Academic</i>

				<i>pediatrics</i> , 18(5), 577-580.
Severity of acute COVID-19	4 categories	Asymptomatic Mild Moderate Severe	Based on the condition occurrence and visit occurrence domains.	Forrest CB, Burrows EK, Mejias A, et al. Severity of acute COVID-19 in children < 18 years old March 2020 to December 2021. <i>Pediatrics</i> . 2022;149(4):e2021055765.
Number of visits to emergency department in 18 months to 179 days prior to the entry	4 categories	0 1 2 ≥3	Based on the condition occurrence and visit occurrence domains.	NA
Number of inpatient visits in 18 months to 179 days prior to the entry	4 categories	0 1 2 ≥3	Based on the condition occurrence and visit occurrence domains, including Inpatient Hospital Stay, Emergency Department Admit to Inpatient Hospital Stay, and Observation Stay	NA
Number of outpatient visits in 18 months to 179 days prior to the entry	4 categories	0 1 2 ≥3	Based on the condition occurrence and visit occurrence domains including Ambulatory/Outpatient Visit (With a Physician) and Interactive Telemedicine Service	NA
Number of unique medications in 18 months to 179 days prior to the entry	4 categories	0 1 2 ≥3	Based on the drug exposure domain	RxNorm code
Diagnosis of each chronic condition cluster in 18 months to 179 days prior to the entry	Indicator	Yes/No	205 chronic condition clusters were defined based on the condition occurrence and visit occurrence domains.	Rao, S., Lee, G. M., Razzaghi, H., Lorman, V., Mejias, A., Pajor, N. M., ... & Forrest, C. B. (2022). Clinical features and burden of post-acute sequelae of SARS-CoV-2 infection in children and adolescents: an exploratory EHR-based cohort study from the RECOVER program. <i>medRxiv</i> , 2022-05.

Other variables for eligibility criteria				
Prior encounter in 18 months to 179 days prior to the entry	Indicator	Yes/No	Based on the condition occurrence and visit occurrence domains.	NA
Documented SARS-CoV-2 infection	Indicator	Yes/No	Based on the observation and visit occurrence, and condition occurrence domains. Defined as a polymerase-chain-reaction (PCR), serology, or antigen test positive for COVID-19, or diagnoses of COVID-19, post-acute sequelae of SARS-CoV-2 (PASC) regardless of the presence of symptoms.	See https://github.com/PEDSnet/PASC/tree/main/observation_derivation_recover_ml_phenotype/specs for detailed codes.
Exposure variable				
Race/Ethnicity	4 categories	NHW NHB Hispanic AAPI	Based on the race_concept_id and ethnicity_concept_id in the person domain.	See https://github.com/PEDSnet/Data_Models_Public/blob/master/PEDSnet/docs/Conventions%20Docs/v5.5_PEDSnet_CDM_ETL_Conventions.md
Outcome variable				
PASC symptoms and conditions	24 categories	abdominal pain, abnormal liver enzyme, acute kidney injury, acute respiratory distress syndrome, arrhythmias, cardiovascular signs and symptoms, changes in taste and smell, chest pain, cognitive functions, fatigue and malaise, fever and chills, fluid and electrolyte, generalized pain, hair loss, headache, heart disease, mental health disorders, musculoskeletal pain, myocarditis, myositis, Postural	Based on the condition occurrence and visit occurrence domains. A value of 1 to the outcome if the relevant ICD codes for the diagnosis were found during the follow-up or baseline period, and a value of 0 if these ICD codes were not present during the corresponding period. There is no intermittent or sporadic missing data concerning the outcome definitions.	Supplemental Table 5 in Razzaghi H, Forrest CB, Hirabayashi K, Wu Q, Allen AJ, Rao S, Chen Y, Bunnell HT, Chrischilles EA, Cowell LG, Cummins MR. Vaccine effectiveness against long COVID in children. Pediatrics. 2024 Apr 1;153(4):e202306444 6.

Orthostatic Tachycardia Syndrome (POTS) or dysautonomia, respiratory signs and symptoms, skin symptoms, and thrombophlebitis and thromboembolism
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Note: All domains in the table above are based on the PEDSnet common data model (CDM). More details are available through this link: <https://data-models-service.research.chop.edu>.

G. Classification of Symptoms and Conditions into Systematic and Syndromic Groups

Table S3. Classification of Symptoms and Conditions into Systematic and Syndromic Groups.

Syndromic (symptoms, signs, non-specific laboratory abnormalities)	Systemic (diagnosed health conditions)
• abdominal pain • abnormal liver enzyme • cardiovascular signs and symptoms • changes in taste and smell • chest pain • cognitive functions • fatigue and malaise • fever and chills • generalized pain • hair loss • headache • mental health disorders • musculoskeletal pain • respiratory signs and symptoms • skin symptoms	• acute kidney injury • acute respiratory distress syndrome • arrhythmias • fluid and electrolyte • heart disease • myocarditis • myositis • Postural Orthostatic Tachycardia Syndrome (POTS) or dysautonomia • thrombophlebitis and thromboembolism

H. The distribution of COVID-19-positive patients by hospital and cohort entry time.

Table S4. The distribution of COVID-19 positive patients by hospital and cohort entry time.

	Severe ¹				Non-severe ²			
	NHW (N=9,140)	AAPI (N=590)	Hispanic (N=3,786)	NHB (N=3,346)	NHW (N=99,882)	AAPI (N=10,276)	Hispanic (N=56,226)	NHB (N=42,477)
Hospital								
A	1459 (16.0%)	37 (6.3%)	154 (4.1%)	389 (11.6%)	14323 (14.3%)	530 (5.2%)	1226 (2.2%)	6069 (14.3%)
B	1113 (12.2%)	95 (16.1%)	317 (8.4%)	646 (19.3%)	24713 (24.7%)	1960 (19.1%)	4289 (7.6%)	9949 (23.4%)
C	1031 (11.3%)	57 (9.7%)	801 (21.2%)	163 (4.9%)	4415 (4.4%)	242 (2.4%)	3880 (6.9%)	848 (2.0%)
D	390 (4.3%)	29 (4.9%)	159 (4.2%)	257 (7.7%)	4647 (4.7%)	471 (4.6%)	2245 (4.0%)	4443 (10.5%)
E	420 (4.6%)	13 (2.2%)	60 (1.6%)	48 (1.4%)	7581 (7.6%)	322 (3.1%)	1094 (1.9%)	1047 (2.5%)
F	712 (7.8%)	71 (12.0%)	595 (15.7%)	250 (7.5%)	1907 (1.9%)	239 (2.3%)	1833 (3.3%)	661 (1.6%)
G	754 (8.2%)	28 (4.7%)	92 (2.4%)	153 (4.6%)	7547 (7.6%)	742 (7.2%)	768 (1.4%)	1314 (3.1%)
H	232 (2.5%)	1 (0.2%)	16 (0.4%)	35 (1.0%)	4529 (4.5%)	109 (1.1%)	283 (0.5%)	710 (1.7%)
I	1156 (12.6%)	85 (14.4%)	183 (4.8%)	517 (15.5%)	8530 (8.5%)	1098 (10.7%)	1801 (3.2%)	5844 (13.8%)
J	882 (9.6%)	33 (5.6%)	643 (17.0%)	501 (15.0%)	8173 (8.2%)	526 (5.1%)	5824 (10.4%)	3404 (8.0%)
K	105 (1.1%)	25 (4.2%)	273 (7.2%)	64 (1.9%)	6783 (6.8%)	2568 (25.0%)	28574 (50.8%)	5440 (12.8%)
L	182 (2.0%)	88 (14.9%)	320 (8.5%)	100 (3.0%)	1942 (1.9%)	1151 (11.2%)	3170 (5.6%)	1057 (2.5%)
M	704 (7.7%)	28 (4.7%)	173 (4.6%)	223 (6.7%)	4792 (4.8%)	318 (3.1%)	1239 (2.2%)	1691 (4.0%)
Entry time								
03/2020 - 06/2020	136 (1.5%)	17 (2.9%)	163 (4.3%)	122 (3.6%)	907 (0.9%)	190 (1.8%)	1935 (3.4%)	891 (2.1%)
07/2020 - 10/2020	241 (2.6%)	19 (3.2%)	166 (4.4%)	108 (3.2%)	5454 (5.5%)	433 (4.2%)	4967 (8.8%)	1760 (4.1%)
11/2020 - 02/2021	753 (8.2%)	47 (8.0%)	346 (9.1%)	291 (8.7%)	16011 (16.0%)	1240 (12.1%)	10089 (17.9%)	5262 (12.4%)
03/2021 - 06/2021	720 (7.9%)	32 (5.4%)	277 (7.3%)	309 (9.2%)	7916 (7.9%)	445 (4.3%)	3007 (5.3%)	4056 (9.5%)
07/2021 - 10/2021	1063 (11.6%)	37 (6.3%)	394 (10.4%)	485 (14.5%)	13868 (13.9%)	818 (8.0%)	6095 (10.8%)	6477 (15.2%)
11/2021 - 02/2022	3050 (33.4%)	193 (32.7%)	1320 (34.9%)	1136 (34.0%)	33830 (33.9%)	3746 (36.5%)	19028 (33.8%)	16290 (38.4%)
03/2022 - 06/2022	1662 (18.2%)	120 (20.3%)	577 (15.2%)	447 (13.4%)	12030 (12.0%)	1951 (19.0%)	4939 (8.8%)	3739 (8.8%)
07/2022 - 10/2022	1515 (16.6%)	125 (21.2%)	543 (14.3%)	448 (13.4%)	9866 (9.9%)	1453 (14.1%)	6166 (11.0%)	4002 (9.4%)

Abbreviation: NHW: Non-Hispanic White; NHB: Non-Hispanic Black; AAPI: Asian American or Pacific Islander; PMCA: Pediatric Medical Complexity Algorithm

Footnote:

1: According to the definition of the severity of COVID-19²⁷ at cohort entry, the positive patients with moderate or severe COVID-19 were grouped into the severe group.

2: Similarly, the positive patients with asymptomatic or mild COVID-19 were grouped into the non-severe group.

Section S2 Supplemental Results: negative control experiment

In this section, we presented the results of difference-in-difference analysis on negative control outcomes. The estimated RR and 95% CI were presented for each negative control outcome, and in each setting, the expected absolute systematic error^{1,2} was also presented.

A. AAPI vs. NHW

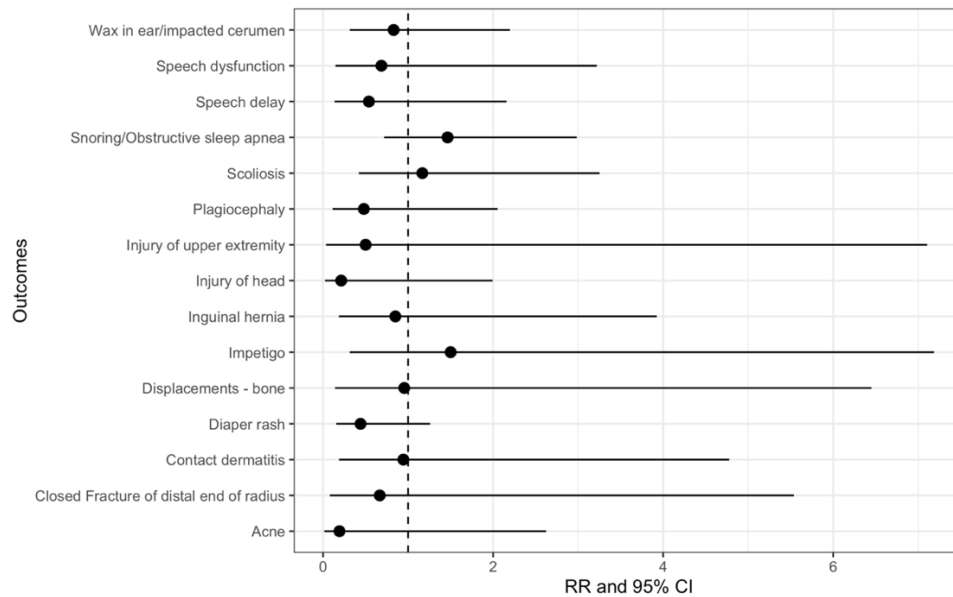


Figure S1. The differential increase related to COVID-19 for prevalence of negative control outcomes among severe COVID-19-positive patients, AAPI vs. NHW (n=9,730 patients). Each dot in the figure shows the estimated RRs of each NCO for AAPI versus the NHW group from the DiD model with each NCO as the outcome. The error bars indicate the 95% CIs. Source data are provided as a Source Data file.

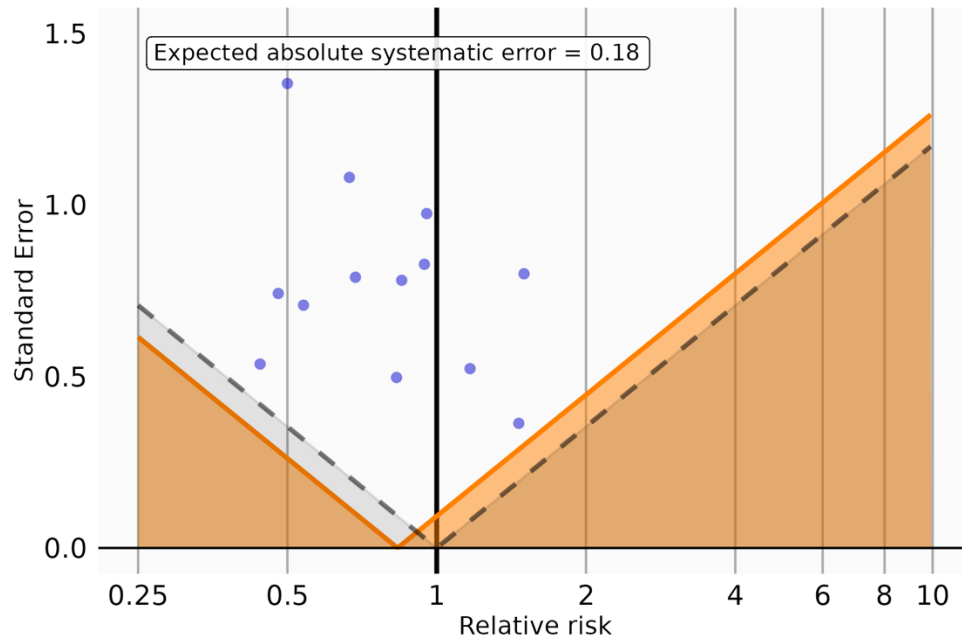


Figure S2. The expected absolute systematic error among severe COVID-19-positive patients, AAPI vs. NHW (n=9,730 patients). Each dot represents the estimated RR and standard error in each NCO. The orange lines are found by the 95% CI for the estimated systematic error. The area under the orange lines indicates statistically significant estimates. The dotted lines are found by the 95% confidence limit when the effect size of RR for systematic error is zero. The area under the dotted lines indicates statistically significant estimates when the effect size of RR for systematic error is zero. Source data are provided as a Source Data file.

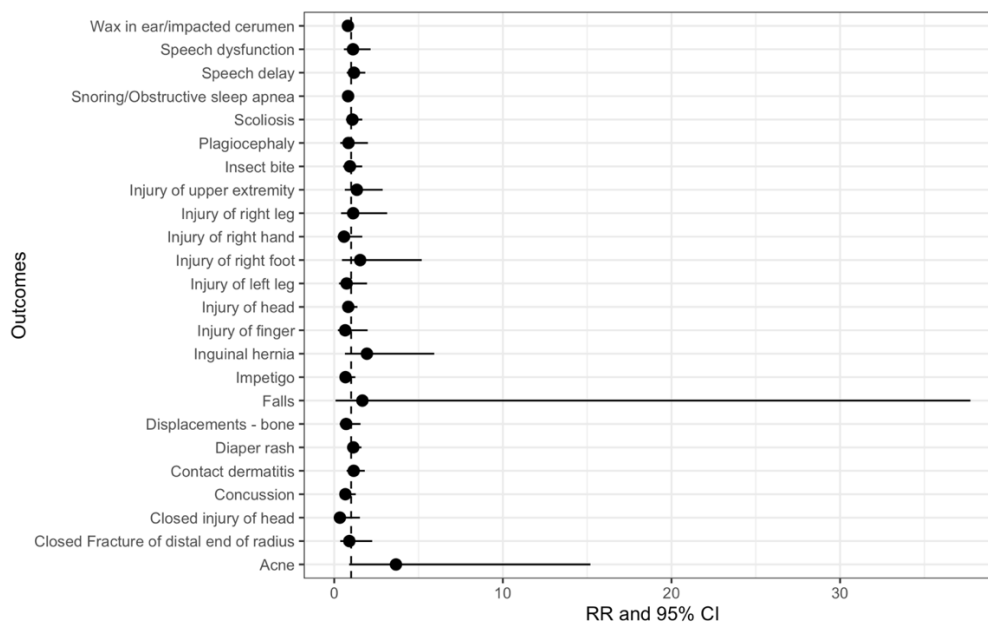


Figure S3. The differential increase related to COVID-19 for prevalence of negative control outcomes among non-severe COVID-19-positive patients, AAPI vs. NHW (n=110,158). Each dot in the figure shows the estimated RRs of each NCO for AAPI versus the NHW group from the

DiD model with each NCO as the outcome. The error bars indicate the 95% CIs. Source data are provided as a Source Data file.

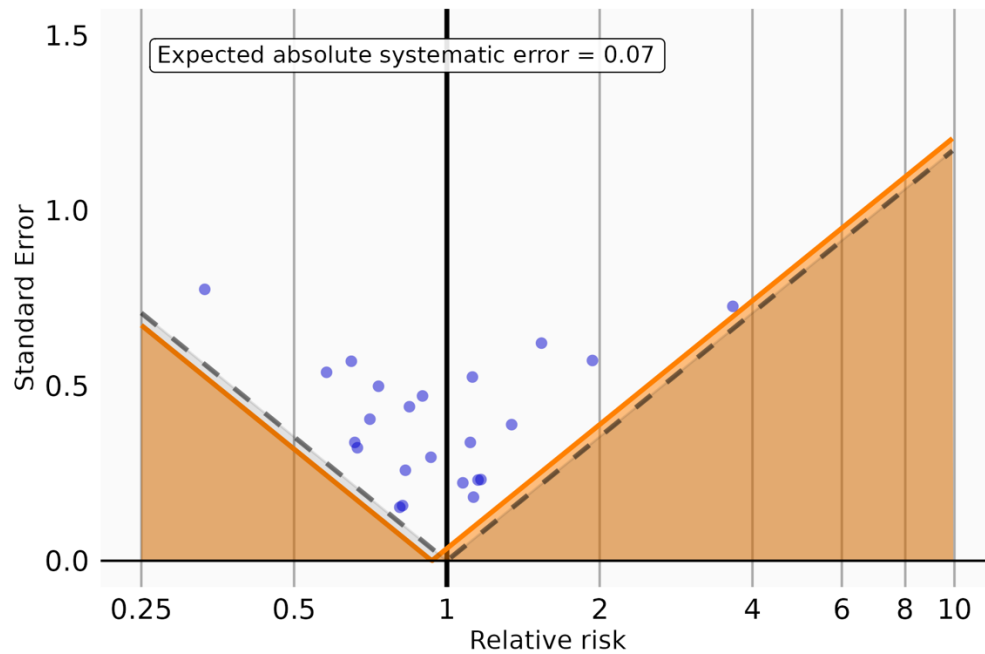


Figure S4. The expected absolute systematic error among non-severe COVID-19-positive patients, AAPI vs. NHW (n=110,158 patients). Each dot represents the estimated RR in each NCO. The orange lines are found by the 95% CI for the estimated systematic error. The area under the orange lines indicates statistically significant estimates. The dotted lines are found by the 95% confidence limit when the effect size of RR for systematic error is zero. The area under the dotted lines indicates statistically significant estimates when the effect size of RR for systematic error is zero. Source data are provided as a Source Data file.

B. Hispanic vs. NHW

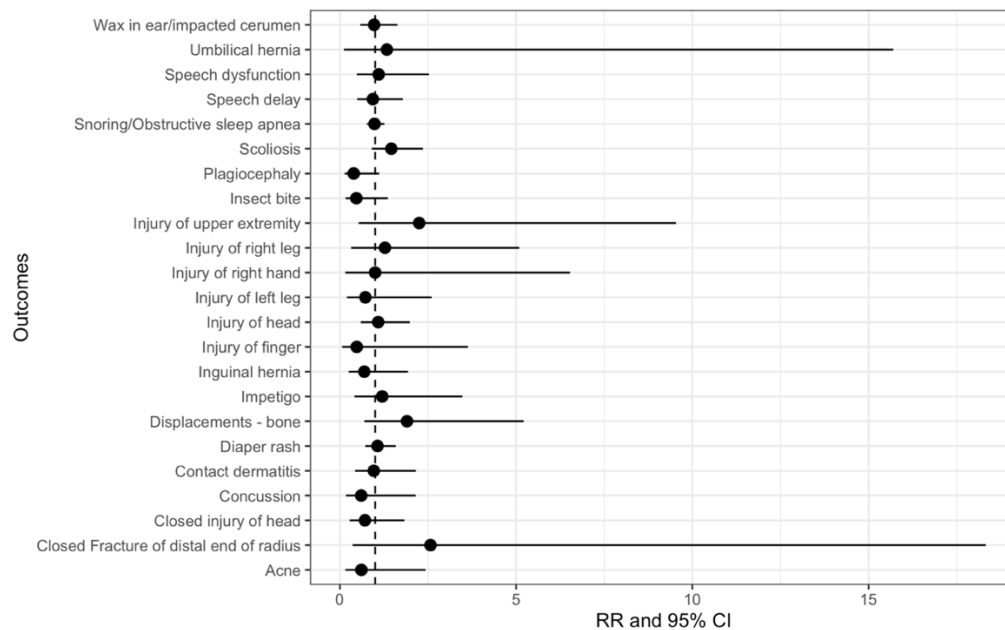


Figure S5. The differential increase related to COVID-19 for prevalence of negative control outcomes among severe COVID-19-positive patients, Hispanic vs. NHW (n=12,926). Each dot in the figure shows the estimated RRs of each NCO for Hispanic versus the NHW group from the DiD model with each NCO as the outcome. The error bars indicate the 95% CIs. Source data are provided as a Source Data file.

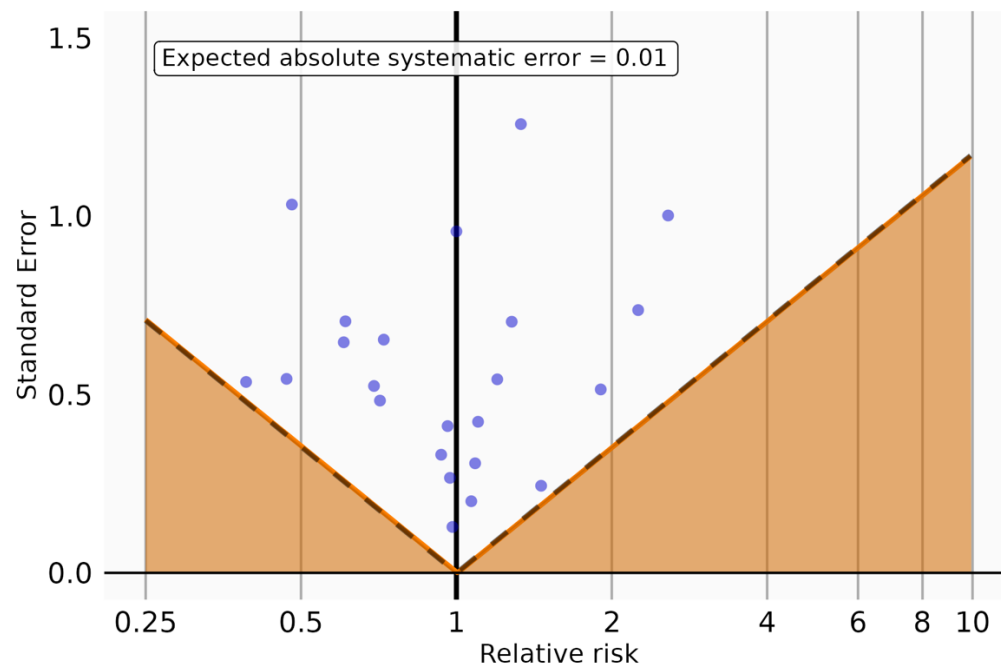


Figure S6. The expected absolute systematic error among severe COVID-19-positive patients, Hispanic vs. NHW (n=12,926 patients). Each dot represents the estimated RR in each NCO. The

orange lines are found by the 95% CI for the estimated systematic error. The area under the orange lines indicates statistically significant estimates. The dotted lines are found by the 95% confidence limit when the effect size of RR for systematic error is zero. The area under the dotted lines indicates statistically significant estimates when the effect size of RR for systematic error is zero. Source data are provided as a Source Data file.

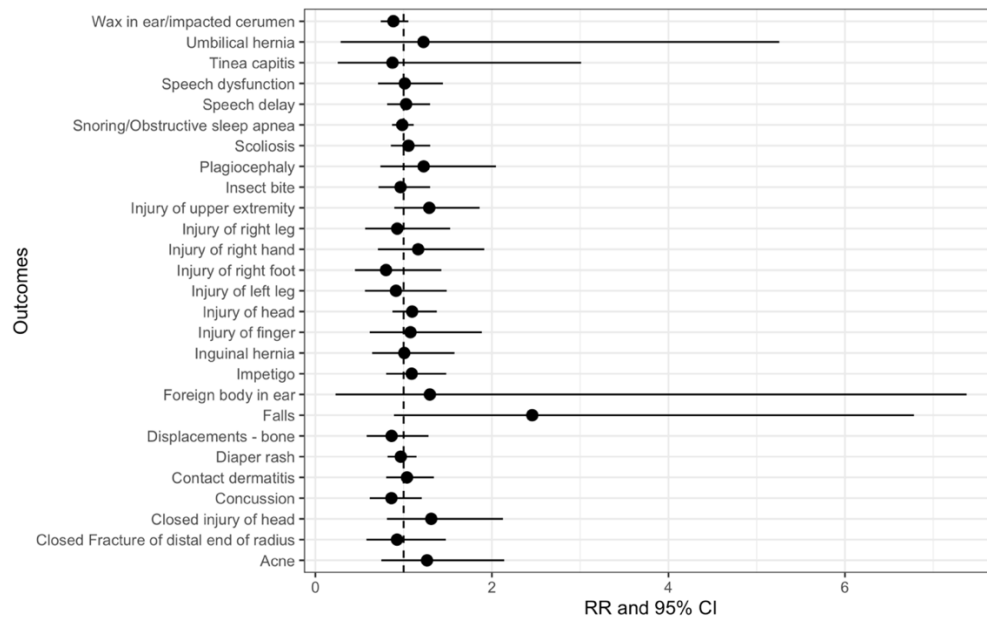


Figure S7. The differential increase related to COVID-19 for the prevalence of negative control outcomes among non-severe COVID-19-positive patients, Hispanic vs. NHW (n=156,108 patients). Each dot in the figure shows the estimated RRs of each NCO for Hispanic versus the NHW group from the DiD model, with each NCO as the outcome. The error bars indicate the 95% CIs. Source data are provided as a Source Data file.

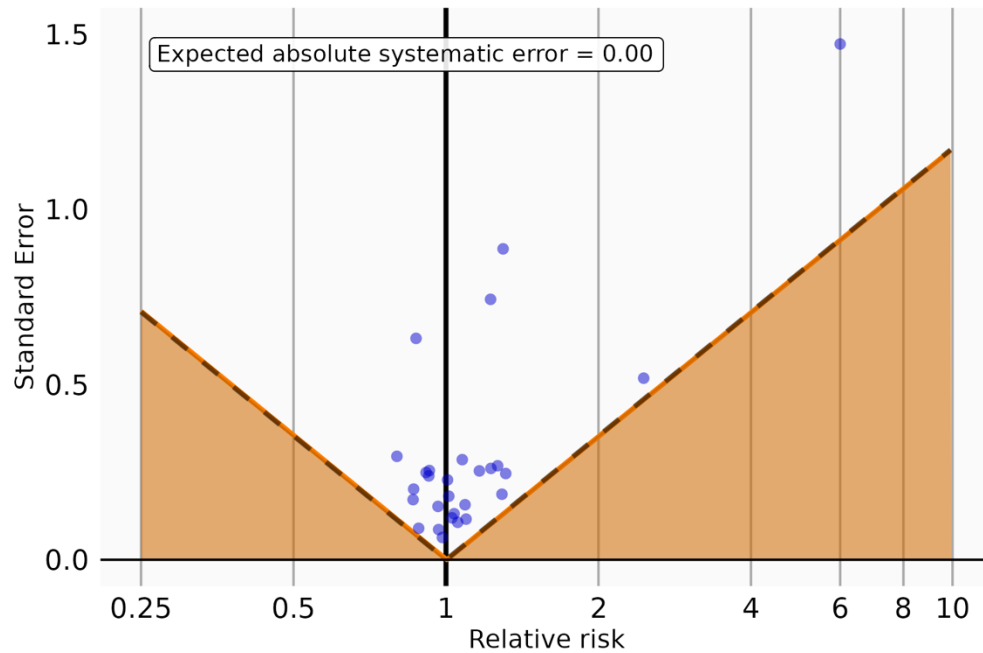


Figure S8. The expected absolute systematic error among non-severe COVID-19-positive patients, Hispanic vs. NHW (n=156,108 patients). Each dot represents the estimated RR in each NCO. The orange lines are found by the 95% CI for the estimated systematic error. The area under the orange lines indicates statistically significant estimates. The dotted lines are found by the 95% confidence limit when the effect size of RR for systematic error is zero. The area under the dotted lines indicates statistically significant estimates when the effect size of RR for systematic error is zero. Source data are provided as a Source Data file.

C. NHB vs. NHW

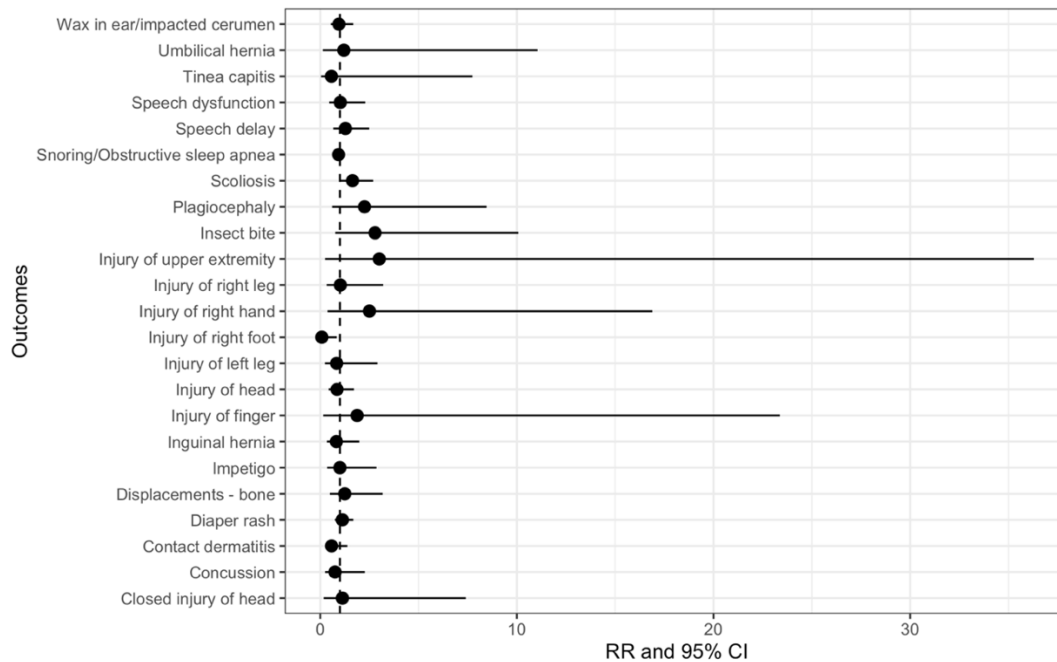


Figure S9. The differential increase related to COVID-19 for prevalence of negative control outcomes among severe COVID-19-positive patients, NHB vs. NHW (n=12,486 patients). Each dot in the figure shows the estimated RRs of each NCO for NHB versus the NHW group from the DiD model, with each NCO as the outcome. The error bars indicate the 95% CIs. Source data are provided as a Source Data file.

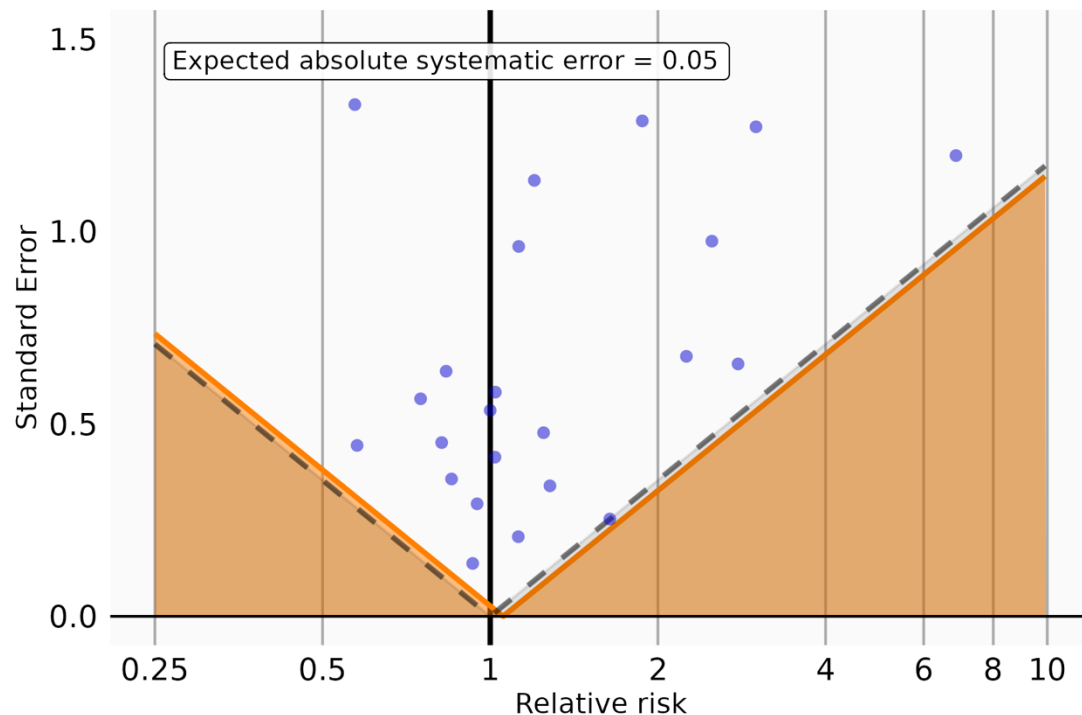


Figure S10. The expected absolute systematic error among severe COVID-19-positive patients, NHB vs. NHW (n=12,486 patients). Each dot represents the estimated RR in each NCO. The orange lines are found by the 95% CI for the estimated systematic error. The area under the orange lines indicates statistically significant estimates. The dotted lines are found by the 95% confidence limit when the effect size of RR for systematic error is zero. The area under the dotted lines indicates statistically significant estimates when the effect size of RR for systematic error is zero. Source data are provided as a Source Data file.

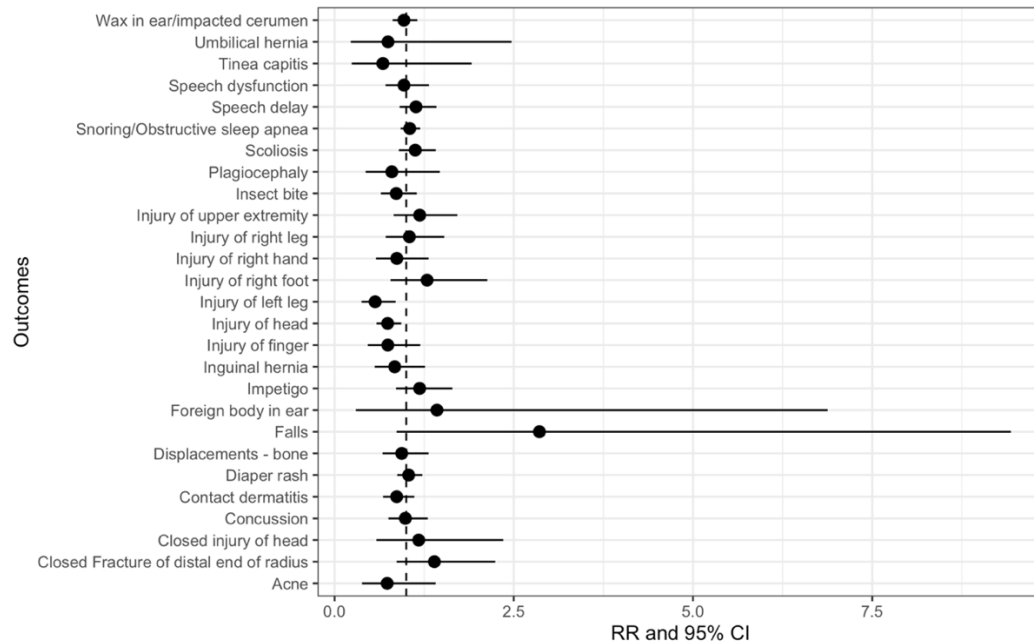


Figure S11. The differential increase related to COVID-19 for prevalence of negative control outcomes among non-severe COVID-19-positive patients, NHB vs. NHW (n=142,359 patients). Each dot in the figure shows the estimated RRs of each NCO for NHB versus the NHW group from the DiD model, with each NCO as the outcome. The error bars indicate the 95% CIs. Source data are provided as a Source Data file.

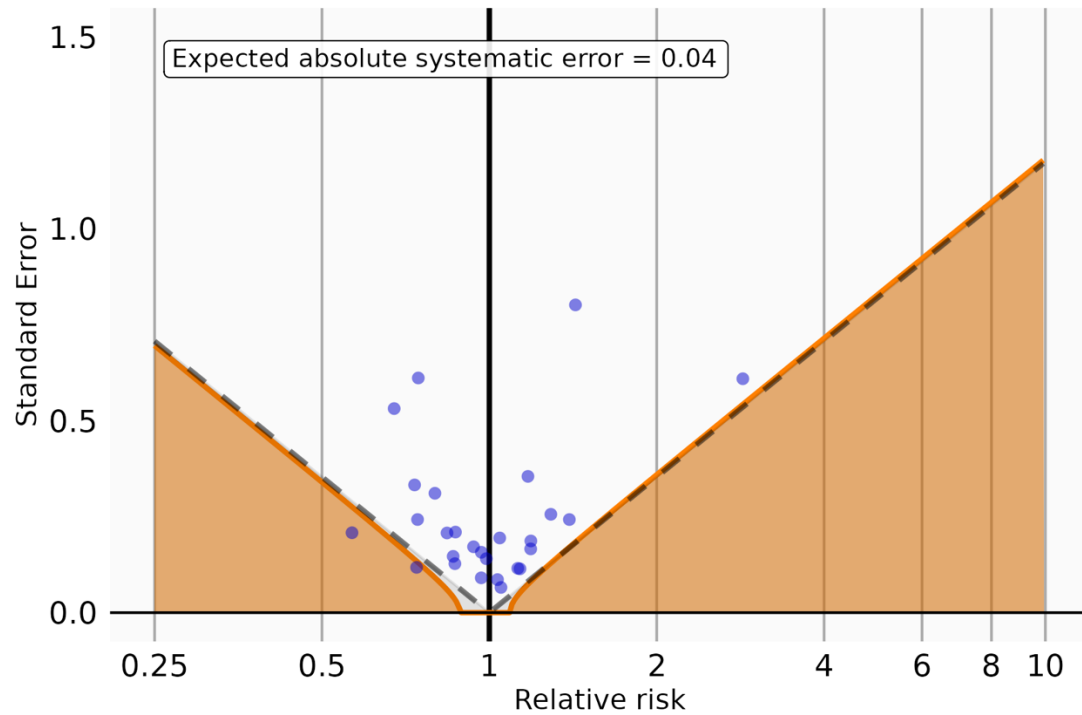


Figure S12. The expected absolute systematic error among non-severe COVID-19-positive patients, NHB vs. NHW (n=142,359 patients). Each dot represents the estimated RR in each NCO. The orange lines are found by the 95% CI for the estimated systematic error. The area under the orange lines indicates statistically significant estimates. The dotted lines are found by the 95% confidence limit when the effect size of RR for systematic error is zero. The area under the dotted lines indicates statistically significant estimates when the effect size of RR for systematic error is zero. Source data are provided as a Source Data file.

Section S3 Supplemental Results: details of ethnic/racial groups

The raw data for all ethnic/racial groups are from the “person” CDM table from the PEDSnet CDM in the EHR data. The ethnic and racial information is identified from columns “ethnicity_concept_id” and “race_concept_id”. Details of categorical definitions are as follows:

-American Indian or Alaska Native: A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.

-Asian: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

-Black or African American: A person having origins in any of the black racial groups of Africa.

-Native Hawaiian or Other Pacific Islander: A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

-White: A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

For patients with multiple races (i.e. biracial), race is considered a single concept, meaning there is only one race slot. If there are multiple races in the source system, concatenate all races into one race_source_value (see below) and use concept_id code as 'Multiple Race.'

Predefined values from concept_id for race are:

- American Indian/Alaska Native: concept_id = 8657
- Asian: concept_id = 8515
- Black or African American: concept_id = 8516
- Native Hawaiian or Other Pacific Islander: concept_id = 8557
- White: concept_id = 8527
- Multiple Race: concept_id = 44814659 (vocabulary_id='PCORNet')
- Refuse to answer: concept_id = 44814660 (vocabulary_id='PCORNet')
- No Information: concept_id = 44814650 (vocabulary_id='PCORNet')
- Unknown: concept_id = 44814653 (vocabulary_id='PCORNet')
- Other: concept_id = 44814649 (vocabulary_id='PCORNet')

A person with Hispanic ethnicity is defined as "A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race."

Predefined values from concept_id for ethnicity are:

- Hispanic: concept_id = 38003563
- Not Hispanic: concept_id = 38003564
- No Information: concept_id = 44814650 (vocabulary_id='PCORNet')
- Unknown: concept_id = 44814653 (vocabulary_id='PCORNet')
- Other: concept_id = 44814649 (vocabulary_id='PCORNet')

More details for the definition of racial/ethnic groups can be found here: https://github.com/PEDSnet/Data_Models_Public/blob/master/PEDSnet/docs/Conventions%20Docs/v5.5_PEDSnet_CDM_ETL_Conventions.md.

All patients with “ethnicity_concept_id” 38003563 are categorized as “Hispanic”. Then based on “race_concept_id”, a value of 8516 indicated “Non-Hispanic Black (NHB)”, 8515 and 8557 indicated “Asian American/Pacific Islanders (AAPI)”, 8527 indicated “Non-Hispanic White (NHB)”, 44814659 indicating “Multiple”, and other values indicated “Other/Unknown”.

We excluded the race/ethnicity based on both the consideration of statistical power (sample size) and the interpretability of the study.

In our study, we considered a sample size to be small for an ethnic/racial group if it comprised less than 3% of the population in any of the following categories:

1. Severe COVID-19 positive patients
2. Non-severe COVID-19 positive patients
3. Severe COVID-19 negative patients
4. Non-severe COVID-19 negative patients

This 3% threshold was applied consistently across all categories to ensure adequate representation and statistical power for meaningful comparisons.

Regarding the exclusion of the “Other/Unknown” categories from our analysis, this decision was made because:

1. The “Other” category often includes a heterogeneous mix of ethnicities that can't be reliably interpreted as a cohesive group.
2. The “Unknown” category represents missing data, which cannot be meaningfully analyzed in the context of racial/ethnic comparisons.

These exclusions help to maintain the integrity and interpretability of our racial/ethnic analyses, focusing on well-defined groups with sufficient representation in our dataset. We have added this information to the methods section of our manuscript to provide readers with a clear understanding of our approach to handling racial/ethnic data in this study.

Table S5. Number of patients for COVID-19-positive and negative groups, stratified by severity status.

	<i>COVID-19-positive</i>			<i>COVID-19-negative</i>		
	Severe (N=18,489)	Non-severe (N=230,827)	Overall (N=249,316)	Severe (N=158,783)	Non-severe (N=594,263)	Overall (N=753,046)
Hispanic	3786 (20.5%)	56226 (24.4%)	60012 (24.1%)	26637 (16.8%)	123049 (20.7%)	149686 (19.9%)
Non-Hispanic White	9140 (49.4%)	99882 (43.3%)	109022 (43.7%)	87222 (54.9%)	277891 (46.8%)	365113 (48.5%)
Non-Hispanic Black/African American	3346 (18.1%)	42477 (18.4%)	45823 (18.4%)	24024 (15.1%)	106441 (17.9%)	130465 (17.3%)
Asian/Pacific Islander	590 (3.2%)	10276 (4.5%)	10866 (4.4%)	5709 (3.6%)	26475 (4.5%)	32184 (4.3%)

Multiple	584 (3.2%)	6312 (2.7%)	6896 (2.8%)	5392 (3.4%)	17960 (3.0%)	23352 (3.1%)
Other/Unknown	1043 (5.6%)	15654 (6.8%)	16697 (6.7%)	9799 (6.2%)	42447 (7.1%)	52246 (6.9%)

Section S4 Supplemental Results: crude analysis comparing COVID-19 positive and negative patients

A. Definition of COVID-19-negative group

For COVID-19-negative patients, we included patients who had neither a documented SARS-CoV-2 infection nor a diagnosis of multisystem inflammatory syndrome in children (MIS-C) within the same study period, and who had at least one negative COVID-19 test result. A random negative test was chosen as the index date for COVID-19-negative patients. The selection of participants for COVID-19-negative in real-world data is summarized in **Figure S13**. The COVID-19-negative patients were required to be members of the healthcare organization during the previous 18 months and have at least one visit 28 to 179 days after the index date, as specified in the flowchart. These included subjects come from ED visits or other visits (i.e., routine, physical), primary care, office visits, and others.

For COVID-19-negative patients, we determined severity status based on the symptoms and conditions observed during the acute phase (seven days before to thirteen days after the index date). Primary care settings typically provide a more comprehensive representation of the general population due to their broader patient demographics and the nature of routine and preventive care they offer. Thus, the presence of these major primary care-driven systems in our data source bolsters the external validity and generalizability of our results to the broader child and adolescent population.

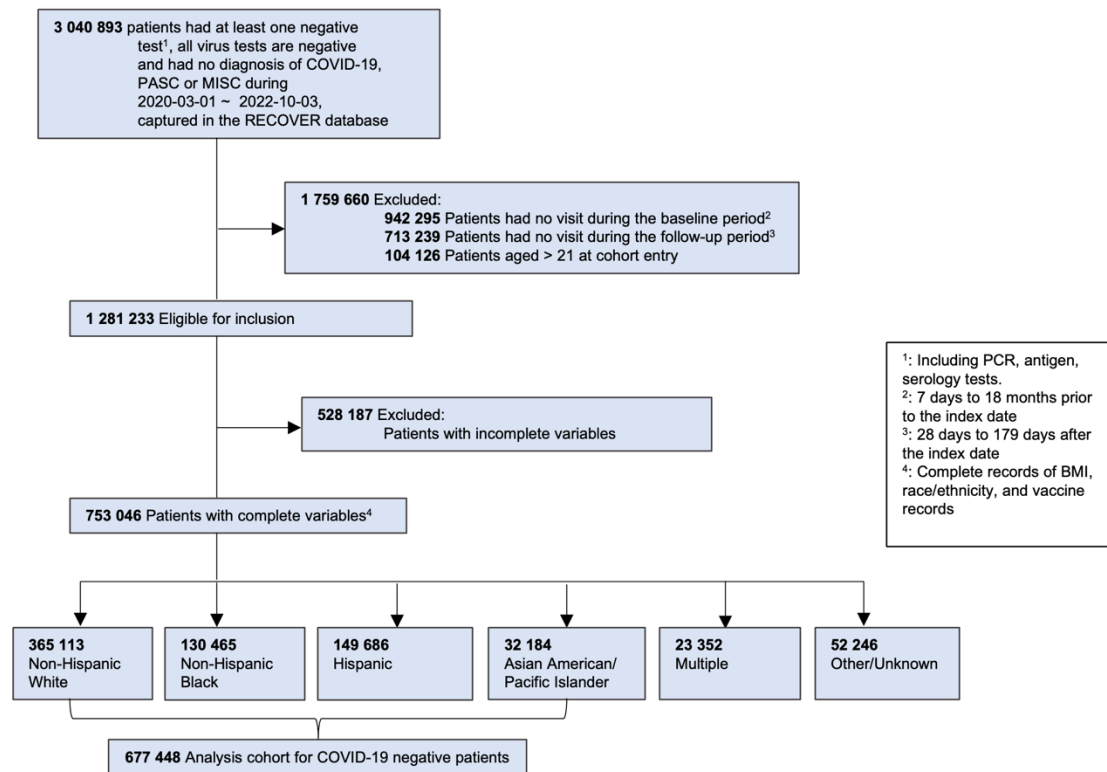


Figure S13. Selection of participants for COVID-19-negative patients.

B. Baseline characteristics of COVID-19-negative group

Table S6. Baseline characteristics of COVID-19 negative patients, by race/ethnicity and severity status. Abbreviation: NHW: Non-Hispanic White; NHB: Non-Hispanic Black; AAPI: Asian American or Pacific Islander.

	<i>Severe</i>				<i>Non-severe</i>			
	NHW (N=87,222)	AAPI (N=5,709)	Hispanic (N=26,637)	NHB (N=24,024)	NHW (N=277,891)	AAPI (N=26,475)	Hispanic (N=123,049)	NHB (N=106,441)
Age categories (%)								
<1 years	10895 (12.5%)	711 (12.5%)	3461 (13.0%)	3978 (16.6%)	24652 (8.9%)	2313 (8.7%)	11795 (9.6%)	10748 (10.1%)
1 to <5 years	24363 (27.9%)	1692 (29.6%)	8024 (30.1%)	7646 (31.8%)	75138 (27.0%)	7739 (29.2%)	32990 (26.8%)	31213 (29.3%)
5 to <12 years	23450 (26.9%)	1727 (30.3%)	7382 (27.7%)	5815 (24.2%)	82081 (29.5%)	8493 (32.1%)	41893 (34.0%)	33954 (31.9%)

12 to <16 years	14085 (16.1%)	771 (13.5%)	4087 (15.3%)	3175 (13.2%)	45195 (16.3%)	3128 (11.8%)	19255 (15.6%)	15311 (14.4%)
16 to <21 years	14429 (16.5%)	808 (14.2%)	3683 (13.8%)	3410 (14.2%)	50825 (18.3%)	4802 (18.1%)	17116 (13.9%)	15215 (14.3%)
Sex								
Female	38451 (44.1%)	2374 (41.6%)	11735 (44.1%)	10568 (44.0%)	138595 (49.9%)	13015 (49.2%)	60993 (49.6%)	52848 (49.7%)
Male	48771 (55.9%)	3335 (58.4%)	14902 (55.9%)	13456 (56.0%)	139296 (50.1%)	13460 (50.8%)	62056 (50.4%)	53593 (50.4%)
Hospital								
A	9036 (10.4%)	344 (6.0%)	872 (3.3%)	2286 (9.5%)	44879 (16.1%)	1639 (6.2%)	4010 (3.3%)	15472 (14.5%)
B	13650 (15.6%)	1180 (20.7%)	2933 (11.0%)	5301 (22.1%)	52929 (19.0%)	4833 (18.3%)	10083 (8.2%)	23891 (22.4%)
C	10948 (12.6%)	524 (9.2%)	6719 (25.2%)	1210 (5.0%)	16505 (5.9%)	838 (3.2%)	10727 (8.7%)	2402 (2.3%)
D	3475 (4.0%)	271 (4.7%)	927 (3.5%)	1678 (7.0%)	13149 (4.7%)	1343 (5.1%)	5287 (4.3%)	8610 (8.1%)
E	6184 (7.1%)	154 (2.7%)	532 (2.0%)	492 (2.0%)	11805 (4.2%)	604 (2.3%)	1543 (1.3%)	1500 (1.4%)
F	5702 (6.5%)	692 (12.1%)	4498 (16.9%)	1704 (7.1%)	7353 (2.6%)	911 (3.4%)	5971 (4.9%)	2114 (2.0%)
G	7301 (8.4%)	434 (7.6%)	623 (2.3%)	1150 (4.8%)	25525 (9.2%)	2997 (11.3%)	2245 (1.8%)	3658 (3.4%)
H	676 (0.8%)	10 (0.2%)	21 (0.1%)	111 (0.5%)	9893 (3.6%)	292 (1.1%)	554 (0.5%)	1458 (1.4%)
I	14095 (16.2%)	860 (15.1%)	1368 (5.1%)	4838 (20.1%)	34132 (12.3%)	3274 (12.4%)	5465 (4.4%)	19021 (17.9%)
J	9492 (10.9%)	436 (7.6%)	4810 (18.1%)	3527 (14.7%)	26348 (9.5%)	1667 (6.3%)	15282 (12.4%)	10672 (10.0%)
K	430 (0.5%)	42 (0.7%)	701 (2.6%)	189 (0.8%)	17024 (6.1%)	4133 (15.6%)	50784 (41.3%)	11677 (11.0%)
L	1616 (1.9%)	567 (9.9%)	1764 (6.6%)	412 (1.7%)	7631 (2.7%)	3183 (12.0%)	8160 (6.6%)	2507 (2.4%)
M	4617 (5.3%)	195 (3.4%)	869 (3.3%)	1126 (4.7%)	10718 (3.9%)	761 (2.9%)	2938 (2.4%)	3459 (3.2%)
Entry time								
03/2020 - 06/2020	6598 (7.6%)	358 (6.3%)	1611 (6.0%)	1404 (5.8%)	10273 (3.7%)	714 (2.7%)	3540 (2.9%)	3039 (2.9%)
07/2020 - 10/2020	13240 (15.2%)	771 (13.5%)	3371 (12.7%)	2909 (12.1%)	37038 (13.3%)	2343 (8.8%)	11387 (9.3%)	9104 (8.6%)
11/2020 - 02/2021	12002 (13.8%)	698 (12.2%)	3125 (11.7%)	2802 (11.7%)	46000 (16.6%)	2981 (11.3%)	14354 (11.7%)	12656 (11.9%)
03/2021 - 06/2021	13330 (15.3%)	815 (14.3%)	3909 (14.7%)	3443 (14.3%)	38195 (13.7%)	3134 (11.8%)	14268 (11.6%)	14430 (13.6%)
07/2021 - 10/2021	12747 (14.6%)	902 (15.8%)	3996 (15.0%)	3962 (16.5%)	52742 (19.0%)	5802 (21.9%)	25692 (20.9%)	22646 (21.3%)
11/2021 - 02/2022	11798 (13.5%)	781 (13.7%)	3822 (14.3%)	3452 (14.4%)	46495 (16.7%)	5083 (19.2%)	22561 (18.3%)	19908 (18.7%)
03/2022 - 06/2022	10277 (11.8%)	779 (13.6%)	3939 (14.8%)	3408 (14.2%)	28142 (10.1%)	3927 (14.8%)	17856 (14.5%)	14132 (13.3%)
07/2022 - 10/2022	7230 (8.3%)	605 (10.6%)	2864 (10.8%)	2644 (11.0%)	19006 (6.8%)	2491 (9.4%)	13391 (10.9%)	10526 (9.9%)
Obesity								
0	59812 (68.6%)	4299 (75.3%)	16878 (63.4%)	14958 (62.3%)	190501 (68.6%)	17846 (67.4%)	54986 (44.7%)	59931 (56.3%)

1	27410 (31.4%)	1410 (24.7%)	9759 (36.6%)	9066 (37.7%)	87390 (31.4%)	8629 (32.6%)	68063 (55.3%)	46510 (43.7%)
PMCA								
0	48327 (55.4%)	3241 (56.8%)	15290 (57.4%)	13804 (57.5%)	186253 (67.0%)	19569 (73.9%)	91266 (74.2%)	71779 (67.4%)
1	16614 (19.0%)	1029 (18.0%)	4902 (18.4%)	4602 (19.2%)	51283 (18.5%)	3952 (14.9%)	18525 (15.1%)	20753 (19.3%)
2	22281 (25.5%)	1439 (25.2%)	6445 (24.2%)	5618 (23.4%)	40355 (14.5%)	2954 (11.2%)	13258 (10.8%)	13909 (13.1%)
Negative tests prior entry								
0	77433 (88.8%)	5035 (88.2%)	23626 (88.7%)	20892 (87.0%)	242041 (87.1%)	23083 (87.2%)	108613 (88.3%)	92542 (86.9%)
1	6553 (7.5%)	455 (8.0%)	2083 (7.8%)	2141 (8.9%)	25358 (9.1%)	2423 (9.2%)	10649 (8.7%)	10170 (9.6%)
2	1816 (2.1%)	117 (2.0%)	522 (2.0%)	543 (2.3%)	6537 (2.4%)	596 (2.3%)	2537 (2.1%)	2460 (2.3%)
>=3	1420 (1.6%)	102 (1.8%)	406 (1.5%)	448 (1.9%)	3955 (1.4%)	373 (1.4%)	1250 (1.0%)	1269 (1.2%)
Vaccine dosage								
0	79029 (90.6%)	4866 (85.2%)	23943 (89.9%)	22208 (92.4%)	243699 (87.7%)	21074 (79.6%)	105725 (85.9%)	96004 (90.2%)
1	1387 (1.6%)	149 (2.6%)	512 (1.9%)	401 (1.7%)	5670 (2.0%)	923 (3.5%)	3101 (2.5%)	2242 (2.1%)
>=2	6806 (7.8%)	694 (12.2%)	2182 (8.2%)	1415 (5.9%)	28522 (10.3%)	4478 (16.9%)	14223 (11.6%)	8195 (7.7%)

For COVID-19-negative patients, we determined severity status based on the symptoms and conditions observed during the acute phase (seven days before to fourteen days after the index date). The index date refers to the first visit with a COVID-19 negative test.

C. Raw incidence of PASC symptoms and conditions

We calculated the incidence of PASC symptoms and conditions in both COVID-19 positive and negative cohorts stratified by severity. For each PASC symptom or condition, we calculated its incidence by dividing the number of patients who experienced the symptom or condition during the follow-up period but not at baseline by the total number of patients.

Table S7. Raw incidence (%) of PASC symptoms and conditions comparing COVID-19 positive and negative patients. The p-value is found by a two-sided Z-test for proportions comparing the COVID-19 positive cohort (n=225,723 patients) and the COVID-19 negative cohort (n=677,448 patients) and no multiple comparisons are adjusted.

All	Severe	Non-severe
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	Pos (%)	Neg (%)	p-value for all ¹	Pos (%)	Neg (%)	p-value for severe ²	Pos (%)	Neg (%)	p-value for non-severe ³
	(N=225,723)	(N=677,448)		(N=16,862)	(N=143,592)		(N=208,861)	(N=533,856)	
At least one condition	26.86	21.44	1.23e-279	34.17	19.80	1.56e-141	26.42	21.84	2.23e-180
Systematic conditions	2.69	1.87	6.33e-113	7.46	2.93	7.41e-166	2.37	1.61	2.05e-101
Acute kidney injury	0.22	0.15	1.35e-09	1.32	0.42	9.38e-52	0.13	0.08	1.13e-08
Acute respiratory distress syndrome	0.03	0.01	1.01e-07	0.24	0.03	2.77e-26	0.01	0.01	0.01
Arrhythmias	1.43	0.95	9.93e-78	4.41	1.56	2.45e-131	1.21	0.79	1.86e-63
Fluid and electrolyte	0.56	0.39	2.32e-28	3.33	0.92	3.20e-152	0.36	0.24	2.92e-17
Heart disease	0.37	0.28	2.44e-10	1.67	0.62	4.16e-49	0.27	0.20	5.11e-10
Myocarditis	0.03	0.01	9.89e-18	0.17	0.02	6.21e-21	0.02	2.44e-03	1.72e-13
Myositis	0.02	0.02	0.01	0.08	0.02	8.39e-05	0.02	0.01	0.07
POTS/dysautonomia	1.03	0.71	1.65e-49	1.34	0.72	5.00e-17	1.01	0.71	8.49e-39
Thrombophlebitis and thromboembolism	0.13	0.11	1.79e-3	1.02	0.33	1.05e-40	0.06	0.05	0.01
Syndromic conditions	26.15	20.83	2.18e-282	32.48	18.77	4.17e-144	25.75	21.35	3.16e-173
Abdominal pain	3.04	2.27	8.55e-85	3.66	2.15	1.70e-31	2.99	2.31	4.47e-60
Abnormal liver enzyme	0.32	0.24	1.11e-09	1.17	0.43	6.44e-36	0.25	0.19	3.87e-07
Cardiovascular signs and symptoms	1.16	0.88	4.62e-31	1.69	0.86	5.37e-25	1.12	0.89	2.37e-19
Changes in the taste and smell	0.16	0.04	3.49e-69	0.08	0.02	1.62e-05	0.17	0.05	3.45e-55
Chest pain	1.39	0.74	2.27e-173	1.69	0.68	5.66e-43	1.37	0.75	4.97e-133
Cognitive functions	0.68	0.66	0.35	1.00	0.62	1.09e-08	0.66	0.68	0.38
Fatigue and malaise	1.74	1.30	1.45e-50	3.22	1.74	7.60e-37	1.63	1.18	1.37e-49
Fever and chills	5.67	3.73	9.37e-306	9.15	3.31	6.57e-246	5.41	3.84	3.98e-177
Generalized pain	1.26	0.91	8.94e-47	1.78	1.02	2.67e-18	1.22	0.88	5.78e-40
Hair loss	0.24	0.14	1.50e-24	0.48	0.14	8.68e-23	0.22	0.14	1.36e-15
Headache	2.20	1.51	3.02e-99	2.33	1.23	2.45e-29	2.19	1.59	5.25e-65
Mental health	6.32	5.45	1.72e-44	8.04	5.05	2.96e-46	6.19	5.55	1.03e-21
Musculoskeletal pain	3.53	2.79	1.32e-66	4.03	2.72	8.21e-20	3.50	2.81	1.63e-50

Respiratory signs and symptoms	9.68	7.25	2.25e-236	15.02	6.77	4.65e-221	9.31	7.38	6.20e-134
Skin symptoms	3.62	2.70	1.04e-101	4.99	2.66	1.26e-56	3.51	2.71	6.47e-70

Footnotes:

¹P-value for all: A two-sided Z-test for proportions comparing the COVID-19 positive cohort and the COVID-19 negative cohort.

²P-value for severe: A two-sided Z-test for proportions comparing the COVID-19 positive and negative cohorts among patients with severe cases during the acute phase.

³P-value for non-severe: A two-sided Z-test for proportions comparing the COVID-19 positive and negative cohorts among patients with non-severe cases during the acute phase.

D. Rerun DiD method with NCO calibration on the COVID-19 negative cohort

In this sensitivity analysis, we rerun the DiD method with NCO calibration on the COVID-19 negative cohort. The results are presented in **Figure S14**.

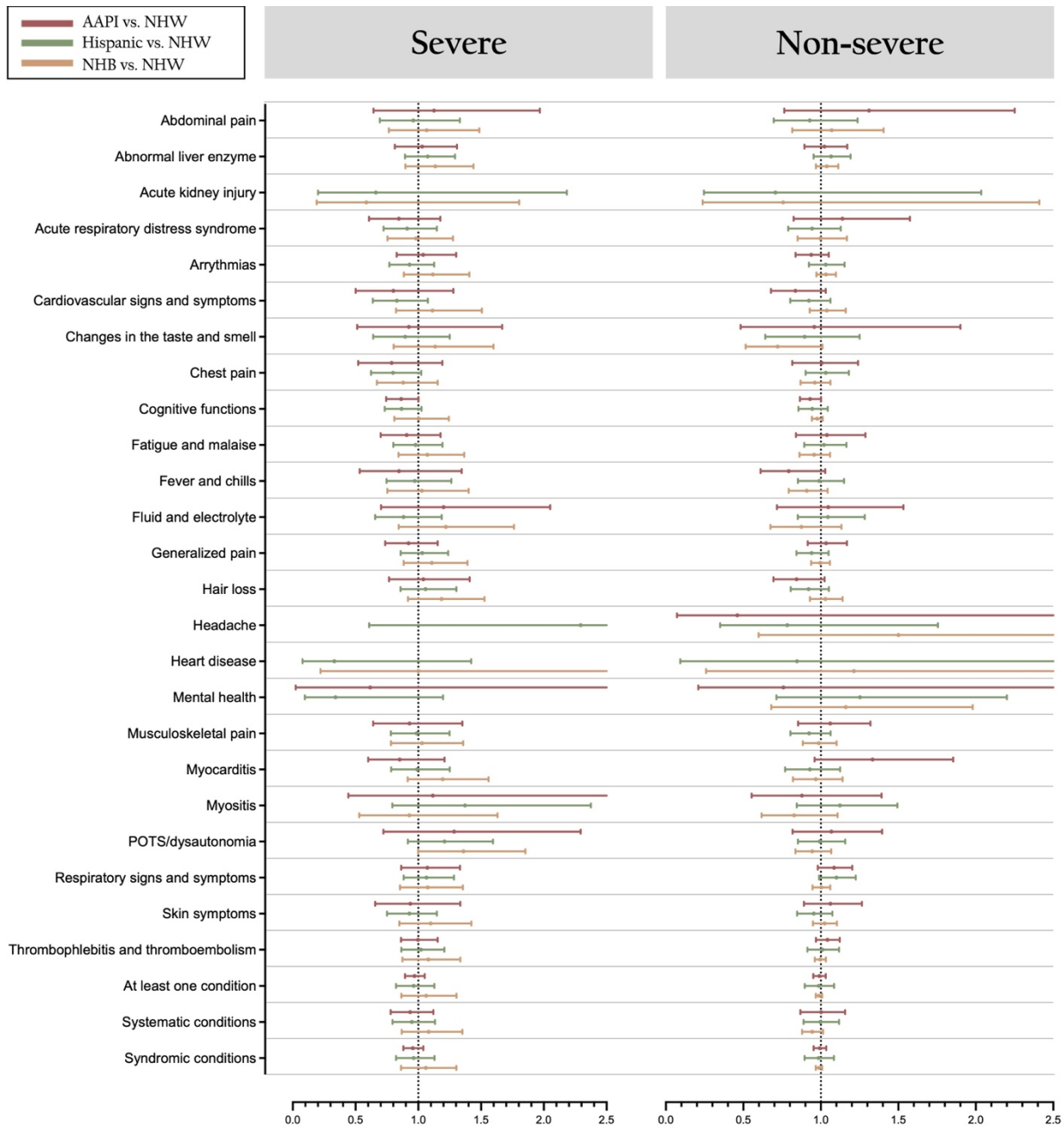


Figure S14. The racial/ethnic difference in risk ratio (RR) across PASC symptoms and conditions for COVID-19 negative cohort (n=677,448 patients). The dots in the figure show the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration stratified by severity status. The error bars showed the 95% confidence interval (CI) of the estimated RR. Source data are provided as a Source Data file.

Section S5 Supplemental Results: details of the matched population

This section provides more details about the matched population for each racial/ethnic group. The number of participants matched is presented in **Table S8**; The baseline characteristics of COVID-19-positive patients after matching for each racial/ethnic group comparison are shown in **Tables S9-11**.

Table S8. Number of participants matched for each racial/ethnic group.

		Matching ratio	# of matched participants of minority groups	# of all participants of minority groups	# of matched participants in NHW group	# of all participants in NHW group
Hispanic vs. NHW	Severe	2	3,392	3,786	5,128	9,140
	Non-severe	5	33,064	56,226	75,966	99,882
NHB vs. NHW	Severe	2	2,911	3,346	5,035	9,140
	Non-severe	2	39,156	42,477	62,071	99,882
AAPI vs. NHW	Severe	8	575	590	3,834	9,140
	Non-severe	2	10,199	10,276	1,9056	99,882

Table S9. Baseline characteristics of COVID-19-positive patients after matching, by severity status, AAPI vs NHW.

	<i>Severe</i>		<i>Non-severe</i>	
	NHW (N=3,834)	AAPI (N=575)	NHW (N=19,056)	AAPI (N=10,119)
Age categories (%)				
<1 years	730 (19.0%)	122 (21.2%)	2044 (10.7%)	965 (9.5%)
1 to <5 years	1374 (35.8%)	190 (33.0%)	5047 (26.5%)	2791 (27.4%)
5 to <12 years	857 (22.4%)	129 (22.4%)	5888 (30.9%)	3139 (30.8%)
12 to <16 years	388 (10.1%)	59 (10.3%)	2565 (13.5%)	1429 (14.0%)
16 to <21 years	485 (12.7%)	75 (13.0%)	3512 (18.4%)	1875 (18.4%)
Sex				
Female	1649 (43.0%)	247 (43.0%)	9368 (49.2%)	4941 (48.4%)
Male	2185 (57.0%)	328 (57.0%)	9688 (50.8%)	5258 (51.6%)
Hospital				
A	366 (9.5%)	37 (6.4%)	1193 (6.3%)	530 (5.2%)
B	741 (19.3%)	95 (16.5%)	3940 (20.7%)	1960 (19.2%)
C	376 (9.8%)	57 (9.9%)	494 (2.6%)	242 (2.4%)
D	201 (5.2%)	29 (5.0%)	918 (4.8%)	471 (4.6%)
E	104 (2.7%)	13 (2.3%)	559 (2.9%)	322 (3.2%)
F	530 (13.8%)	71 (12.3%)	490 (2.6%)	239 (2.3%)
G	198 (5.2%)	28 (4.9%)	1549 (8.1%)	742 (7.3%)
H	14 (0.4%)	1 (0.2%)	216 (1.1%)	109 (1.1%)
I	640 (16.7%)	85 (14.8%)	2023 (10.6%)	1098 (10.8%)
J	239 (6.2%)	33 (5.7%)	1034 (5.4%)	526 (5.2%)
K	103 (2.7%)	25 (4.3%)	4478 (23.5%)	2524 (24.7%)
L	179 (4.7%)	73 (12.7%)	1615 (8.5%)	1118 (11.0%)
M	143 (3.7%)	28 (4.9%)	547 (2.9%)	318 (3.1%)
Entry time				
03/2020 - 06/2020	84 (2.2%)	17 (3.0%)	278 (1.5%)	185 (1.8%)

07/2020 - 10/2020	111 (2.9%)	16 (2.8%)	777 (4.1%)	433 (4.2%)
11/2020 - 02/2021	290 (7.6%)	47 (8.2%)	2332 (12.2%)	1240 (12.2%)
03/2021 - 06/2021	251 (6.5%)	32 (5.6%)	900 (4.7%)	445 (4.4%)
07/2021 - 10/2021	261 (6.8%)	36 (6.3%)	1658 (8.7%)	818 (8.0%)
11/2021 - 02/2022	1224 (31.9%)	188 (32.7%)	7065 (37.1%)	3726 (36.5%)
03/2022 - 06/2022	794 (20.7%)	117 (20.3%)	3390 (17.8%)	1914 (18.8%)
07/2022 - 10/2022	819 (21.4%)	122 (21.2%)	2656 (13.9%)	1438 (14.1%)
Obesity				
No	2704 (70.5%)	411 (71.5%)	11825 (62.1%)	6112 (59.9%)
Yes	1130 (29.5%)	164 (28.5%)	7231 (37.9%)	4087 (40.1%)
PMCA				
No chronic condition	2082 (54.3%)	305 (53.0%)	14456 (75.9%)	7548 (74.0%)
Non-complex chronic condition	515 (13.4%)	79 (13.7%)	2663 (14.0%)	1551 (15.2%)
Complex chronic condition	1237 (32.3%)	191 (33.2%)	1937 (10.2%)	1100 (10.8%)
Negative tests prior entry				
0	2625 (68.5%)	400 (69.6%)	14738 (77.3%)	7848 (76.9%)
1	619 (16.1%)	94 (16.3%)	2651 (13.9%)	1428 (14.0%)
2	243 (6.3%)	31 (5.4%)	922 (4.8%)	518 (5.1%)
>=3	347 (9.1%)	50 (8.7%)	745 (3.9%)	405 (4.0%)
Vaccine dosage				
0	3137 (81.8%)	459 (79.8%)	13882 (72.8%)	7238 (71.0%)
1	128 (3.3%)	20 (3.5%)	840 (4.4%)	467 (4.6%)
>=2	569 (14.8%)	96 (16.7%)	4334 (22.7%)	2494 (24.5%)

Table S10. Baseline characteristics of COVID-19-positive patients after matching, by severity status, NHB vs NHW.

	<i>Severe</i>		<i>Non-severe</i>	
	NHW (N=5,035)	NHB (N=2,911)	NHW (N=62,071)	NHB (N=39,156)
Age categories (%)				
<1 years	1230 (24.4%)	716 (24.6%)	7520 (12.1%)	4483 (11.4%)
1 to <5 years	1446 (28.7%)	822 (28.2%)	13844 (22.3%)	8519 (21.8%)
5 to <12 years	849 (16.9%)	477 (16.4%)	17901 (28.8%)	11822 (30.2%)
12 to <16 years	663 (13.2%)	386 (13.3%)	11149 (18.0%)	7073 (18.1%)
16 to <21 years	847 (16.8%)	510 (17.5%)	11657 (18.8%)	7259 (18.5%)
Sex				
Female	2311 (45.9%)	1374 (47.2%)	30815 (49.6%)	19664 (50.2%)
Male	2724 (54.1%)	1537 (52.8%)	31256 (50.4%)	19492 (49.8%)
Hospital				
A	730 (14.5%)	361 (12.4%)	9711 (15.6%)	5741 (14.7%)
B	833 (16.5%)	541 (18.6%)	15704 (25.3%)	9208 (23.5%)
C	291 (5.8%)	148 (5.1%)	1628 (2.6%)	826 (2.1%)
D	336 (6.7%)	221 (7.6%)	4382 (7.1%)	3796 (9.7%)
E	96 (1.9%)	41 (1.4%)	2041 (3.3%)	1021 (2.6%)
F	373 (7.4%)	212 (7.3%)	1082 (1.7%)	615 (1.6%)
G	268 (5.3%)	141 (4.8%)	2559 (4.1%)	1288 (3.3%)
H	65 (1.3%)	32 (1.1%)	1383 (2.2%)	698 (1.8%)
I	766 (15.2%)	449 (15.4%)	7123 (11.5%)	5169 (13.2%)
J	684 (13.6%)	421 (14.5%)	5680 (9.2%)	3242 (8.3%)
K	92 (1.8%)	57 (2.0%)	6320 (10.2%)	4974 (12.7%)
L	131 (2.6%)	82 (2.8%)	1481 (2.4%)	967 (2.5%)
M	370 (7.3%)	205 (7.0%)	2977 (4.8%)	1611 (4.1%)
Entry time				
03/2020 - 06/2020	113 (2.2%)	83 (2.9%)	746 (1.2%)	679 (1.7%)
07/2020 - 10/2020	136 (2.7%)	89 (3.1%)	2526 (4.1%)	1621 (4.1%)
11/2020 - 02/2021	412 (8.2%)	238 (8.2%)	8711 (14.0%)	4974 (12.7%)
03/2021 - 06/2021	417 (8.3%)	264 (9.1%)	5427 (8.7%)	3686 (9.4%)
07/2021 - 10/2021	675 (13.4%)	416 (14.3%)	9507 (15.3%)	6039 (15.4%)
11/2021 - 02/2022	1702 (33.8%)	1001 (34.4%)	22555 (36.3%)	14807 (37.8%)
03/2022 - 06/2022	799 (15.9%)	407 (14.0%)	6315 (10.2%)	3559 (9.1%)
07/2022 - 10/2022	781 (15.5%)	413 (14.2%)	6284 (10.1%)	3791 (9.7%)
Obesity				
No	3174 (63.0%)	1744 (59.9%)	36791 (59.3%)	20816 (53.2%)
Yes	1861 (37.0%)	1167 (40.1%)	25280 (40.7%)	18340 (46.8%)
PMCA				
No condition	2596 (51.6%)	1490 (51.2%)	43344 (69.8%)	26630 (68.0%)
Non-complex chronic condition	806 (16.0%)	473 (16.2%)	11336 (18.3%)	7651 (19.5%)
Complex chronic condition	1633 (32.4%)	948 (32.6%)	7391 (11.9%)	4875 (12.5%)
Negative tests prior entry				
0	3549 (70.5%)	2057 (70.7%)	47779 (77.0%)	30172 (77.1%)
1	727 (14.4%)	416 (14.3%)	8987 (14.5%)	5694 (14.5%)
2	320 (6.4%)	186 (6.4%)	3045 (4.9%)	1928 (4.9%)
>=3	439 (8.7%)	252 (8.7%)	2260 (3.6%)	1362 (3.5%)
Vaccine dosage				
0	4537 (90.1%)	2642 (90.8%)	53628 (86.4%)	34251 (87.5%)
1	107 (2.1%)	59 (2.0%)	1627 (2.6%)	1057 (2.7%)
>=2	391 (7.8%)	210 (7.2%)	6816 (11.0%)	3848 (9.8%)

Table S11. Baseline characteristics of COVID-19-positive patients after matching, by severity status, Hispanic vs NHW.

	<i>Severe</i>		<i>Non-severe</i>	
	NHW (N=5,128)	Hispanic (N=3,392)	NHW (N=75,966)	Hispanic (N=33,064)
Age categories (%)				
<1 years	950 (18.5%)	702 (20.7%)	8435 (11.1%)	3865 (11.7%)
1 to <5 years	1643 (32.0%)	1067 (31.5%)	17687 (23.3%)	7593 (23.0%)
5 to <12 years	1035 (20.2%)	686 (20.2%)	21630 (28.5%)	9912 (30.0%)
12 to <16 years	700 (13.7%)	427 (12.6%)	13400 (17.6%)	5946 (18.0%)
16 to <21 years	800 (15.6%)	510 (15.0%)	14814 (19.5%)	5748 (17.4%)
Sex				
Female	2359 (46.0%)	1544 (45.5%)	38046 (50.1%)	16476 (49.8%)
Male	2769 (54.0%)	1848 (54.5%)	37920 (49.9%)	16588 (50.2%)
Hospital				
A	378 (7.4%)	154 (4.5%)	6914 (9.1%)	1224 (3.7%)
B	622 (12.1%)	315 (9.3%)	18943 (24.9%)	4280 (12.9%)
C	1010 (19.7%)	743 (21.9%)	4404 (5.8%)	3484 (10.5%)
D	313 (6.1%)	155 (4.6%)	4607 (6.1%)	2123 (6.4%)
E	115 (2.2%)	60 (1.8%)	5278 (6.9%)	1094 (3.3%)
F	702 (13.7%)	550 (16.2%)	1904 (2.5%)	1596 (4.8%)
G	165 (3.2%)	92 (2.7%)	3958 (5.2%)	768 (2.3%)
H	27 (0.5%)	16 (0.5%)	1687 (2.2%)	283 (0.9%)
I	313 (6.1%)	182 (5.4%)	7016 (9.2%)	1791 (5.4%)
J	862 (16.8%)	613 (18.1%)	8151 (10.7%)	5500 (16.6%)
K	105 (2.0%)	132 (3.9%)	6783 (8.9%)	7606 (23.0%)
L	180 (3.5%)	207 (6.1%)	1940 (2.6%)	2082 (6.3%)
M	336 (6.6%)	173 (5.1%)	4381 (5.8%)	1233 (3.7%)
Entry time				
03/2020 - 06/2020	115 (2.2%)	105 (3.1%)	854 (1.1%)	983 (3.0%)
07/2020 - 10/2020	167 (3.3%)	133 (3.9%)	4367 (5.7%)	2350 (7.1%)
11/2020 - 02/2021	428 (8.3%)	313 (9.2%)	12189 (16.0%)	5043 (15.3%)
03/2021 - 06/2021	379 (7.4%)	263 (7.8%)	5656 (7.4%)	2120 (6.4%)
07/2021 - 10/2021	553 (10.8%)	361 (10.6%)	9859 (13.0%)	3959 (12.0%)
11/2021 - 02/2022	1776 (34.6%)	1184 (34.9%)	26353 (34.7%)	11411 (34.5%)
03/2022 - 06/2022	927 (18.1%)	538 (15.9%)	8615 (11.3%)	3429 (10.4%)
07/2022 - 10/2022	783 (15.3%)	495 (14.6%)	8073 (10.6%)	3769 (11.4%)
Obesity				
No	3280 (64.0%)	2085 (61.5%)	45211 (59.5%)	16514 (49.9%)
Yes	1848 (36.0%)	1307 (38.5%)	30755 (40.5%)	16550 (50.1%)
PMCA				
No condition	2573 (50.2%)	1729 (51.0%)	52184 (68.7%)	21931 (66.3%)
Non-complex chronic condition	749 (14.6%)	474 (14.0%)	13575 (17.9%)	6385 (19.3%)
Complex chronic condition	1806 (35.2%)	1189 (35.1%)	10207 (13.4%)	4748 (14.4%)
Negative tests prior entry				
0	3529 (68.8%)	2379 (70.1%)	57339 (75.5%)	25655 (77.6%)
1	741 (14.5%)	480 (14.2%)	11315 (14.9%)	4557 (13.8%)
2	317 (6.2%)	200 (5.9%)	4001 (5.3%)	1623 (4.9%)
>=3	541 (10.6%)	333 (9.8%)	3311 (4.4%)	1229 (3.7%)
Vaccine dosage				
0	4482 (87.4%)	2991 (88.2%)	63375 (83.4%)	27436 (83.0%)
1	122 (2.4%)	75 (2.2%)	2177 (2.9%)	1040 (3.1%)
>=2	524 (10.2%)	326 (9.6%)	10414 (13.7%)	4588 (13.9%)

Section S6 Supplemental Results: sensitivity analysis using standard regression models

We conducted a sensitivity analysis using standard regression models, adjusting for demographic, clinical, and healthcare utilization factors. **Figure S15** shows the results of this sensitivity analysis.

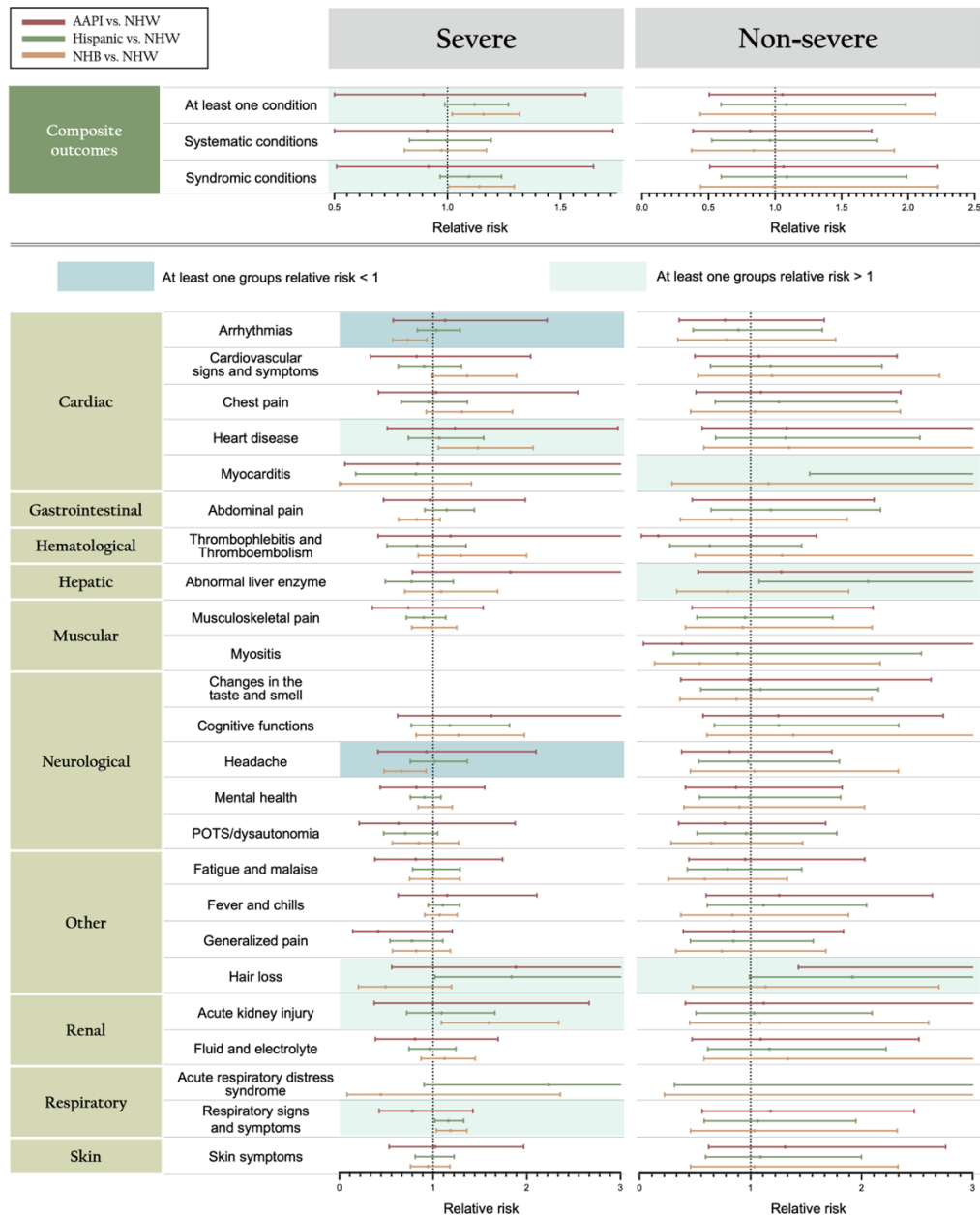


Figure S15. Racial/Ethnic Differences that are attributable to COVID-19 estimated from the difference-in-differences (DiD) analyses for prevalence of PASC symptoms and conditions among COVID-19-positive patients (n=225,723 participants) using standard regression models, by race/ethnicity and severity status. The dots in the figure show the estimated RRs for each minority group versus the NHW group from the standard Poisson regression model stratified by severity

status. The error bars showed the 95% confidence interval (CI) of the estimated RR. Source data are provided as a Source Data file.

Section S7 Supplemental Results: sensitivity analysis for COVID-19 patients with a positive PCR/antigen test only

We conducted analyses for COVID-19 patients identified only by positive SARS-CoV-2 PCR or antigen tests, because the recorded date of COVID-19 diagnoses may not accurately reflect the actual infection date. The results are shown in **Tables S12-13** for both severe and non-severe groups.

Table S12. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients with PCR or antigen test only, by race/ethnicity (n=4,340 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.4	(0.921, 2.129)	0.115	1.117	(0.936, 1.332)	0.219	0.759	(0.574, 1.003)	0.053
Systematic conditions - Composite	1.173	(0.481, 2.862)	0.726	1.014	(0.704, 1.460)	0.941	0.68	(0.455, 1.016)	0.06
Syndromic conditions - Composite	1.413	(0.921, 2.167)	0.113	1.123	(0.937, 1.345)	0.209	0.758	(0.572, 1.005)	0.054
Arrhythmias - Cardiac	1.45	(0.479, 4.395)	0.511	0.828	(0.480, 1.428)	0.497	0.702	(0.407, 1.212)	0.204
Cardiovascular signs and symptoms - Cardiac	0.904	(0.147, 5.559)	0.913	1.173	(0.527, 2.611)	0.696	0.671	(0.312, 1.444)	0.308
Chest pain - Cardiac	0.511	(0.056, 4.684)	0.553	0.515	(0.199, 1.332)	0.171	0.7	(0.297, 1.647)	0.414
Heart disease - Cardiac	0.598	(0.108, 3.308)	0.556	1.07	(0.458, 2.496)	0.876	0.709	(0.345, 1.454)	0.347
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	1.365	(0.365, 5.110)	0.644	0.947	(0.565, 1.588)	0.837	0.69	(0.394, 1.206)	0.192
Thrombophlebitis and thromboembolism - Hematological	NA	NA	NA	0.662	(0.216, 2.027)	0.471	0.542	(0.204, 1.435)	0.218
Abnormal liver enzyme - Hepatic	0.95	(0.157, 5.742)	0.955	0.826	(0.363, 1.878)	0.648	1.911	(0.704, 5.189)	0.204
Musculoskeletal pain - Muscular	0.793	(0.218, 2.887)	0.725	1.469	(0.909, 2.375)	0.116	0.922	(0.553, 1.536)	0.755
Myositis - Muscular	NA	NA	NA	1.059	(0.036, 31.564)	0.974	NA	NA	NA
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	1.773	(0.315, 9.984)	0.516	0.865	(0.322, 2.325)	0.774	1.243	(0.370, 4.175)	0.725
Headache Neurological	1.709	(0.263, 11.095)	0.574	0.69	(0.368, 1.294)	0.247	0.551	(0.308, 0.988)	0.045
Mental health - Neurological	1.221	(0.571, 2.613)	0.607	1.197	(0.872, 1.644)	0.266	0.737	(0.505, 1.076)	0.114
POTS/dysautonomia - Neurological	NA	NA	NA	0.933	(0.351, 2.484)	0.89	0.565	(0.222, 1.439)	0.232
Fatigue and malaise - Other	1.266	(0.278, 5.761)	0.76	0.929	(0.538, 1.603)	0.791	0.47	(0.258, 0.853)	0.013
Fever and chills - Other	1.406	(0.680, 2.908)	0.358	1.312	(0.935, 1.839)	0.116	0.803	(0.540, 1.194)	0.279
Generalized pain - Other	NA	NA	NA	1.393	(0.580, 3.346)	0.459	1.298	(0.599, 2.813)	0.509
Hair loss - Other	NA	NA	NA	1.925	(0.169, 21.928)	0.598	0.435	(0.065, 2.928)	0.392
Acute kidney injury - Renal	NA	NA	NA	1.286	(0.507, 3.261)	0.596	0.483	(0.203, 1.148)	0.1
Fluid and electrolyte - Renal	3.196	(0.567, 18.014)	0.188	1.09	(0.621, 1.915)	0.764	0.817	(0.475, 1.404)	0.464

Acute respiratory distress syndrome - Respiratory	NA	NA	NA	NA	NA	NA	NA	NA	NA
Respiratory signs and symptoms - Respiratory	1.353	(0.645,2.839)	0.423	1.221	(0.930,1.603)	0.151	0.728	(0.520, 1.020)	0.065
Skin symptoms - Skin	2.569	(0.961,6.868)	0.06	1.078	(0.683,1.700)	0.747	0.71	(0.439,1.150)	0.164

Table S13. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients with PCR or antigen test only, by race/ethnicity (n=94,584 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.015	(0.676,1.523)	0.943	1.002	(0.958,1.049)	0.925	0.955	(0.914,0.997)	0.037
Systematic conditions - Composite	1.024	(0.595,1.760)	0.932	1.019	(0.866,1.199)	0.818	0.94	(0.803,1.099)	0.437
Syndromic conditions - Composite	1.018	(0.678,1.529)	0.93	1	(0.955,1.047)	0.995	0.95	(0.909,0.993)	0.023
Arrhythmias - Cardiac	1.282	(0.661, 2.484)	0.462	1.177	(0.929,1.493)	0.178	0.975	(0.772,1.230)	0.828
Cardiovascular signs and symptoms - Cardiac	1.021	(0.551,1.893)	0.947	1.06	(0.839,1.338)	0.627	0.942	(0.757, 1.172)	0.593
Chest pain - Cardiac	1.356	(0.632, 2.909)	0.434	0.938	(0.733,1.202)	0.615	0.793	(0.628,1.001)	0.051
Heart disease - Cardiac	1.284	(0.472, 3.496)	0.624	0.772	(0.502, 1.187)	0.238	0.853	(0.591,1.231)	0.395
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	1.004	(0.602, 1.672)	0.989	0.981	(0.854,1.128)	0.79	0.957	(0.832,1.101)	0.539
Thrombophlebitis and thromboembolism - Hematological	0.73	(0.093, 5.755)	0.765	0.906	(0.369, 2.222)	0.829	0.879	(0.391, 1.976)	0.754
Abnormal liver enzyme - Hepatic	2.677	(0.656,10.923)	0.17	1.259	(0.821,1.931)	0.291	1.151	(0.650, 2.037)	0.629
Musculoskeletal pain - Muscular	0.934	(0.573,1.521)	0.783	0.912	(0.801, 1.037)	0.16	0.975	(0.863,1.101)	0.683
Myositis - Muscular	NA	NA	NA	NA	NA	NA	2.634	(0.221, 31.442)	0.444
Changes in the taste and smell - Neurological	0.912	(0.107, 7.802)	0.933	1.629	(0.707, 3.751)	0.252	0.838	(0.393,1.786)	0.647
Cognitive functions - Neurological	0.786	(0.410,1.508)	0.469	1.003	(0.774,1.301)	0.98	1.104	(0.851,1.433)	0.455
Headache Neurological	0.859	(0.487, 1.513)	0.598	0.946	(0.804,1.115)	0.509	0.916	(0.791, 1.061)	0.242
Mental health - Neurological	0.936	(0.607, 1.443)	0.766	0.98	(0.904,1.063)	0.623	0.921	(0.852,0.997)	0.041
POTS/dysautonomia - Neurological	1.722	(0.747, 3.967)	0.202	1.022	(0.769,1.359)	0.879	0.892	(0.676,1.177)	0.418
Fatigue and malaise - Other	1.182	(0.661, 2.112)	0.573	0.985	(0.806,1.203)	0.879	0.934	(0.768,1.135)	0.49
Fever and chills - Other	1.002	(0.642,1.563)	0.994	0.981	(0.882,1.090)	0.72	1.069	(0.959, 1.192)	0.228
Generalized pain - Other	0.673	(0.359,1.261)	0.216	0.947	(0.749, 1.197)	0.648	0.923	(0.742, 1.149)	0.473
Hair loss - Other	2.059	(0.647, 6.547)	0.221	1.198	(0.688,2.085)	0.524	0.767	(0.422,1.395)	0.385
Acute kidney injury - Renal	1.19	(0.313,4.526)	0.799	0.979	(0.495,1.935)	0.95	1.432	(0.702, 2.921)	0.324
Fluid and electrolyte - Renal	0.683	(0.231,2.013)	0.489	0.684	(0.456,1.026)	0.066	0.843	(0.570,1.247)	0.393
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	4.866	(0.146,162.129)	0.376	NA	NA	NA
Respiratory signs and symptoms - Respiratory	1.126	(0.736,1.724)	0.584	1.019	(0.942,1.102)	0.642	0.965	(0.897, 1.038)	0.343
Skin symptoms - Skin	0.867	(0.542, 1.385)	0.55	1.004	(0.876,1.150)	0.956	0.891	(0.783,1.015)	0.082

Section S8 Supplemental Results: sensitivity analysis excluding patients in the first wave of the pandemic (March to May 2020)

We conducted analyses excluding patients whose index dates fell within the first wave of the pandemic (March to May 2020) due to limited SARS-CoV-2 testing availability during this period. The results are shown in **Tables S14-15** for both severe and non-severe groups.

Table S14. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients not in the first wave of the pandemic, by race/ethnicity (n=16,424 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.284	(1.068,1.544)	0.008	1	(0.916,1.093)	0.994	0.923	(0.840, 1.013)	0.091
Systematic conditions - Composite	1.221	(0.870, 1.715)	0.249	0.951	(0.804,1.124)	0.556	0.907	(0.762, 1.079)	0.271
Syndromic conditions - Composite	1.242	(1.026,1.502)	0.026	1.029	(0.939,1.128)	0.54	0.945	(0.858,1.041)	0.253
Arrhythmias - Cardiac	1.352	(0.853,2.142)	0.199	1.102	(0.865,1.403)	0.433	0.834	(0.644,1.078)	0.166
Cardiovascular signs and symptoms - Cardiac	1.248	(0.560, 2.781)	0.588	0.903	(0.586,1.390)	0.642	1.073	(0.720, 1.601)	0.728
Chest pain - Cardiac	1.041	(0.452, 2.396)	0.925	0.992	(0.633,1.555)	0.971	1.314	(0.836,2.066)	0.237
Heart disease - Cardiac	1.39	(0.764, 2.529)	0.281	0.916	(0.671, 1.252)	0.583	0.985	(0.702, 1.383)	0.93
Myocarditis - Cardiac	0.318	(0.013, 7.602)	0.479	0.763	(0.085,6.847)	0.809	0.104	(0.008,1.312)	0.08
Abdominal pain - Gastrointestinal	1.342	(0.751, 2.400)	0.321	0.997	(0.773,1.287)	0.984	0.977	(0.733,1.303)	0.874
Thrombophlebitis and thromboembolism - Hematological	1.186	(0.418,3.364)	0.749	0.799	(0.475,1.342)	0.396	1.161	(0.698,1.931)	0.566
Abnormal liver enzyme - Hepatic	1.51	(0.667, 3.420)	0.323	1.094	(0.688,1.740)	0.705	1.517	(0.881,2.611)	0.133
Musculoskeletal pain - Muscular	1.066	(0.626,1.816)	0.813	1	(0.774,1.291)	0.998	0.935	(0.702, 1.245)	0.645
Myositis - Muscular	NA	NA	NA	NA	NA	NA	8.226	(0.694, 97.520)	0.095
Changes in the taste and smell - Neurological	NA	NA	NA	0.654	(0.039, 11.067)	0.768	NA	NA	NA
Cognitive functions - Neurological	1.243	(0.434,3.562)	0.685	1.29	(0.776,2.144)	0.326	1.031	(0.582, 1.825)	0.917
Headache Neurological	1.398	(0.674, 2.899)	0.368	0.93	(0.684, 1.266)	0.646	0.741	(0.539, 1.018)	0.065
Mental health - Neurological	1.253	(0.875,1.796)	0.219	1.047	(0.890, 1.232)	0.582	0.997	(0.840, 1.184)	0.975
POTS/dysautonomia - Neurological	2.025	(0.579, 7.078)	0.269	0.947	(0.608, 1.475)	0.809	0.761	(0.479,1.208)	0.247
Fatigue and malaise - Other	1.001	(0.556,1.800)	0.998	1.062	(0.802, 1.407)	0.674	0.955	(0.704, 1.294)	0.765
Fever and chills - Other	1.431	(1.022,2.004)	0.037	1.027	(0.858,1.230)	0.768	0.899	(0.738,1.096)	0.291
Generalized pain - Other	0.669	(0.267, 1.677)	0.392	0.862	(0.567, 1.310)	0.487	0.986	(0.638,1.523)	0.948
Hair loss - Other	1.347	(0.287,6.318)	0.705	2.697	(1.051, 6.919)	0.039	0.607	(0.208,1.771)	0.36
Acute kidney injury - Renal	1.184	(0.458,3.063)	0.727	1.227	(0.788,1.909)	0.365	0.989	(0.643, 1.522)	0.96
Fluid and electrolyte - Renal	1.076	(0.610, 1.900)	0.8	1.087	(0.828,1.427)	0.547	1.02	(0.778,1.339)	0.884
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	2.277	(0.458, 11.322)	0.315	0.588	(0.108, 3.208)	0.539
Respiratory signs and symptoms - Respiratory	1.203	(0.902, 1.606)	0.209	1.132	(0.989, 1.297)	0.072	0.876	(0.761, 1.009)	0.066
Skin symptoms - Skin	1.574	(1.007, 2.459)	0.046	1.215	(0.953, 1.550)	0.116	0.81	(0.629, 1.043)	0.102

Table S15. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients not in the first wave of the pandemic, by race/ethnicity (n=204,938 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.067	(1.004, 1.133)	0.037	1.001	(0.971, 1.031)	0.949	0.988	(0.861, 1.133)	0.859
Systematic conditions - Composite	1.066	(0.846, 1.343)	0.587	0.952	(0.863, 1.052)	0.334	0.971	(0.818, 1.151)	0.732
Syndromic conditions - Composite	1.065	(1.001, 1.132)	0.045	0.998	(0.968, 1.028)	0.886	0.986	(0.860, 1.131)	0.841
Arrhythmias - Cardiac	0.841	(0.606, 1.168)	0.302	0.953	(0.826, 1.099)	0.508	1.001	(0.816, 1.229)	0.992
Cardiovascular signs and symptoms - Cardiac	1.04	(0.767, 1.410)	0.8	1.016	(0.872, 1.182)	0.842	0.942	(0.771, 1.151)	0.558
Chest pain - Cardiac	1.294	(0.869, 1.925)	0.204	1.022	(0.873, 1.196)	0.784	0.89	(0.725, 1.093)	0.267
Heart disease - Cardiac	1.466	(0.810, 2.652)	0.206	0.882	(0.694, 1.122)	0.308	0.925	(0.695, 1.232)	0.595
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	0.391	(0.029, 5.250)	0.478
Abdominal pain - Gastrointestinal	0.964	(0.786, 1.183)	0.726	1.03	(0.940, 1.128)	0.526	0.984	(0.833, 1.162)	0.849
Thrombophlebitis and thromboembolism - Hematological	0.631	(0.155, 2.564)	0.519	1.045	(0.599, 1.821)	0.877	1.199	(0.684, 2.101)	0.526
Abnormal liver enzyme - Hepatic	0.785	(0.399, 1.545)	0.483	1.221	(0.936, 1.592)	0.14	1.064	(0.698, 1.622)	0.773
Musculoskeletal pain - Muscular	1.167	(0.965, 1.412)	0.112	0.951	(0.873, 1.036)	0.247	0.981	(0.837, 1.150)	0.814
Myositis - Muscular	NA	NA	NA	1.396	(0.379, 5.138)	0.616	1.596	(0.458, 5.563)	0.463
Changes in the taste and smell - Neurological	0.931	(0.290, 2.982)	0.904	1.14	(0.693, 1.874)	0.606	0.91	(0.536, 1.547)	0.729
Cognitive functions - Neurological	1.023	(0.731, 1.429)	0.896	1.049	(0.884, 1.245)	0.582	1.232	(0.981, 1.547)	0.072
Headache - Neurological	0.919	(0.722, 1.170)	0.495	0.913	(0.822, 1.014)	0.091	0.928	(0.785, 1.097)	0.381
Mental health - Neurological	0.973	(0.868, 1.091)	0.641	0.979	(0.928, 1.033)	0.436	0.96	(0.830, 1.109)	0.577
POTS/dysautonomia - Neurological	1.48	(0.964, 2.271)	0.073	0.97	(0.819, 1.149)	0.721	0.894	(0.709, 1.127)	0.344
Fatigue and malaise - Other	1.157	(0.874, 1.532)	0.308	0.961	(0.842, 1.098)	0.559	0.958	(0.789, 1.162)	0.662
Fever and chills - Other	1.034	(0.905, 1.181)	0.622	1.005	(0.937, 1.078)	0.887	1.077	(0.923, 1.256)	0.347
Generalized pain - Other	0.891	(0.647, 1.227)	0.479	0.945	(0.812, 1.100)	0.469	0.908	(0.740, 1.113)	0.352
Hair loss - Other	1.078	(0.559, 2.079)	0.822	1.1	(0.771, 1.571)	0.599	0.796	(0.523, 1.213)	0.289
Acute kidney injury - Renal	1.31	(0.577, 2.974)	0.518	1.147	(0.747, 1.759)	0.531	1.231	(0.788, 1.924)	0.362
Fluid and electrolyte - Renal	1.204	(0.680, 2.131)	0.525	1.001	(0.783, 1.279)	0.997	1.057	(0.794, 1.408)	0.704
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	3.532	(0.652, 19.125)	0.143	6.028	(0.723, 50.282)	0.097
Respiratory signs and symptoms - Respiratory	1.127	(1.018, 1.247)	0.021	1.031	(0.980, 1.085)	0.235	1.025	(0.888, 1.182)	0.738
Skin symptoms - Skin	1.135	(0.964, 1.338)	0.129	0.986	(0.902, 1.078)	0.755	0.947	(0.806, 1.112)	0.505

Section S9 Supplemental Results: stratified analysis by age group

We conducted subgroup analyses stratified by age group (0-4 years, 5 to 11 years, and 12 to 20 years). The results are shown in **Tables S16-21** for both severe and non-severe groups.

A. 0-4 years

Table S16. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients aged <5, by race/ethnicity (n=8,315 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.139	(0.849,1.527)	0.386	1.022	(0.900,1.160)	0.737	0.884	(0.779,1.004)	0.058
Systematic conditions - Composite	0.8	(0.418,1.533)	0.502	1.011	(0.781, 1.309)	0.934	0.871	(0.671,1.130)	0.298
Syndromic conditions - Composite	1.1	(0.814,1.486)	0.535	1.048	(0.920,1.194)	0.482	0.903	(0.792, 1.029)	0.127
Arrhythmias - Cardiac	0.828	(0.367, 1.870)	0.65	1.068	(0.741,1.539)	0.726	0.821	(0.562,1.198)	0.306
Cardiovascular signs and symptoms - Cardiac	0.632	(0.194,2.062)	0.447	0.871	(0.498,1.525)	0.629	0.84	(0.501, 1.410)	0.51
Chest pain - Cardiac	NA	NA	NA	1.285	(0.167, 9.884)	0.809	1.348	(0.110, 16.503)	0.815
Heart disease - Cardiac	1.055	(0.372, 2.988)	0.92	1.093	(0.711,1.678)	0.686	0.907	(0.571, 1.441)	0.68
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	0.844	(0.203,3.510)	0.816	0.736	(0.412,1.315)	0.3	0.686	(0.346,1.360)	0.281
Thrombophlebitis and thromboembolism - Hematological	0.096	(0.006,1.437)	0.09	0.822	(0.380,1.778)	0.619	1.364	(0.618,3.010)	0.443
Abnormal liver enzyme - Hepatic	1.689	(0.337,8.462)	0.524	0.749	(0.335,1.675)	0.482	1.883	(0.863,4.107)	0.112
Musculoskeletal pain - Muscular	1.994	(0.493, 8.059)	0.333	0.717	(0.375,1.371)	0.314	1.055	(0.502, 2.214)	0.888
Myositis - Muscular	NA	NA	NA	NA	NA	NA	NA	NA	NA
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	0.965	(0.223, 4.173)	0.962	1.198	(0.656,2.186)	0.556	1.038	(0.551,1.954)	0.908
Headache Neurological	1.206	(0.058,25.121)	0.904	1.542	(0.363,6.562)	0.558	0.084	(0.008,0.859)	0.037
Mental health - Neurological	0.944	(0.485,1.838)	0.865	0.959	(0.717, 1.281)	0.775	1.038	(0.771, 1.397)	0.808
POTS/dysautonomia - Neurological	NA	NA	NA	0.757	(0.215,2.666)	0.665	0.843	(0.237, 2.998)	0.791
Fatigue and malaise - Other	1.206	(0.368,3.958)	0.757	0.953	(0.599, 1.516)	0.838	0.803	(0.495,1.301)	0.373
Fever and chills - Other	1.134	(0.705,1.825)	0.604	1.116	(0.899,1.384)	0.32	0.905	(0.724,1.132)	0.381
Generalized pain - Other	NA	NA	NA	1.127	(0.414,3.065)	0.815	0.607	(0.209,1.757)	0.357
Hair loss - Other	NA	NA	NA	1.414	(0.252, 7.932)	0.694	0.333	(0.041, 2.709)	0.304
Acute kidney injury - Renal	0.804	(0.057, 11.420)	0.872	1.749	(0.778,3.934)	0.176	1.222	(0.586,2.545)	0.593
Fluid and electrolyte - Renal	0.832	(0.300,2.310)	0.724	1.046	(0.707, 1.549)	0.821	1.005	(0.686,1.473)	0.978
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	1.157	(0.158,8.481)	0.886	0.096	(0.007, 1.264)	0.075
Respiratory signs and symptoms - Respiratory	0.979	(0.648,1.480)	0.919	1.11	(0.936,1.315)	0.23	0.857	(0.722,1.016)	0.076
Skin symptoms - Skin	2.197	(1.088,4.435)	0.028	1.401	(0.992,1.979)	0.056	0.867	(0.624,1.204)	0.393

Table S17. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients aged <5, by race/ethnicity

(n=67,319 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.006	(0.914,1.107)	0.908	1.023	(0.973,1.076)	0.379	1.023	(0.973, 1.076)	0.373
Systematic conditions - Composite	1.08	(0.696, 1.675)	0.732	0.953	(0.781,1.162)	0.633	1.037	(0.842, 1.275)	0.735
Syndromic conditions - Composite	1.004	(0.912,1.106)	0.936	1.019	(0.968,1.072)	0.468	1.023	(0.972, 1.077)	0.384
Arrhythmias - Cardiac	0.852	(0.471, 1.540)	0.596	0.925	(0.704,1.214)	0.573	1.066	(0.792, 1.434)	0.674
Cardiovascular signs and symptoms - Cardiac	1.272	(0.796,2.032)	0.315	1.1	(0.871, 1.389)	0.424	0.862	(0.685,1.086)	0.208
Chest pain - Cardiac	1.984	(0.407,9.667)	0.396	1.493	(0.636,3.505)	0.357	2.279	(0.868,5.982)	0.094
Heart disease - Cardiac	1.169	(0.469,2.914)	0.737	0.979	(0.669, 1.432)	0.911	1.106	(0.738,1.658)	0.624
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	1.097	(0.698,1.725)	0.687	0.999	(0.788,1.267)	0.992	0.945	(0.720,1.240)	0.682
Thrombophlebitis and thromboembolism - Hematological	1.389	(0.069, 27.897)	0.83	1.153	(0.407, 3.265)	0.789	1.014	(0.415, 2.479)	0.976
Abnormal liver enzyme - Hepatic	0.812	(0.159,4.139)	0.802	1.849	(0.966,3.540)	0.064	1.073	(0.525,2.191)	0.847
Musculoskeletal pain - Muscular	0.924	(0.530, 1.612)	0.781	0.92	(0.691, 1.225)	0.57	0.655	(0.483,0.889)	0.007
Myositis - Muscular	NA	NA	NA	NA	NA	NA	0.683	(0.025,18.491)	0.821
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	0.853	(0.565,1.287)	0.448	1.029	(0.835,1.269)	0.786	1.142	(0.913,1.429)	0.246
Headache Neurological	0.445	(0.137, 1.445)	0.178	0.581	(0.342,0.987)	0.045	0.961	(0.542, 1.706)	0.893
Mental health - Neurological	0.891	(0.713, 1.114)	0.312	0.954	(0.846,1.075)	0.437	1.026	(0.909, 1.158)	0.675
POTS/dysautonomia - Neurological	2.976	(0.437, 20.273)	0.265	1.027	(0.463, 2.279)	0.948	0.937	(0.409, 2.143)	0.877
Fatigue and malaise - Other	1.28	(0.719,2.280)	0.402	0.829	(0.625,1.099)	0.192	0.947	(0.703,1.275)	0.718
Fever and chills - Other	1.029	(0.879, 1.206)	0.72	1.058	(0.972,1.151)	0.192	1.121	(1.024,1.227)	0.014
Generalized pain - Other	1.003	(0.257,3.907)	0.997	1.354	(0.705,2.599)	0.363	0.628	(0.310,1.273)	0.197
Hair loss - Other	3.175	(0.535,18.827)	0.203	1.446	(0.540,3.872)	0.463	2.009	(0.824,4.897)	0.125
Acute kidney injury - Renal	1.01	(0.230, 4.430)	0.989	1.034	(0.480, 2.229)	0.932	1.453	(0.695,3.041)	0.321
Fluid and electrolyte - Renal	1.613	(0.686,3.792)	0.273	1.045	(0.726,1.506)	0.811	1.078	(0.757, 1.534)	0.679
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	0.827	(0.090,7.616)	0.867	0.683	(0.062, 7.528)	0.755
Respiratory signs and symptoms - Respiratory	1.103	(0.960,1.267)	0.166	1.077	(1.003,1.157)	0.041	1.074	(1.002,1.151)	0.043
Skin symptoms - Skin	0.871	(0.688,1.104)	0.253	0.937	(0.822,1.069)	0.335	0.967	(0.849,1.103)	0.621

B. 5 to 11 years

Table S18. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients aged 5 to 11, by race/ethnicity (n=3,367 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	0.456	(0.298,0.698)	2.986e-4	1.093	(0.900, 1.326)	0.371	0.957	(0.769,1.192)	0.695
Systematic conditions - Composite	0.629	(0.277, 1.427)	0.267	1.124	(0.785,1.610)	0.523	1.147	(0.758,1.736)	0.516
Syndromic conditions - Composite	0.438	(0.283,0.678)	2.113e-4	1.101	(0.901, 1.345)	0.345	0.991	(0.790, 1.242)	0.936
Arrhythmias - Cardiac	0.344	(0.105,1.122)	0.077	0.971	(0.583,1.616)	0.909	1.02	(0.551,1.887)	0.95
Cardiovascular signs and symptoms - Cardiac	0.19	(0.020, 1.855)	0.153	0.479	(0.174,1.320)	0.155	1.036	(0.373, 2.876)	0.946
Chest pain - Cardiac	0.102	(0.012,0.893)	0.039	0.853	(0.272, 2.679)	0.786	0.888	(0.343, 2.301)	0.808
Heart disease - Cardiac	0.457	(0.101, 2.062)	0.308	1.039	(0.483,2.238)	0.922	1.007	(0.442, 2.298)	0.986
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	0.373	(0.132, 1.053)	0.062	1.14	(0.707, 1.839)	0.591	1.086	(0.623, 1.894)	0.771
Thrombophlebitis and thromboembolism - Hematological	0.519	(0.039,6.974)	0.621	0.896	(0.245,3.284)	0.869	0.763	(0.247, 2.355)	0.639
Abnormal liver enzyme - Hepatic	2.14	(0.439, 10.428)	0.346	0.647	(0.278,1.504)	0.311	1.263	(0.405,3.936)	0.688
Musculoskeletal pain - Muscular	0.192	(0.063,0.582)	0.004	1.362	(0.814, 2.278)	0.239	0.954	(0.525,1.734)	0.878
Myositis - Muscular	NA	NA	NA	NA	NA	NA	NA	NA	NA
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	NA	NA	NA	1.468	(0.472,4.570)	0.508	1.534	(0.309,7.612)	0.6
Headache Neurological	0.567	(0.141, 2.285)	0.425	1.241	(0.691, 2.230)	0.47	0.912	(0.464,1.792)	0.789
Mental health - Neurological	0.36	(0.168,0.774)	0.009	1.169	(0.845,1.617)	0.345	0.998	(0.691, 1.443)	0.993
POTS/dysautonomia - Neurological	NA	NA	NA	0.735	(0.257, 2.106)	0.567	0.967	(0.263,3.557)	0.96
Fatigue and malaise - Other	0.191	(0.057,0.642)	0.007	1.471	(0.846,2.557)	0.171	1.202	(0.608,2.376)	0.597
Fever and chills - Other	0.634	(0.261, 1.542)	0.315	1.09	(0.719,1.651)	0.686	0.889	(0.560,1.410)	0.616
Generalized pain - Other	0.51	(0.109,2.387)	0.392	1.048	(0.445, 2.466)	0.915	0.971	(0.385,2.450)	0.951
Hair loss - Other	NA	NA	NA	3.368	(0.498,22.797)	0.213	0.725	(0.051, 10.243)	0.812
Acute kidney injury - Renal	0.595	(0.111,3.193)	0.544	1.769	(0.768,4.074)	0.18	0.67	(0.260,1.723)	0.406
Fluid and electrolyte - Renal	0.539	(0.127, 2.282)	0.401	0.982	(0.565,1.707)	0.948	0.854	(0.471, 1.550)	0.605
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	5.613	(0.307, 102.675)	0.245	NA	NA	NA
Respiratory signs and symptoms - Respiratory	0.541	(0.260,1.125)	0.1	1.098	(0.807, 1.494)	0.552	0.842	(0.599, 1.183)	0.321
Skin symptoms - Skin	0.547	(0.170,1.757)	0.311	0.688	(0.412, 1.149)	0.153	0.79	(0.422, 1.478)	0.461

Table S19. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients aged 5 to 11, by race/ethnicity (n=60,934 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.048	(0.935,1.175)	0.416	1.044	(0.987, 1.105)	0.136	1.081	(1.020, 1.145)	0.009
Systematic conditions - Composite	0.77	(0.478,1.239)	0.281	1.054	(0.851, 1.307)	0.629	1.06	(0.839,1.340)	0.625
Syndromic conditions - Composite	1.067	(0.951, 1.198)	0.269	1.044	(0.986,1.106)	0.142	1.08	(1.019, 1.145)	0.01
Arrhythmias - Cardiac	0.781	(0.388,1.570)	0.488	1.052	(0.773,1.432)	0.747	1.12	(0.800, 1.569)	0.51
Cardiovascular signs and symptoms - Cardiac	1.044	(0.598,1.821)	0.88	0.923	(0.681,1.251)	0.607	1.088	(0.793,1.494)	0.601

Chest pain - Cardiac	2.181	(1.089,4.370)	0.028	0.956	(0.711, 1.285)	0.765	0.958	(0.710,1.293)	0.778
Heart disease - Cardiac	1.201	(0.378,3.816)	0.756	1.312	(0.780, 2.205)	0.306	1.197	(0.687, 2.085)	0.525
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	1.058	(0.763,1.467)	0.735	1.124	(0.961,1.314)	0.143	1.073	(0.905,1.272)	0.418
Thrombophlebitis and thromboembolism - Hematological	NA	NA	NA	0.987	(0.309, 3.157)	0.983	1.052	(0.342, 3.239)	0.93
Abnormal liver enzyme - Hepatic	0.658	(0.106,4.090)	0.654	1.163	(0.696,1.944)	0.564	1.12	(0.553, 2.269)	0.752
Musculoskeletal pain - Muscular	1.025	(0.721, 1.459)	0.889	0.974	(0.825,1.149)	0.752	0.981	(0.824,1.169)	0.833
Myositis - Muscular	NA	NA	NA	0.766	(0.095,6.168)	0.802	NA	NA	NA
Changes in the taste and smell - Neurological	0.891	(0.054, 14.584)	0.936	0.957	(0.252, 3.630)	0.949	1.532	(0.439, 5.347)	0.504
Cognitive functions - Neurological	0.792	(0.388,1.615)	0.521	1.111	(0.767, 1.610)	0.577	1.273	(0.867, 1.868)	0.218
Headache Neurological	0.97	(0.628,1.498)	0.892	1.021	(0.845,1.233)	0.83	1.004	(0.841, 1.199)	0.966
Mental health - Neurological	0.886	(0.708,1.110)	0.293	1.058	(0.956,1.171)	0.273	1.044	(0.942,1.157)	0.41
POTS/dysautonomia - Neurological	1.01	(0.419, 2.438)	0.982	0.959	(0.645,1.425)	0.835	0.989	(0.626,1.560)	0.961
Fatigue and malaise - Other	1.173	(0.681, 2.021)	0.566	1.053	(0.806,1.374)	0.706	1	(0.752, 1.328)	0.999
Fever and chills - Other	1.088	(0.819,1.446)	0.559	0.882	(0.762,1.020)	0.091	1.133	(0.961,1.336)	0.137
Generalized pain - Other	1.987	(0.971, 4.066)	0.06	1.066	(0.760, 1.497)	0.71	0.88	(0.637, 1.216)	0.439
Hair loss - Other	1.506	(0.456,4.976)	0.502	1.185	(0.547, 2.567)	0.666	0.87	(0.376,2.009)	0.744
Acute kidney injury - Renal	1.426	(0.246,8.283)	0.692	1.341	(0.502,3.584)	0.559	1.337	(0.537, 3.333)	0.533
Fluid and electrolyte - Renal	0.554	(0.171, 1.797)	0.326	0.984	(0.586,1.654)	0.953	1.049	(0.607, 1.810)	0.865
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	NA	NA	NA	NA	NA	NA
Respiratory signs and symptoms - Respiratory	1.187	(0.984,1.433)	0.073	1.067	(0.969,1.174)	0.186	1.116	(1.012,1.230)	0.028
Skin symptoms - Skin	1.11	(0.796,1.550)	0.538	1.053	(0.878,1.263)	0.579	1.165	(0.969,1.400)	0.104

C. 12 to 20 years

Table S20. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients aged 12 to 20, by race/ethnicity (n=5,180 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.113	(0.770, 1.609)	0.569	0.832	(0.708,0.978)	0.026	1.145	(0.794,1.651)	0.469
Systematic conditions - Composite	0.991	(0.560, 1.752)	0.974	0.707	(0.538,0.928)	0.013	1.079	(0.710, 1.641)	0.721
Syndromic conditions - Composite	1.12	(0.758,1.656)	0.57	0.849	(0.717,1.005)	0.056	1.159	(0.801, 1.675)	0.433
Arrhythmias - Cardiac	1.349	(0.600,3.030)	0.469	0.902	(0.601, 1.353)	0.618	1.15	(0.693,1.909)	0.588
Cardiovascular signs and symptoms - Cardiac	1.049	(0.196,5.619)	0.955	1.09	(0.433, 2.745)	0.854	1.344	(0.622,2.903)	0.453
Chest pain - Cardiac	1.417	(0.482,4.163)	0.526	0.772	(0.455,1.310)	0.337	1.748	(0.988,3.094)	0.055
Heart disease - Cardiac	1.226	(0.401, 3.746)	0.721	0.765	(0.441, 1.328)	0.341	1.162	(0.623,2.166)	0.637
Myocarditis - Cardiac	NA	NA	NA	0.221	(0.017, 2.954)	0.254	NA	NA	NA
Abdominal pain - Gastrointestinal	1.989	(0.767, 5.157)	0.157	0.992	(0.700,1.407)	0.965	1.217	(0.754,1.964)	0.422
Thrombophlebitis and thromboembolism - Hematological	2.319	(0.406,13.249)	0.344	0.839	(0.368,1.911)	0.676	2.024	(0.896,4.570)	0.09

Abnormal liver enzyme - Hepatic	0.294	(0.044, 1.970)	0.207	0.829	(0.386,1.780)	0.63	1.665	(0.700, 3.959)	0.249
Musculoskeletal pain - Muscular	0.937	(0.416,2.107)	0.874	0.843	(0.601,1.183)	0.324	1.213	(0.770,1.910)	0.406
Myositis - Muscular	NA	NA	NA	NA	NA	NA	2.316	(0.127,42.244)	0.571
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	0.699	(0.026,18.945)	0.832	1.286	(0.245,6.751)	0.766	5.159	(0.506,52.647)	0.166
Headache Neurological	1.117	(0.408,3.061)	0.829	0.74	(0.505,1.085)	0.123	0.903	(0.559, 1.459)	0.677
Mental health - Neurological	1.153	(0.626,2.123)	0.648	0.931	(0.726,1.194)	0.573	1.154	(0.772, 1.727)	0.485
POTS/dysautonomia - Neurological	1.224	(0.270,5.544)	0.793	0.667	(0.386,1.154)	0.148	1.027	(0.548,1.924)	0.934
Fatigue and malaise - Other	1.208	(0.443,3.293)	0.712	0.836	(0.523,1.335)	0.453	0.854	(0.488, 1.494)	0.581
Fever and chills - Other	1.08	(0.438,2.662)	0.867	0.661	(0.402, 1.086)	0.102	1.159	(0.653, 2.057)	0.614
Generalized pain - Other	0.647	(0.169,2.481)	0.526	0.764	(0.445,1.311)	0.328	1.248	(0.717, 2.174)	0.434
Hair loss - Other	0.799	(0.115,5.542)	0.821	3.458	(0.805,14.856)	0.095	0.6	(0.127, 2.836)	0.519
Acute kidney injury - Renal	1.049	(0.204,5.407)	0.954	0.916	(0.464,1.810)	0.802	1.024	(0.513,2.045)	0.946
Fluid and electrolyte - Renal	1.075	(0.392,2.954)	0.888	0.909	(0.561, 1.473)	0.699	1.288	(0.733, 2.263)	0.378
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	8.84	(0.353, 221.375)	0.185	NA	NA	NA
Respiratory signs and symptoms - Respiratory	1.426	(0.704, 2.889)	0.325	1.154	(0.845,1.577)	0.368	1.157	(0.740,1.807)	0.523
Skin symptoms - Skin	0.722	(0.305,1.707)	0.458	0.835	(0.531, 1.314)	0.436	0.877	(0.510,1.510)	0.637

Table S21. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients aged 12 to 20, by race/ethnicity (n=80,608 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.154	(1.036,1.284)	0.009	1.069	(1.018,1.123)	0.007	0.935	(0.890,0.982)	0.007
Systematic conditions - Composite	1.408	(1.003, 1.976)	0.048	1.092	(0.955,1.249)	0.2	0.897	(0.780,1.032)	0.13
Syndromic conditions - Composite	1.137	(1.020,1.268)	0.021	1.065	(1.013,1.120)	0.013	0.931	(0.885,0.978)	0.005
Arrhythmias - Cardiac	1.239	(0.755,2.034)	0.396	1.075	(0.880,1.313)	0.479	0.896	(0.727, 1.104)	0.303
Cardiovascular signs and symptoms - Cardiac	0.77	(0.427, 1.391)	0.387	1.237	(0.943,1.624)	0.125	0.936	(0.726,1.205)	0.606
Chest pain - Cardiac	1.137	(0.681,1.898)	0.624	0.987	(0.815,1.195)	0.891	0.889	(0.739,1.070)	0.212
Heart disease - Cardiac	1.749	(0.665,4.606)	0.257	0.875	(0.597, 1.283)	0.495	0.682	(0.467, 0.995)	0.047
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	1.099	(0.137, 8.784)	0.929
Abdominal pain - Gastrointestinal	1.094	(0.793,1.510)	0.583	1.062	(0.935,1.205)	0.357	0.961	(0.841,1.098)	0.56
Thrombophlebitis and thromboembolism - Hematological	0.653	(0.109, 3.925)	0.642	1.01	(0.470, 2.174)	0.979	1.446	(0.670,3.121)	0.347
Abnormal liver enzyme - Hepatic	1.158	(0.464, 2.890)	0.754	1.297	(0.896,1.875)	0.168	1.119	(0.657, 1.908)	0.678
Musculoskeletal pain - Muscular	1.164	(0.908,1.492)	0.231	1.049	(0.942,1.168)	0.385	1.006	(0.907, 1.115)	0.911
Myositis - Muscular	NA	NA	NA	3.739	(0.505, 27.664)	0.197	4.395	(0.557, 34.687)	0.16
Changes in the taste and smell - Neurological	1.232	(0.327, 4.637)	0.758	1.44	(0.807, 2.570)	0.217	0.81	(0.453,1.447)	0.476
Cognitive functions - Neurological	1.934	(0.742,5.040)	0.177	1.474	(0.897, 2.421)	0.126	1.583	(0.910, 2.755)	0.104
Headache Neurological	0.864	(0.638,1.170)	0.344	0.936	(0.820,1.068)	0.327	0.89	(0.785,1.009)	0.068

- Muscular									
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	1.209	(0.096,15.176)	0.883	1.424	(0.394,5.144)	0.589	1.805	(0.347, 9.395)	0.483
Headache Neurological	1.991	(0.567,6.983)	0.282	1.096	(0.628,1.913)	0.746	0.787	(0.439, 1.412)	0.422
Mental health - Neurological	1.298	(0.646,2.608)	0.464	1.01	(0.729, 1.399)	0.952	0.989	(0.704,1.389)	0.948
POTS/dysautonomia - Neurological	0.879	(0.048,16.244)	0.931	0.564	(0.237, 1.339)	0.194	0.903	(0.388,2.102)	0.812
Fatigue and malaise - Other	0.846	(0.271, 2.644)	0.774	1.223	(0.687, 2.177)	0.493	0.689	(0.381,1.247)	0.219
Fever and chills - Other	1.544	(0.616,3.871)	0.354	0.827	(0.543,1.260)	0.377	0.773	(0.504,1.186)	0.239
Generalized pain - Other	0.161	(0.016,1.649)	0.124	0.957	(0.439, 2.089)	0.913	1.354	(0.618,2.966)	0.449
Hair loss - Other	0.483	(0.019, 12.106)	0.658	1.323	(0.302,5.788)	0.71	0.271	(0.020,3.664)	0.326
Acute kidney injury - Renal	1.209	(0.185,7.893)	0.843	0.946	(0.421, 2.123)	0.893	0.727	(0.300,1.761)	0.48
Fluid and electrolyte - Renal	0.846	(0.288,2.489)	0.761	0.755	(0.453,1.259)	0.282	1.116	(0.650,1.917)	0.691
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	NA	NA	NA	NA	NA	NA
Respiratory signs and symptoms - Respiratory	0.891	(0.428,1.854)	0.757	0.849	(0.619,1.165)	0.311	0.937	(0.673,1.303)	0.699
Skin symptoms - Skin	1.084	(0.389,3.017)	0.878	0.875	(0.532, 1.439)	0.598	0.879	(0.519,1.488)	0.631

Table S23. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients during the pre-Delta period, by race/ethnicity (n=63,234 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.074	(0.943,1.224)	0.283	0.908	(0.855,0.964)	0.002	0.954	(0.844,1.078)	0.446
Systematic conditions - Composite	1.101	(0.701, 1.728)	0.677	0.854	(0.710, 1.026)	0.092	0.926	(0.741, 1.156)	0.495
Syndromic conditions - Composite	1.082	(0.948,1.236)	0.243	0.907	(0.853,0.964)	0.002	0.948	(0.839,1.072)	0.397
Arrhythmias - Cardiac	1.149	(0.589, 2.243)	0.684	0.929	(0.711, 1.214)	0.588	0.938	(0.694,1.267)	0.676
Cardiovascular signs and symptoms - Cardiac	1.359	(0.685,2.698)	0.381	1.094	(0.812,1.473)	0.555	1.028	(0.756,1.398)	0.861
Chest pain - Cardiac	1.806	(0.819, 3.984)	0.143	0.835	(0.625,1.116)	0.223	0.89	(0.658,1.203)	0.448
Heart disease - Cardiac	1.104	(0.367, 3.325)	0.86	0.841	(0.559, 1.265)	0.406	0.833	(0.526,1.319)	0.436
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	1.411	(0.128,15.597)	0.779
Abdominal pain - Gastrointestinal	1.366	(0.874,2.134)	0.171	0.93	(0.778,1.112)	0.429	0.844	(0.679, 1.049)	0.126
Thrombophlebitis and thromboembolism - Hematological	0.396	(0.041, 3.808)	0.423	1.207	(0.399, 3.658)	0.739	0.814	(0.334, 1.986)	0.652
Abnormal liver enzyme - Hepatic	3.994	(0.736,21.666)	0.108	1.03	(0.653, 1.624)	0.899	0.937	(0.472,1.860)	0.853
Musculoskeletal pain - Muscular	1.188	(0.833,1.696)	0.342	0.861	(0.739, 1.003)	0.055	0.905	(0.751, 1.090)	0.292
Myositis - Muscular	NA	NA	NA	3.715	(0.232, 59.395)	0.353	15.052	(0.678,334.327)	0.087
Changes in the taste and smell - Neurological	1.509	(0.230, 9.903)	0.668	1.229	(0.534,2.832)	0.628	1.118	(0.460, 2.717)	0.806
Cognitive functions - Neurological	2.275	(1.056,4.903)	0.036	1.277	(0.880,1.854)	0.198	1.105	(0.743, 1.645)	0.622
Headache Neurological	0.888	(0.536,1.472)	0.646	0.799	(0.657,0.972)	0.025	0.919	(0.739, 1.144)	0.451
Mental health - Neurological	0.935	(0.744,1.175)	0.565	0.93	(0.839,1.031)	0.169	0.883	(0.761, 1.024)	0.099
POTS/dysautonomia - Neurological	1.393	(0.530,3.661)	0.502	0.782	(0.571, 1.071)	0.125	0.842	(0.584,1.215)	0.359
Fatigue and malaise - Other	1.395	(0.781, 2.492)	0.26	0.86	(0.677, 1.093)	0.217	1.019	(0.760, 1.366)	0.898
Fever and chills - Other	0.951	(0.671,1.348)	0.779	0.923	(0.782,1.089)	0.341	1.105	(0.890, 1.372)	0.366

Generalized pain - Other	0.959	(0.544,1.691)	0.884	0.887	(0.674, 1.167)	0.391	0.896	(0.667, 1.202)	0.463
Hair loss - Other	2.129	(0.730, 6.208)	0.167	1.397	(0.702,2.782)	0.341	1.272	(0.604, 2.682)	0.527
Acute kidney injury - Renal	0.65	(0.138,3.068)	0.586	1.296	(0.604, 2.779)	0.506	1.045	(0.438,2.493)	0.921
Fluid and electrolyte - Renal	1.881	(0.581,6.087)	0.292	1.089	(0.673,1.762)	0.73	1.102	(0.668,1.817)	0.703
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	NA	NA	NA	NA	NA	NA
Respiratory signs and symptoms - Respiratory	1.028	(0.784,1.346)	0.843	0.916	(0.815,1.030)	0.144	1.068	(0.912,1.252)	0.414
Skin symptoms - Skin	1.283	(0.926,1.778)	0.134	0.839	(0.703, 1.001)	0.051	0.898	(0.728,1.108)	0.314

B. Delta variant period

Table S24. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients during the Delta period, by race/ethnicity (n=2,489 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	2.107	(1.092, 4.063)	0.026	1.164	(0.906,1.494)	0.235	1.1	(0.880, 1.376)	0.402
Systematic conditions - Composite	0.82	(0.256,2.623)	0.738	1.297	(0.807, 2.085)	0.283	0.994	(0.648,1.524)	0.976
Syndromic conditions - Composite	2.044	(1.036,4.031)	0.039	1.14	(0.878,1.480)	0.324	1.131	(0.898,1.424)	0.297
Arrhythmias - Cardiac	0.295	(0.045,1.910)	0.2	1.628	(0.806,3.289)	0.174	0.833	(0.428,1.621)	0.591
Cardiovascular signs and symptoms - Cardiac	0.526	(0.026,10.503)	0.674	0.702	(0.194,2.541)	0.59	0.914	(0.348,2.406)	0.856
Chest pain - Cardiac	NA	NA	NA	1.87	(0.560,6.241)	0.309	1.094	(0.431, 2.779)	0.85
Heart disease - Cardiac	2.105	(0.235,18.831)	0.506	1.101	(0.433, 2.796)	0.84	1.666	(0.679, 4.088)	0.265
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	NA	NA	NA	1.3	(0.659, 2.566)	0.45	0.994	(0.485,2.035)	0.986
Thrombophlebitis and thromboembolism - Hematological	NA	NA	NA	1.28	(0.225,7.269)	0.781	1.368	(0.441, 4.250)	0.588
Abnormal liver enzyme - Hepatic	9.472	(0.350, 256.571)	0.182	1.981	(0.564,6.954)	0.286	2.205	(0.557, 8.726)	0.26
Musculoskeletal pain - Muscular	2.631	(0.396, 17.477)	0.317	0.939	(0.458,1.927)	0.865	0.828	(0.445,1.539)	0.55
Myositis - Muscular	NA	NA	NA	NA	NA	NA	NA	NA	NA
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	NA	NA	NA	1.792	(0.368,8.724)	0.47	1.632	(0.361, 7.382)	0.525
Headache Neurological	4.736	(0.415, 53.986)	0.21	1.263	(0.523,3.047)	0.604	1.03	(0.521, 2.035)	0.933
Mental health - Neurological	1.783	(0.600,5.296)	0.298	0.837	(0.523,1.341)	0.46	1.102	(0.747, 1.627)	0.625
POTS/dysautonomia - Neurological	NA	NA	NA	0.543	(0.173,1.707)	0.296	0.51	(0.171,1.518)	0.226
Fatigue and malaise - Other	1.133	(0.196,6.564)	0.889	1.171	(0.547, 2.509)	0.684	0.914	(0.461,1.813)	0.797
Fever and chills - Other	0.817	(0.179,3.732)	0.794	1.051	(0.602,1.835)	0.861	0.856	(0.525,1.395)	0.532
Generalized pain - Other	1.579	(0.079,31.514)	0.765	1.864	(0.539,6.450)	0.326	1.246	(0.468,3.321)	0.659
Hair loss - Other	NA	NA	NA	1.173	(0.073,18.754)	0.91	0.518	(0.034,7.812)	0.635
Acute kidney injury - Renal	1.353	(0.069,26.602)	0.842	1.323	(0.351,4.997)	0.679	0.909	(0.317, 2.603)	0.858
Fluid and electrolyte - Renal	1.015	(0.201, 5.124)	0.986	1.487	(0.647, 3.417)	0.35	0.939	(0.461,1.913)	0.863

Acute respiratory distress syndrome - Respiratory	NA	NA	NA	NA	NA	NA	NA	NA	NA
Respiratory signs and symptoms - Respiratory	1.661	(0.582,4.736)	0.343	1.315	(0.884,1.957)	0.177	1.111	(0.789,1.565)	0.547
Skin symptoms - Skin	3.279	(0.536,20.074)	0.199	1.456	(0.706,3.000)	0.309	0.89	(0.474,1.671)	0.716

Table S25. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients during the Delta period, by race/ethnicity (n=33,925 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	0.844	(0.699, 1.020)	0.08	0.965	(0.895,1.040)	0.35	0.803	(0.748,0.863)	2.124e-09
Systematic conditions - Composite	1.369	(0.526,3.564)	0.521	1.028	(0.779, 1.356)	0.847	0.833	(0.645,1.075)	0.16
Syndromic conditions - Composite	0.841	(0.695,1.019)	0.077	0.96	(0.890,1.035)	0.289	0.803	(0.747,0.863)	2.854e-09
Arrhythmias - Cardiac	1.344	(0.375,4.821)	0.65	0.984	(0.658,1.472)	0.937	0.748	(0.514,1.091)	0.132
Cardiovascular signs and symptoms - Cardiac	1.117	(0.440, 2.833)	0.816	0.818	(0.556,1.205)	0.31	0.832	(0.584,1.187)	0.31
Chest pain - Cardiac	2.8	(0.559, 14.027)	0.21	1.121	(0.762,1.649)	0.561	0.792	(0.553,1.133)	0.202
Heart disease - Cardiac	1.246	(0.074,21.094)	0.879	0.933	(0.459, 1.895)	0.847	0.887	(0.474,1.660)	0.708
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	0.702	(0.374,1.317)	0.27	1.087	(0.870,1.359)	0.463	0.908	(0.718,1.148)	0.421
Thrombophlebitis and thromboembolism - Hematological	NA	NA	NA	1.272	(0.185,8.736)	0.807	0.692	(0.184, 2.606)	0.587
Abnormal liver enzyme - Hepatic	1.385	(0.189,10.153)	0.749	1.448	(0.688,3.047)	0.33	1.237	(0.485,3.150)	0.656
Musculoskeletal pain - Muscular	0.724	(0.402, 1.305)	0.283	0.805	(0.651, 0.995)	0.045	0.68	(0.554,0.834)	2.161e-4
Myositis - Muscular	NA	NA	NA	NA	NA	NA	0.732	(0.040,13.399)	0.834
Changes in the taste and smell - Neurological	NA	NA	NA	1.366	(0.431,4.328)	0.596	2.06	(0.658,6.448)	0.214
Cognitive functions - Neurological	0.666	(0.238,1.865)	0.439	1.011	(0.667, 1.533)	0.958	1.254	(0.792,1.986)	0.334
Headache Neurological	1.151	(0.520, 2.549)	0.729	0.967	(0.747, 1.252)	0.798	0.789	(0.626,0.995)	0.046
Mental health - Neurological	0.862	(0.599, 1.239)	0.422	0.961	(0.844, 1.094)	0.547	0.859	(0.755,0.977)	0.021
POTS/dysautonomia - Neurological	NA	NA	NA	1.241	(0.773,1.994)	0.372	0.761	(0.475,1.217)	0.254
Fatigue and malaise - Other	0.982	(0.422, 2.283)	0.965	0.916	(0.633, 1.326)	0.643	0.866	(0.627, 1.196)	0.383
Fever and chills - Other	1.092	(0.697, 1.710)	0.7	0.958	(0.795,1.154)	0.649	0.707	(0.585,0.855)	3.490e-4
Generalized pain - Other	0.672	(0.261, 1.729)	0.409	0.866	(0.594, 1.263)	0.456	0.784	(0.547, 1.124)	0.186
Hair loss - Other	1.108	(0.244, 5.020)	0.894	1.107	(0.453, 2.705)	0.823	0.355	(0.136,0.926)	0.034
Acute kidney injury - Renal	0.208	(0.014,3.132)	0.256	1.723	(0.516,5.754)	0.377	1.177	(0.463, 2.995)	0.732
Fluid and electrolyte - Renal	2.215	(0.197,24.948)	0.52	1.158	(0.542, 2.474)	0.706	0.76	(0.416,1.389)	0.373
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	NA	NA	NA	NA	NA	NA
Respiratory signs and symptoms - Respiratory	0.768	(0.557, 1.060)	0.108	0.949	(0.832,1.082)	0.435	0.776	(0.687, 0.878)	5.141e-05
Skin symptoms - Skin	0.946	(0.545,1.642)	0.844	0.888	(0.701, 1.125)	0.326	0.713	(0.572,0.888)	0.003

C. Omicron variant period

Table S26. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients during the Omicron period, by race/ethnicity (n=9,355 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.155	(0.893, 1.493)	0.273	0.968	(0.863,1.087)	0.586	0.95	(0.841, 1.074)	0.414
Systematic conditions - Composite	1.032	(0.612, 1.741)	0.905	0.94	(0.752, 1.174)	0.586	1.002	(0.792,1.268)	0.985
Syndromic conditions - Composite	1.144	(0.879,1.488)	0.316	0.982	(0.872,1.106)	0.765	0.956	(0.843,1.084)	0.484
Arrhythmias - Cardiac	1.119	(0.555,2.257)	0.754	1.121	(0.815,1.544)	0.482	1.029	(0.726,1.460)	0.871
Cardiovascular signs and symptoms - Cardiac	1.111	(0.326,3.782)	0.867	0.593	(0.328,1.073)	0.084	0.987	(0.577, 1.690)	0.962
Chest pain - Cardiac	1.095	(0.304, 3.942)	0.889	0.813	(0.429, 1.541)	0.525	1.53	(0.857, 2.731)	0.151
Heart disease - Cardiac	1.285	(0.500, 3.301)	0.602	0.998	(0.659,1.512)	0.993	0.948	(0.604,1.490)	0.818
Myocarditis - Cardiac	NA	NA	NA	0.731	(0.079,6.785)	0.783	NA	NA	NA
Abdominal pain - Gastrointestinal	1.024	(0.480, 2.187)	0.95	0.915	(0.644,1.301)	0.621	1.064	(0.735,1.540)	0.742
Thrombophlebitis and thromboembolism - Hematological	1.19	(0.204, 6.952)	0.847	0.696	(0.338,1.432)	0.325	0.887	(0.456,1.726)	0.724
Abnormal liver enzyme - Hepatic	0.892	(0.246,3.243)	0.863	0.748	(0.383,1.462)	0.396	1.367	(0.668,2.796)	0.392
Musculoskeletal pain - Muscular	0.765	(0.351, 1.671)	0.502	1.02	(0.711,1.463)	0.915	0.944	(0.651, 1.367)	0.759
Myositis - Muscular	NA	NA	NA	17.555	(0.792, 389.275)	0.07	NA	NA	NA
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	0.928	(0.219,3.937)	0.919	1.151	(0.607, 2.183)	0.667	1.124	(0.530, 2.383)	0.761
Headache Neurological	1.451	(0.458,4.594)	0.527	0.825	(0.543,1.253)	0.367	0.725	(0.467, 1.126)	0.152
Mental health - Neurological	1.066	(0.630, 1.806)	0.812	1.031	(0.831,1.278)	0.784	0.945	(0.751, 1.189)	0.628
POTS/dysautonomia - Neurological	1.318	(0.255,6.809)	0.742	1.214	(0.648, 2.272)	0.545	0.905	(0.477, 1.715)	0.759
Fatigue and malaise - Other	0.863	(0.346,2.151)	0.751	0.907	(0.625,1.317)	0.608	0.934	(0.614,1.421)	0.75
Fever and chills - Other	1.403	(0.892, 2.207)	0.143	1.017	(0.812,1.273)	0.884	0.949	(0.742,1.214)	0.677
Generalized pain - Other	0.633	(0.200,2.007)	0.437	0.795	(0.463, 1.364)	0.405	0.823	(0.495,1.368)	0.452
Hair loss - Other	NA	NA	NA	4.801	(1.113,20.706)	0.035	0.582	(0.128,2.644)	0.484
Acute kidney injury - Renal	0.714	(0.155,3.292)	0.666	1.247	(0.661, 2.349)	0.495	0.938	(0.511, 1.721)	0.836
Fluid and electrolyte - Renal	0.87	(0.349, 2.174)	0.766	1.279	(0.891, 1.838)	0.183	1.162	(0.809, 1.670)	0.416
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	0.975	(0.137, 6.923)	0.98	0.243	(0.026,2.250)	0.213
Respiratory signs and symptoms - Respiratory	1.154	(0.782,1.703)	0.47	1.053	(0.889,1.247)	0.553	0.929	(0.777, 1.111)	0.42
Skin symptoms - Skin	1.724	(0.919, 3.235)	0.09	0.97	(0.710,1.324)	0.846	0.741	(0.534, 1.029)	0.073

Table S27. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients during the Omicron period, by race/ethnicity (n=94,248 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO

calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.118	(1.037, 1.206)	0.004	1.049	(1.006, 1.093)	0.026	1.074	(1.029, 1.122)	0.001
Systematic conditions - Composite	1.122	(0.837, 1.504)	0.442	1.09	(0.949, 1.252)	0.223	1.083	(0.931, 1.260)	0.303
Syndromic conditions - Composite	1.118	(1.036, 1.207)	0.004	1.047	(1.003, 1.092)	0.034	1.075	(1.029, 1.123)	0.001
Arrhythmias - Cardiac	0.953	(0.622, 1.462)	0.827	1.057	(0.865, 1.292)	0.587	1.184	(0.943, 1.487)	0.145
Cardiovascular signs and symptoms - Cardiac	1.055	(0.721, 1.545)	0.781	1.24	(1.002, 1.534)	0.048	1.034	(0.830, 1.287)	0.768
Chest pain - Cardiac	1.503	(0.911, 2.481)	0.111	0.981	(0.778, 1.239)	0.874	1.008	(0.794, 1.280)	0.949
Heart disease - Cardiac	1.454	(0.708, 2.987)	0.308	1.017	(0.718, 1.440)	0.924	1.153	(0.807, 1.647)	0.434
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abdominal pain - Gastrointestinal	1.136	(0.876, 1.473)	0.336	1.106	(0.972, 1.258)	0.127	1.107	(0.959, 1.278)	0.166
Thrombophlebitis and thromboembolism - Hematological	NA	NA	NA	0.969	(0.465, 2.018)	0.933	1.241	(0.580, 2.656)	0.578
Abnormal liver enzyme - Hepatic	1.071	(0.453, 2.528)	0.876	1.368	(0.916, 2.041)	0.126	0.96	(0.551, 1.671)	0.884
Musculoskeletal pain - Muscular	1.179	(0.914, 1.522)	0.205	1.075	(0.947, 1.220)	0.262	1.216	(1.067, 1.384)	0.003
Myositis - Muscular	NA	NA	NA	1.985	(0.404, 9.752)	0.398	0.603	(0.096, 3.771)	0.589
Changes in the taste and smell - Neurological	NA	NA	NA	1.513	(0.532, 4.299)	0.437	0.865	(0.293, 2.550)	0.793
Cognitive functions - Neurological	0.96	(0.637, 1.448)	0.847	1.045	(0.825, 1.324)	0.715	1.248	(0.969, 1.608)	0.086
Headache Neurological	0.946	(0.693, 1.291)	0.725	0.941	(0.807, 1.098)	0.442	1.03	(0.885, 1.198)	0.703
Mental health - Neurological	0.957	(0.826, 1.108)	0.556	0.986	(0.913, 1.066)	0.724	1.022	(0.942, 1.110)	0.598
POTS/dysautonomia - Neurological	1.608	(0.966, 2.678)	0.068	1.144	(0.899, 1.455)	0.274	1.151	(0.877, 1.510)	0.31
Fatigue and malaise - Other	0.915	(0.634, 1.319)	0.633	1.122	(0.929, 1.356)	0.232	1.178	(0.962, 1.443)	0.113
Fever and chills - Other	1.141	(0.975, 1.334)	0.1	1.019	(0.932, 1.115)	0.672	1.129	(1.023, 1.247)	0.016
Generalized pain - Other	1.111	(0.714, 1.727)	0.641	1.021	(0.817, 1.276)	0.857	1.033	(0.819, 1.303)	0.784
Hair loss - Other	0.899	(0.360, 2.247)	0.821	1.035	(0.594, 1.804)	0.902	0.849	(0.464, 1.553)	0.595
Acute kidney injury - Renal	1.087	(0.360, 3.277)	0.883	1.044	(0.582, 1.875)	0.885	1.26	(0.690, 2.302)	0.452
Fluid and electrolyte - Renal	0.614	(0.285, 1.324)	0.213	1.036	(0.752, 1.427)	0.828	1.075	(0.767, 1.508)	0.675
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	0.638	(0.041, 9.852)	0.748	5.359	(0.506, 56.759)	0.163
Respiratory signs and symptoms - Respiratory	1.227	(1.086, 1.386)	0.001	1.094	(1.023, 1.170)	0.009	1.103	(1.030, 1.181)	0.005
Skin symptoms - Skin	1.09	(0.886, 1.340)	0.416	1.058	(0.935, 1.197)	0.372	1.195	(1.052, 1.358)	0.006

Section S11 Supplemental Results: patient characteristic balance between race/ethnicity groups

A. Propensity-score (PS) models and matching

We built large-scale PS models for each of the cohorts with baseline patient characteristics including

- Demographics (age at index date; race/ethnicity; sex)
- Obesity

- Chronic condition indicator as defined by the Pediatric Medical Complexity Algorithm (PMCA)
 - No chronic condition (PMCA = 0)
 - Non-complex chronic condition (PMCA = 1)
 - Complex chronic condition comorbidities (PMCA = 2)
- Healthcare utilization 18 months ~ 179 days prior to index date categorized to 0,1,2,>=3
 - Number of outpatient visits
 - Number of inpatient visits
 - Number of ED visits
 - Number of unique medications/prescriptions
 - Number of COVID tests
- Cohort entry date (index date) categorized to 1 month
- Hospital index
- Existence of a list of 205 chronic conditions 18 months ~ 179 days prior to the index
- Vaccine dosage prior to index categorized to 0,1, >=2
- Duration from last immunization date categorized to no vaccine, <4 months, >= 4 months

We exclude all covariates that occur in fewer than 1% of participants in the cohort for computational efficiency. The minor race/ethnicity group patients were then matched using the propensity score to NHW group patients with caliper 0.2. The propensity score is estimated by the lasso model.

B. Patient characteristic balance in the primary analysis

We evaluate the balance of patient characteristics using the standardized difference of means (SMD). **Figure S16-S21** presents the SMD of three cohorts before and after PS score matching.

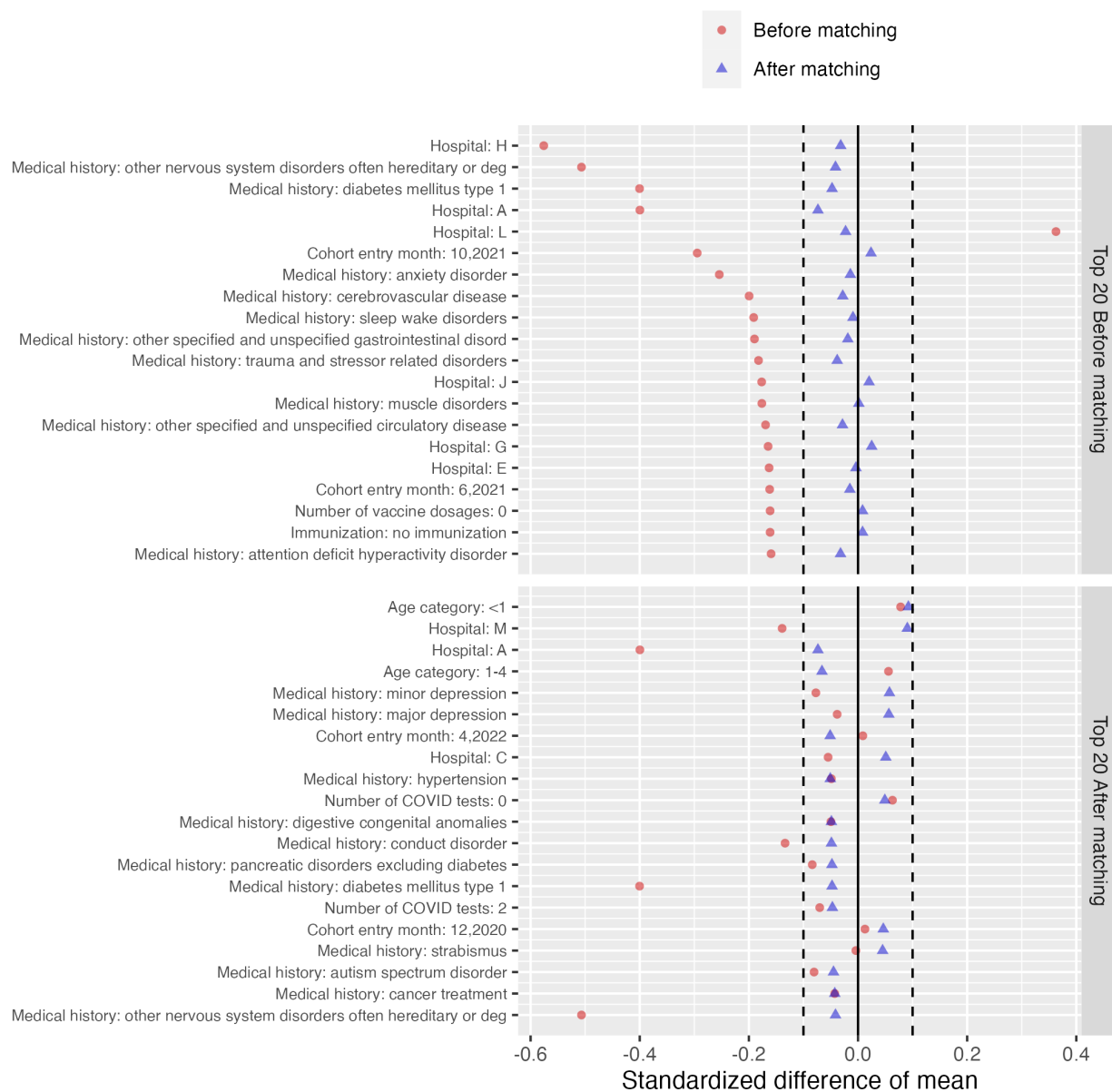


Figure S16. Patient characteristic balance for severe COVID-19 AAPI vs. NHW patients before and after large-scale propensity score (PS) matching (n=9730 patients). The upper panel displays the top 20 covariates with the largest standardized difference of means before PS matching, while the lower panel displays the top 20 covariates with the largest standardized difference of means after PS matching. The red points showed the SMD before matching and the blue points showed the SMD after matching. The dotted line showed the ± 0.1 cutoff value for the standardized mean difference. Source data are provided as a Source Data file.

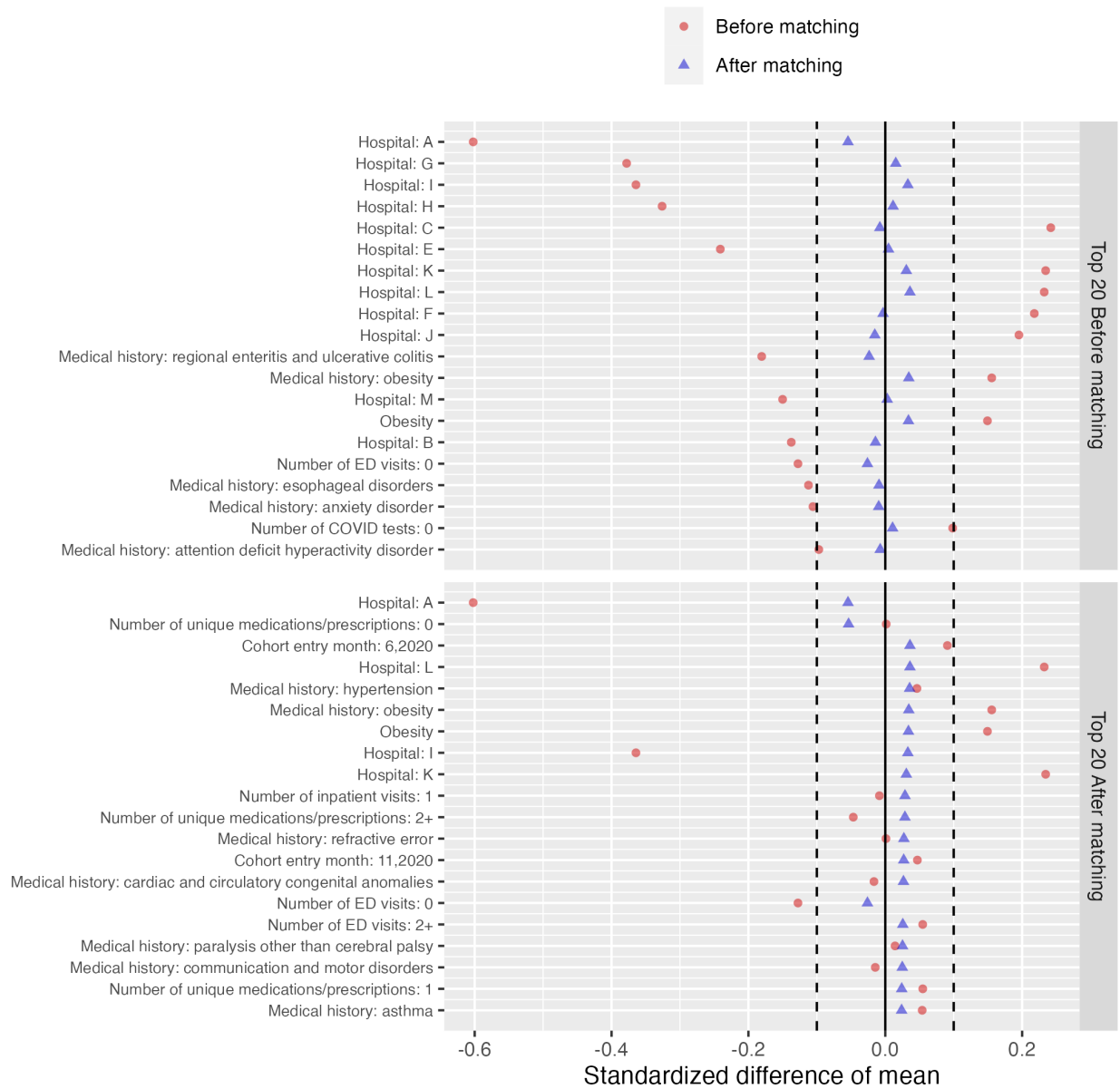


Figure S17. Patient characteristic balance for severe COVID-19 Hispanic vs. NHW patients before and after large-scale propensity score (PS) matching (n=12,926 patients). The upper panel displays the top 20 covariates with the largest standardized difference of means before PS matching, while the lower panel displays the top 20 covariates with the largest standardized difference of means after PS matching. The red points showed the SMD before matching and the blue points showed the SMD after matching. The dotted line showed the +/- 0.1 cutoff value for standardized mean difference. Source data are provided as a Source Data file.

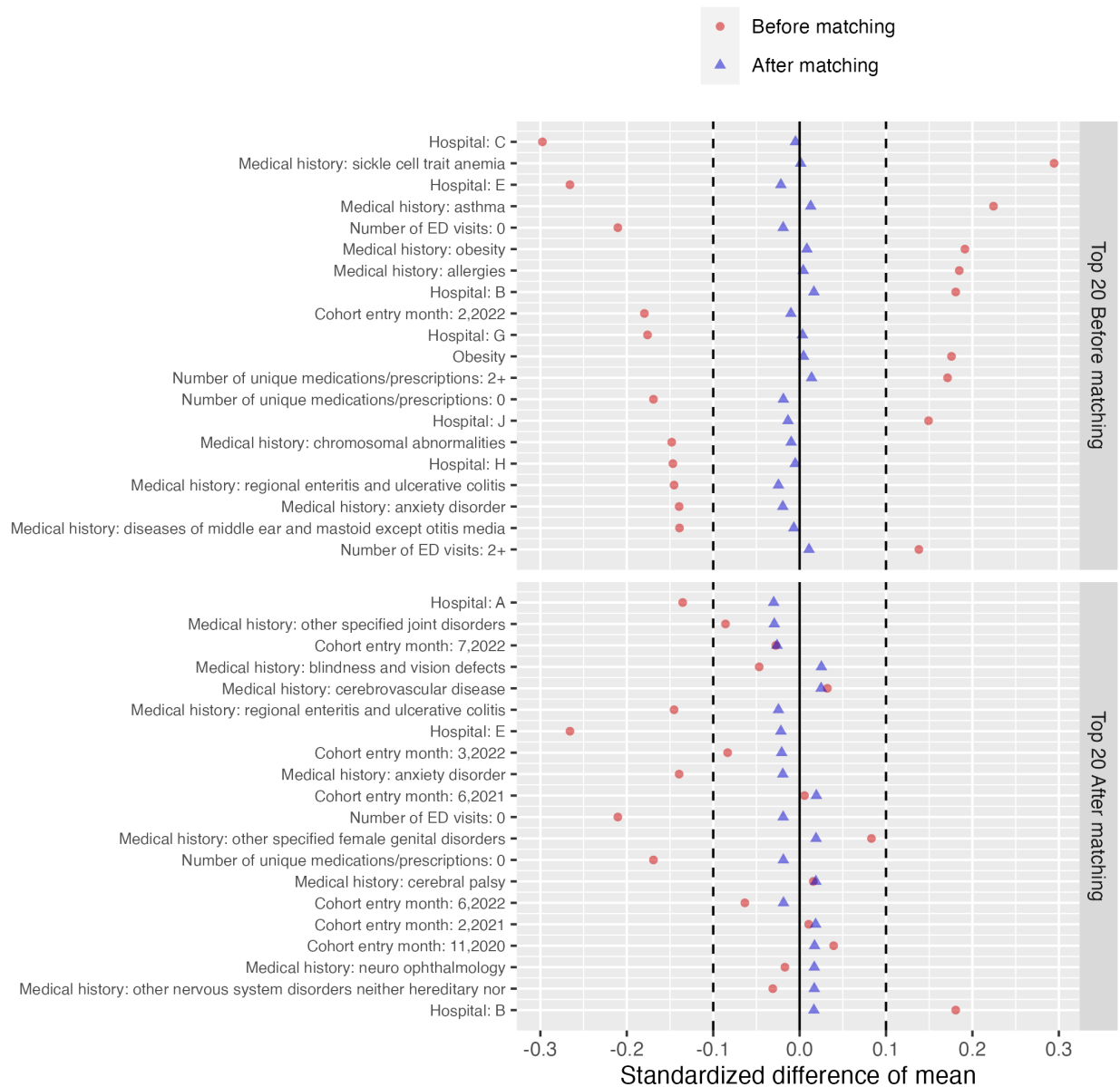


Figure S18. Patient characteristic balance for severe COVID-19 NHB vs. NHW patients before and after large-scale propensity score (PS) matching (n=12,486 patients). The upper panel displays the top 20 covariates with the largest standardized difference of means before PS matching, while the lower panel displays the top 20 covariates with the largest standardized difference of means after PS matching. The red points showed the SMD before matching and the blue points showed the SMD after matching. The dotted line showed the +/- 0.1 cutoff value for standardized mean difference. Source data are provided as a Source Data file.

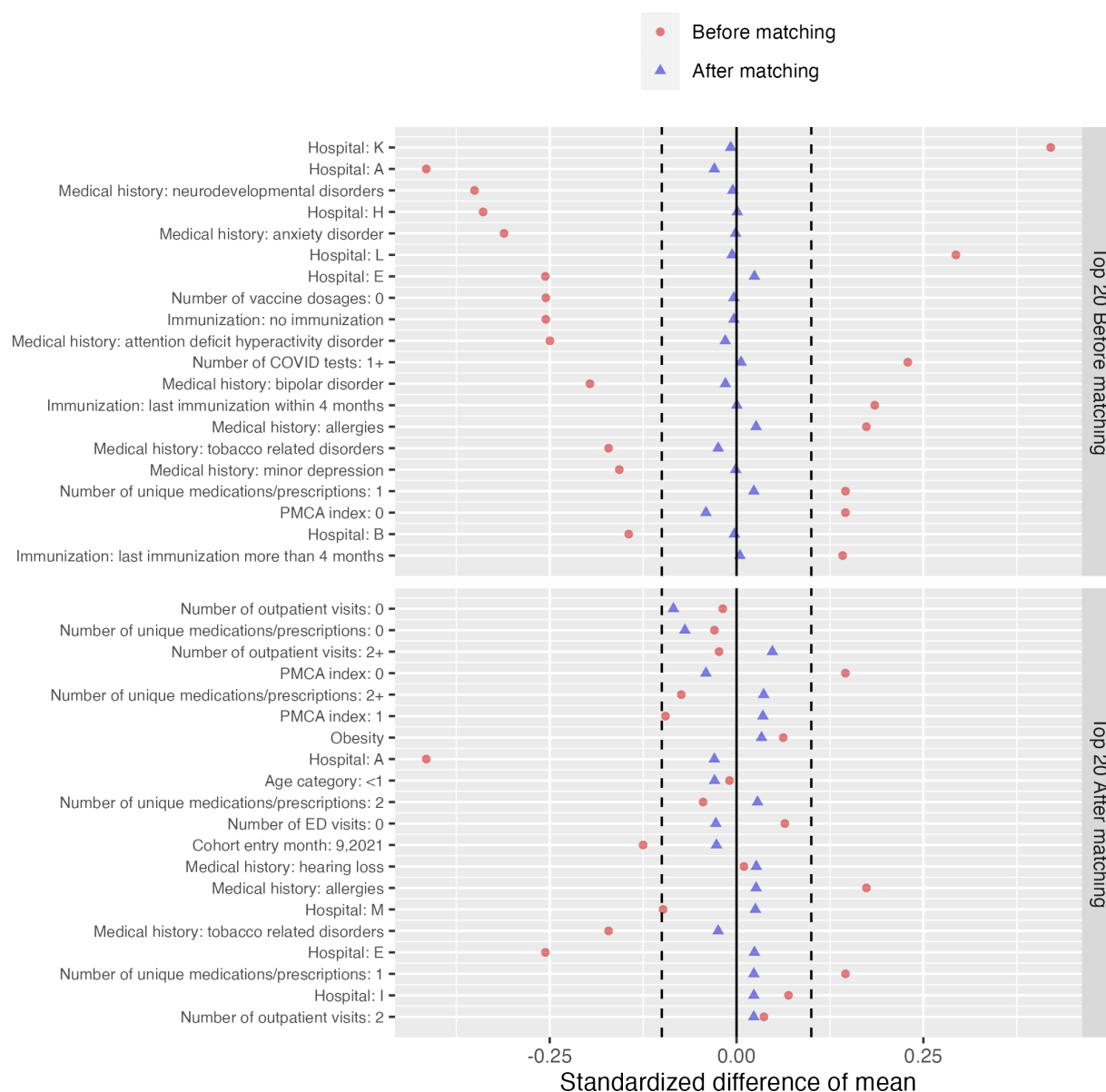


Figure S19. Patient characteristic balance for non-severe COVID-19 AAPI vs. NHW patients before and after large-scale propensity score (PS) matching (n=110,158 patients). The upper panel displays the top 20 covariates with the largest standardized difference of means before PS matching, while the lower panel displays the top 20 covariates with the largest standardized difference of means after PS matching. The red points showed the SMD before matching and the blue points showed the SMD after matching. The dotted line showed the +/- 0.1 cutoff value for standardized mean difference. Source data are provided as a Source Data file.

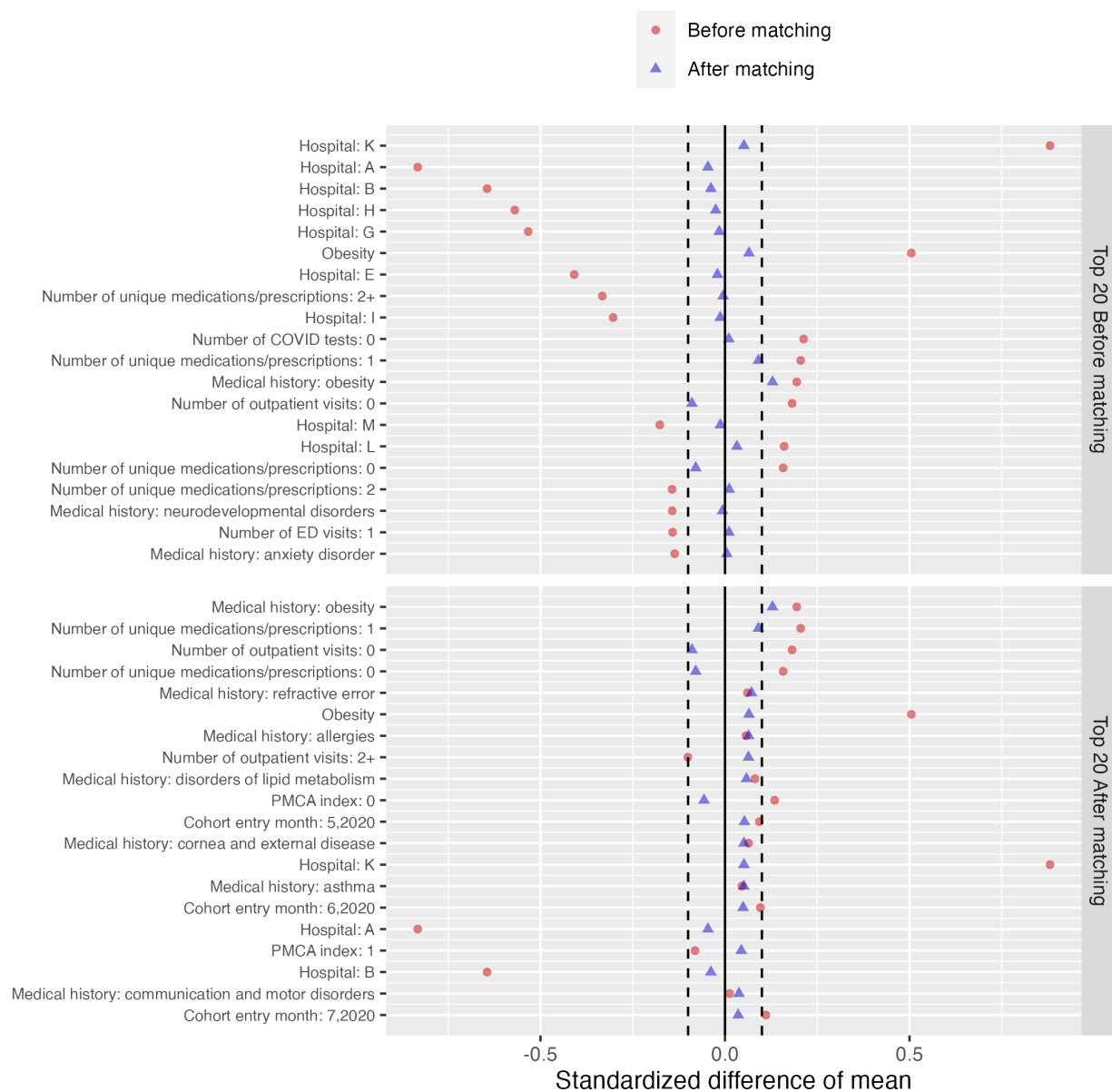


Figure S20. Patient characteristic balance for non-severe COVID-19 Hispanic vs. NHW patients before and after large-scale propensity score (PS) matching (n=156,108 patients). The upper panel displays the top 20 covariates with the largest standardized difference of means before PS matching, while the lower panel displays the top 20 covariates with the largest standardized difference of means after PS matching. The dotted line showed the +/- 0.1 cutoff value for standardized mean difference (SMD). The red points showed the SMD before matching and the blue points showed the SMD after matching. Source data are provided as a Source Data file.

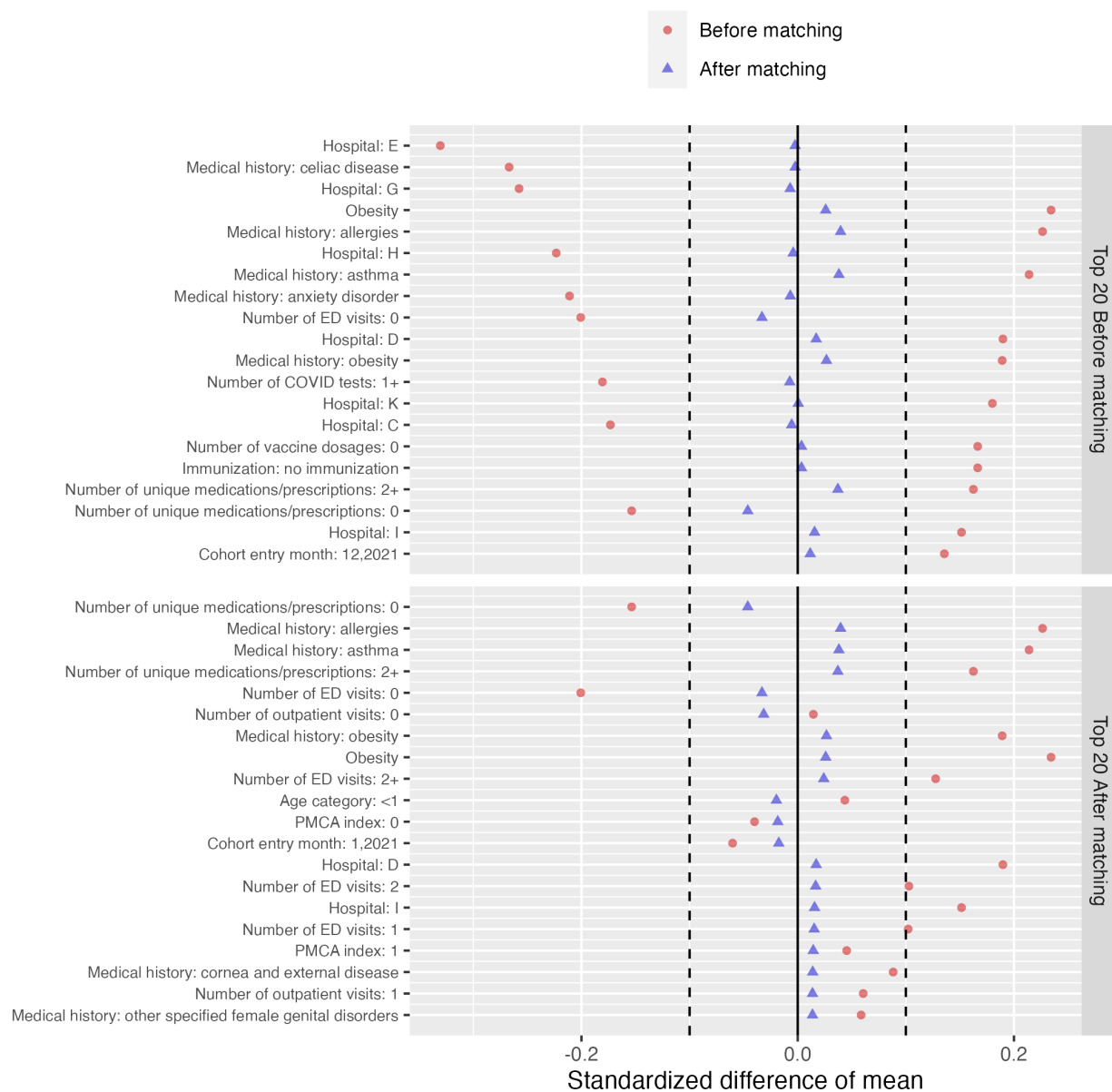


Figure S21. Patient characteristic balance for non-severe COVID-19 NHB vs. NHW patients before and after large-scale propensity score (PS) matching (n=156,108 patients). The upper panel displays the top 20 covariates with the largest standardized difference of means before PS matching, while the lower panel displays the top 20 covariates with the largest standardized difference of means after PS matching. The red points showed the SMD before matching and the blue points showed the SMD after matching. The dotted line showed the +/- 0.1 cutoff value for standardized mean difference. Source data are provided as a Source Data file.

Section S12 Supplemental Results: sensitivity analysis adding socio-economic confounder

The data utilized in this study can be linked to geographical level data, i.e., Area Deprivation Index (ADI), although this information is not available for every participant. We conducted a sensitivity analysis including ADI as a measured confounder, which excluded patients who did not have this information.

Table S28. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among severe COVID-19-positive patients adding social-economic confounder, by race/ethnicity (n=16,862 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.602	(1.253, 2.048)	1.708e-4	1.052	(0.943, 1.174)	0.364	0.907	(0.813,1.011)	0.079
Systematic conditions - Composite	1.848	(1.119,3.054)	0.017	1.073	(0.859, 1.341)	0.535	0.871	(0.703,1.078)	0.204
Syndromic conditions - Composite	1.545	(1.199, 1.992)	7.739e-4	1.07	(0.956,1.198)	0.239	0.929	(0.830, 1.040)	0.198
Arrhythmias - Cardiac	2.374	(1.100,5.123)	0.028	1.282	(0.918,1.790)	0.145	0.853	(0.617, 1.181)	0.339
Cardiovascular signs and symptoms - Cardiac	0.84	(0.308, 2.290)	0.733	0.892	(0.530, 1.502)	0.668	0.928	(0.589, 1.463)	0.748
Chest pain - Cardiac	0.955	(0.253, 3.606)	0.946	0.755	(0.423,1.350)	0.344	1.343	(0.775,2.327)	0.293
Heart disease - Cardiac	1.967	(0.804, 4.810)	0.138	0.861	(0.528,1.405)	0.550	0.841	(0.535,1.323)	0.454
Myocarditis - Cardiac	NA	NA	NA	0.61	(0.029, 12.641)	0.749	NA	NA	NA
Abdominal pain - Gastrointestinal	2.111	(0.979, 4.551)	0.057	1.226	(0.889,1.690)	0.213	1.071	(0.756,1.518)	0.700
Thrombophlebitis and thromboembolism - Hematological	1.116	(0.296, 4.210)	0.871	0.669	(0.335, 1.336)	0.254	1.331	(0.710, 2.497)	0.372
Abnormal liver enzyme - Hepatic	2.111	(0.740,6.017)	0.162	1.152	(0.669,1.983)	0.610	1.453	(0.772, 2.735)	0.247
Musculoskeletal pain - Muscular	1.247	(0.573, 2.714)	0.578	0.994	(0.716,1.379)	0.970	0.771	(0.551, 1.078)	0.128
Myositis - Muscular	NA	NA	NA	NA	NA	NA	NA	NA	NA
Changes in the taste and smell - Neurological	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cognitive functions - Neurological	2.234	(0.496,10.060)	0.295	1.13	(0.634,2.014)	0.678	1.708	(0.879, 3.316)	0.114
Headache Neurological	1.887	(0.635,5.608)	0.253	1.166	(0.800, 1.701)	0.424	0.764	(0.529, 1.104)	0.151
Mental health - Neurological	1.423	(0.892, 2.270)	0.139	1.066	(0.873, 1.302)	0.530	0.963	(0.790, 1.174)	0.710
POTS/dysautonomia - Neurological	2.652	(0.252, 27.913)	0.417	0.758	(0.426,1.350)	0.347	0.859	(0.496,1.488)	0.587
Fatigue and malaise - Other	1.563	(0.696,3.513)	0.279	1.012	(0.707, 1.449)	0.946	0.792	(0.550, 1.142)	0.211
Fever and chills - Other	1.7	(1.070, 2.701)	0.025	1.168	(0.938,1.454)	0.166	0.901	(0.712, 1.139)	0.382
Generalized pain - Other	0.467	(0.087, 2.492)	0.373	1.07	(0.589, 1.945)	0.824	0.984	(0.563, 1.721)	0.956
Hair loss - Other	3.134	(0.269,36.447)	0.362	1.826	(0.650,5.131)	0.254	0.698	(0.200, 2.434)	0.572
Acute kidney injury - Renal	2.128	(0.547, 8.272)	0.276	1.254	(0.717, 2.193)	0.428	1.025	(0.606,1.733)	0.927
Fluid and electrolyte - Renal	1.972	(0.926,4.197)	0.078	1.403	(0.981, 2.008)	0.064	0.943	(0.678,1.311)	0.726
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	1.44	(0.226,9.193)	0.700	0.523	(0.052, 5.287)	0.583

Respiratory signs and symptoms - Respiratory	1.485	(0.996, 2.216)	0.053	1.138	(0.963,1.344)	0.129	0.865	(0.733, 1.021)	0.087
Skin symptoms - Skin	2.085	(1.125,3.864)	0.020	1.169	(0.866,1.579)	0.308	0.737	(0.548,0.991)	0.043

Table S29. Adjusted differential increase related to COVID-19 for prevalence of PASC symptoms and conditions among non-severe COVID-19-positive patients adding social-economic confounder, by race/ethnicity (n=208,861 patients). The est column shows the estimated RRs for each minority group versus the NHW group from the difference-in-differences (DiD) analysis with NCO calibration. The 95% CI column shows the 95% confidence interval (CI) of the estimated RR. The P-value column is found by the two-sided Wald test and no multiple comparisons are adjusted.

Symptom	AAPI vs. NHW			Hispanic vs. NHW			NHB vs. NHW		
	Est	95% CI	P-value	Est	95% CI	P-value	Est	95% CI	P-value
At least one condition - Composite	1.092	(1.017, 1.173)	0.015	1.021	(0.986,1.058)	0.247	1.005	(0.834, 1.211)	0.955
Systematic conditions - Composite	0.922	(0.685,1.241)	0.592	0.933	(0.823,1.057)	0.278	0.943	(0.756,1.175)	0.601
Syndromic conditions - Composite	1.101	(1.024,1.183)	0.009	1.021	(0.985,1.058)	0.255	1.007	(0.836, 1.214)	0.938
Arrhythmias - Cardiac	0.667	(0.428, 1.039)	0.073	0.812	(0.675,0.978)	0.028	0.928	(0.716, 1.202)	0.569
Cardiovascular signs and symptoms - Cardiac	1.171	(0.816,1.681)	0.391	1.082	(0.908,1.289)	0.380	0.962	(0.751, 1.233)	0.760
Chest pain - Cardiac	1.697	(1.031,2.792)	0.037	1.025	(0.841,1.248)	0.809	0.93	(0.719,1.203)	0.579
Heart disease - Cardiac	1.166	(0.496, 2.743)	0.724	1.007	(0.711, 1.425)	0.970	0.874	(0.614,1.244)	0.456
Myocarditis - Cardiac	NA	NA	NA	NA	NA	NA	0.652	(0.042,10.121)	0.760
Abdominal pain - Gastrointestinal	0.942	(0.739, 1.201)	0.631	1.083	(0.970, 1.210)	0.154	0.968	(0.781, 1.199)	0.763
Thrombophlebitis and thromboembolism - Hematological	0.695	(0.125,3.869)	0.678	1.08	(0.517, 2.255)	0.837	1.04	(0.529, 2.045)	0.908
Abnormal liver enzyme - Hepatic	0.66	(0.282, 1.549)	0.340	1.259	(0.899, 1.761)	0.180	0.998	(0.609, 1.635)	0.993
Musculoskeletal pain - Muscular	1.22	(0.972, 1.532)	0.086	0.981	(0.883, 1.090)	0.726	0.982	(0.798, 1.209)	0.863
Myositis - Muscular	NA	NA	NA	4.942	(0.854,28.591)	0.074	4.302	(0.911, 20.317)	0.065
Changes in the taste and smell - Neurological	1.518	(0.393, 5.867)	0.545	1.085	(0.590, 1.997)	0.793	0.944	(0.509, 1.752)	0.856
Cognitive functions - Neurological	1.103	(0.753, 1.617)	0.614	1.173	(0.963, 1.428)	0.113	1.409	(1.070, 1.855)	0.015
Headache Neurological	0.884	(0.661, 1.182)	0.406	0.943	(0.832, 1.069)	0.361	0.933	(0.752,1.157)	0.528
Mental health - Neurological	1.014	(0.888, 1.157)	0.841	0.996	(0.936,1.060)	0.900	0.998	(0.823, 1.211)	0.988
POTS/dysautonomia - Neurological	1.356	(0.806,2.283)	0.251	1.022	(0.833, 1.253)	0.835	0.949	(0.716,1.257)	0.714
Fatigue and malaise - Other	1.217	(0.862,1.718)	0.265	0.999	(0.850, 1.175)	0.990	0.983	(0.769, 1.257)	0.892
Fever and chills - Other	1.083	(0.924, 1.269)	0.326	1.016	(0.934, 1.104)	0.712	1.035	(0.845,1.267)	0.743
Generalized pain - Other	1.035	(0.700, 1.531)	0.861	1.055	(0.874, 1.275)	0.576	0.885	(0.686, 1.143)	0.350
Hair loss - Other	1.331	(0.637, 2.785)	0.447	1.58	(1.012,2.468)	0.044	0.964	(0.593,1.568)	0.883
Acute kidney injury - Renal	1.31	(0.470, 3.647)	0.606	0.99	(0.570, 1.717)	0.970	1.432	(0.841, 2.440)	0.187
Fluid and electrolyte - Renal	0.831	(0.400, 1.729)	0.620	0.831	(0.602, 1.149)	0.263	0.986	(0.697, 1.395)	0.936
Acute respiratory distress syndrome - Respiratory	NA	NA	NA	1.373	(0.074, 25.393)	0.831	2.503	(0.313,20.015)	0.387
Respiratory signs and symptoms - Respiratory	1.137	(1.009, 1.281)	0.035	1.024	(0.963, 1.088)	0.452	1.022	(0.844, 1.238)	0.823
Skin symptoms - Skin	1.241	(1.020, 1.509)	0.031	0.975	(0.877, 1.085)	0.645	0.995	(0.807, 1.227)	0.965

Section S13 Supplemental Results: details for differences in pre- and post-COVID-19 infection

This section shows the relative risk (RR) differences in pre- and post-COVID-19 infection for COVID-19-positive patients.

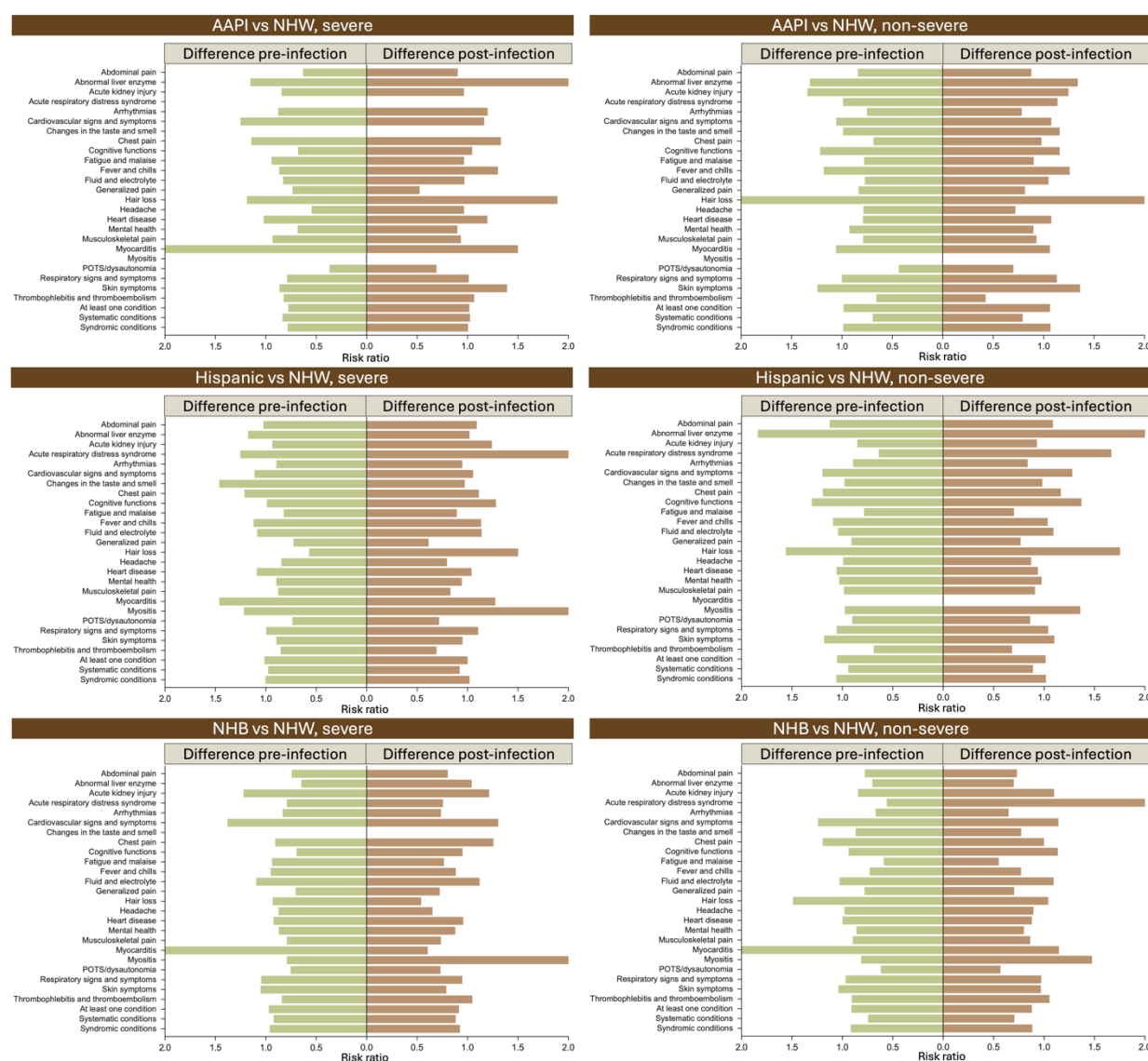


Figure S22. Risk ratio (RR) differences for twenty-four individual outcomes and three composite outcomes among COVID-19-positive patients, stratified by comparison groups and severity status across both pre- and post-infection periods. The red line shows the estimated RR for racial/ethnic difference during the before-infection period, and the green line shows the estimated RR for racial/ethnic difference during the difference after-infection period. Both RRs were estimated from the difference-in-difference (DiD) with the NCO calibration. Source data are provided as a Source Data file.

References

1. Schuemie, M. J., Hripcsak, G., Ryan, P. B., Madigan, D. & Suchard, M. A. Empirical confidence interval calibration for population-level effect estimation studies in observational healthcare data. *Proc Natl Acad Sci U S A* **115**, 2571–2577 (2018).
2. Schuemie, M. J., Ryan, P. B., Dumouchel, W., Suchard, M. A. & Madigan, D. Interpreting observational studies: Why empirical calibration is needed to correct p-values. *Stat Med* **33**, 209–218 (2014).