

APPENDIX TEXT

Piloting Social Determinants of Health Screening Within the Health System

Prior to the implementation of the social determinants of health (SDH) screening program described in the current paper, a 2-year process was completed that involved a multi-disciplinary workgroup assessing existing internal and external screening tools, conducting a pre-pilot where the two selected tools were evaluated by a Patient Advisory Group, and the formal implementation of two screening tools from March 2017 to March 2018. One tool, hereafter referred to as the stressor screener, was an internal 11-item tool adapted from one created by the Montefiore Community Pediatrics Program. This tool had previously been validated against PHQ-4, a four-item screener for anxiety and depression, and asks respondents the amount of stress a particular risk/issue was causing them, with a three-level response option: “none,” “some,” or “a lot.” The second selected tool, hereafter referred to as the SDH screener, was modified from the 2016 Health Leads Social Needs Screening Toolkit, which included eight primary questions and two follow-up questions in “yes”/“no” format.

The pilot process included formalizing workflows for screening and implementing the tools into Epic to facilitate population-based analytics and reporting. Both screeners were available in English and Spanish during the pilot period.

During the pilot period 18,964 unique patients were screened (17,380 completed the SDH screener, and 1,584 completed the stressor screener). The stressor tool was used by five sites, and 54.0% of patients indicated “some” or “a lot of” stress due to one or more of the questions;

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13.9% indicated “a lot” to one or more of the questions. The SDH screener was used by 18 sites, and 21.2% of patients reported issues with one or more of the seven items.

To assess the criterion validity of the SDH screener, the association between the number of social risks identified through the screener with outcomes known to have an association with SDH, including obesity, smoking, diabetes, asthma, and the number of emergency department visits in the past year, was examined. These results indicated that those with more social risks were significantly more likely to have each outcome, except obesity (only significant for women, but not men), which supports the use of the tool to capture social risks.

Following the pilot period, a final ten-item tool was developed based on the SDH screener and supplemented by questions from the stressor tool. The final tool was available in nine languages and was integrated into Epic.

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Appendix Table 1. Characteristics of Patients Who Completed and Declined the Screener, April–December 2018

Characteristic	Completed, %(n=24,633)	Declined, %(n=1,442)	p-value^a
Total	100.0	100.0	
Age, years			
0–5	19.8	6.9	<0.001***
6–11	12.3	5.4	<0.001***
12–17	9.8	6.7	<0.001***
18–29	11.4	9.3	0.016*
30–39	7.9	8.7	0.293
40–49	8.4	11.7	<0.001***
50–59	10.8	15.6	<0.001***
60–69	10.0	16.8	<0.001***
≥70	9.6	18.9	<0.001***
Sex			
Male	41.3	42.9	0.239
Female	58.7	57.1	0.239
Race/ethnicity			
Hispanic	50.4	48.8	0.320
NHB	41.3	39.2	0.189
NHW	5.5	8.3	<0.001***
NHAPI	2.3	3.3	0.034*
NHAIAN	0.5	0.4	0.509
Missing	—	—	
Preferred language			
English	83.5	79.4	<0.001***
Spanish	13.8	16.8	0.001**
Other	2.7	3.8	0.019*
Missing	—	—	
Insurance status			
Medicaid	50.9	41.4	<0.001***
Medicare	15.8	29.1	<0.001***
Commercial	33.3	29.4	0.003**
Missing	—	—	

Note: Boldface indicates statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

^aTested for differences in the two populations using proportion tests.

NHB, non-Hispanic black; NHW, non-Hispanic white; NHAPI, non-Hispanic Asian/Pacific Islander; NHAIAN, non-Hispanic American Indian/Alaskan Native.

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Appendix Table 2. Screening Practices by Clinic, April–December 2018

Clinic^a and population screened^a	Departments^a	Risk^b	N screened^c	Unique patients seen,^d n	Proportion of eligible patients screened
Clinic A	Pediatrics				
Children		High	115	4,087	2.8%
Clinic B	Pediatrics, internal medicine				
Children		Normal	270	9,652	2.8%
Adults		Normal	1,769	21,051	8.4%
Clinic C	Pediatrics, family medicine, internal medicine				
Children		Normal	51	1,534	3.3%
Adults		Normal	2,136	2,818	75.8%
Clinic D	Pediatrics, internal medicine				
Children		Normal	1,284	4,163	30.8%
Adults		High	1,051	7,466	14.1%
Clinic E	Internal medicine				
Adults		Normal	1,604	3,391	47.3%
Clinic F	Pediatrics, internal medicine				
Children		Normal	1,732	8,704	19.9%
Adults		Normal	3,851	7,266	53.0%
Clinic G	Pediatrics				
Children		Normal	3,771	6,637	56.8%

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Clinic H	Internal medicine				
Adults		High	116	5,558	2.1%
Clinic I	Pediatrics, internal medicine				
Children		Normal	152	2,349	6.5%
Adults		Normal	190	5,847	3.2%
Clinic J	Pediatrics, internal medicine				
Children		Normal	280	9,722	2.9%
Adults		High	629	9,811	6.4%
Clinic K	Family medicine				
Children		Normal	52	2,795	1.9%
Adults		Normal	282	8,613	3.3%
Clinic L	Pediatrics				
Children		Normal	146	5,463	2.7%
Clinic M	Pediatrics				
Children		Normal	692	1,680	41.2%
Clinic N	Pediatrics, internal medicine				
Children		Normal	2,348	4,784	49.1%
Adults		Normal	356	10,539	3.4%
Clinic O	Pediatrics, family medicine, internal medicine				
Children		Normal	172	2,718	6.3%
Adults		Normal	490	4,819	10.2%

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Clinic P	Family medicine				
Children		Normal	34	769	4.4%
Adults		Normal	388	1,798	21.6%
Clinic Q	Internal medicine				
Adults		High	143	4,589	3.1%
Clinic R	Family medicine				
Children		Normal	18	1,349	1.3%
Adults		Normal	148	2,761	5.4%
Clinic S	Family medicine, internal medicine				
Children		High	19	1,803	1.1%
Adults		High	320	7,444	4.3%

^aOnly included if screened ≥ 10 patients.

^bRisk determined by screening practices at the departmental-level; higher-risk refers to clinics that screened patients who were recently discharged, had recent emergency department visits or were social work patients, for example.

^cDoes not add up to 24,633 because we excluded clinics and age categories that screened < 10 patients.

^dDefined as all primary care patients screened by participating clinics between April and December 2018.

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Appendix Table 3. Characteristics of Montefiore Patients, April–December 2018, Screened, Comparison and Weighted Analyses

Characteristic	Screened population		Comparison population, ^a % (n=205,145)	Age, race/ethnicity, insurance weighted % ^b
	n	%		
Total	24,633	100.0	100.0	—
Age, years				
0–5	4,884	19.8 (19.3, 20.3)	13.5*** (13.3, 13.6)	13.5
6–11	3,036	12.3 (11.9, 12.7)	10.8*** (10.7, 10.9)	10.8
12–17	2,415	9.8 (9.4, 10.2)	9.2** (9.1, 9.3)	9.2
18–29	2,798	11.4 (11.0, 11.8)	10.8* (10.7, 11.0)	10.8
30–39	1,945	7.9 (7.6, 8.2)	8.4** (8.3, 8.5)	8.8
40–49	2,063	8.4 (8.0, 8.7)	9.6*** (9.5, 9.7)	9.2
50–59	2,656	10.8 (10.4, 11.2)	13.5*** (13.4, 13.7)	13.7
60–69	2,461	10.0 (9.6, 10.4)	12.4*** (12.2, 12.5)	12.2
≥70	2,375	9.6 (9.3, 10.0)	11.8*** (11.7, 11.9)	11.8
Sex				
Male	10,172	41.3 (40.7, 41.9)	39.9*** (39.7, 40.1)	40.4
Female	14,461	58.7 (58.1, 59.3)	60.1*** (59.9, 60.3)	59.6
Race/ethnicity				
Hispanic	8,671	50.4 (49.7, 51.2)	48.9*** (48.6, 49.1)	48.9
NHB	7,103	41.3 (40.6, 42.0)	40.3* (40.1, 40.6)	40.4
NHW	944	5.5 (5.2, 5.8)	7.5*** (7.4, 7.7)	7.5
NHAPI	393	2.3 (2.1, 2.5)	2.8** (2.7, 2.9)	2.7
NHAIAN	92	0.5 (0.4, 0.7)	0.5 (0.5, 0.5)	0.5
Missing	7,430	—	—	—
Preferred language				
English	19,804	83.5 (83.0, 83.9)	82.0*** (81.9, 82.2)	83.2
Spanish	3,274	13.8 (13.4, 14.2)	14.9*** (14.8, 15.1)	14.3
Other	651	2.7 (2.5, 3.0)	3.0* (2.9, 3.1)	2.5
Missing	904	—	—	—
Insurance status				

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Medicaid	12,144	50.9 (50.3, 51.5)	42.6*** (42.4, 42.9)	42.6
Medicare	3,763	15.8 (15.3, 16.2)	19.3*** (19.1, 19.5)	19.3
Commercial	7,947	33.3 (32.7, 33.9)	38.1*** (37.8, 38.3)	38.1
Missing	779	—	—	—
FQHC^c				
No	10,469	42.5 (41.9, 43.1)	64.3*** (64.1, 64.5)	43.3
Yes	14,164	57.5 (56.9, 58.1)	35.7*** (35.5, 35.9)	56.7
Public housing^d				
No	19,564	88.0 (87.6, 88.5)	89.3*** (89.2, 89.4)	89.0
Yes	2,658	12.0 (11.5, 12.4)	10.7*** (10.6, 10.8)	11.0
Area-based poverty^e				
Q1: 0.0%–8.3%	4,703	20.1 (19.6, 20.7)	19.4** (19.2, 19.6)	21.8
Q2: 8.4%–19.2%	4,663	20.0 (19.5, 20.5)	20.6* (20.4, 20.8)	21.1
Q3: 19.3%–31.4%	4,663	20.0 (19.5, 20.5)	20.4 (20.3, 20.6)	19.7
Q4: 31.5%–43.4%	4,670	20.0 (19.5, 20.5)	20.8** (20.6, 20.9)	19.0
Q5: 43.5%–75.5%	4,646	19.9 (19.4, 20.4)	18.8*** (18.6, 18.9)	18.3
Area-based race/ethnicity^e				
% NHB				
Q1: 0.0%–10.8%	4,666	20.0 (19.5, 20.5)	23.3*** (23.1, 23.5)	20.7
Q2: 10.9%–23.4%	4,700	20.1 (19.6, 20.7)	22.1*** (21.9, 22.3)	19.9
Q3: 23.5%–35.5%	4,636	19.9 (19.4, 20.4)	18.1*** (17.9, 18.2)	18.9
Q4: 35.6%–55.9%	4,666	20.0 (19.5, 20.5)	17.3*** (17.2, 17.5)	19.5
Q5: 56.0%–100.0%	4,677	20.0 (19.5, 20.6)	19.3** (19.1, 19.4)	21.0
% Hispanic				
Q1: 0.0%–24.8%	4,906	21.0 (20.5, 21.5)	24.0*** (23.8, 24.2)	22.5
Q2: 24.9%–44.7%	4,470	19.1 (18.6, 19.7)	18.2*** (18.0, 18.4)	19.7

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Q3: 44.8%– 59.2%	4,675	20.0 (19.5, 20.5)	17.8*** (17.7, 18.0)	19.7
Q4: 59.3%– 70.7%	4,660	20.0 (19.5, 20.5)	17.7*** (17.5, 17.9)	19.0
Q5: 70.8%– 98.6%	4,634	19.9 (19.3, 20.4)	22.3*** (22.1, 22.5)	19.2
Area-based rental burden^{e,f}				
<30%	7,220	31.6 (31.0, 32.2)	29.2*** (29.0, 29.4)	32.8
30%–50%	12,371	54.1 (53.5, 54.8)	56.1*** (55.9, 56.3)	53.3
>50%	3,268	14.3 (13.8, 14.8)	14.6 (14.5, 14.8)	13.9

Note: Boldface indicates statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

^aThe comparison population includes all patients (n=205,145) that had a primary care visit at a clinic implementing the screener in April–December 2018.

^bWeighted by age, race/ethnicity, and insurance status distributions of comparison population.

^cIndicates that the screener was completed at a Federally Qualified Health Center (FQHC).

^dOnly includes patients who live in New York City.

^eArea-level measures are at the Census Block Group level. They only include those who were successfully geocoded (n=443 were not geocoded). Residents who were geocoded to block groups with zero population (according to the Census) were excluded from the analysis for this variable.

^fRental burden is defined as median gross rent as a percentage of household income in the past 12 months.

NHB, non-Hispanic black; NHW, non-Hispanic white; NHAPI, non-Hispanic Asian/Pacific Islander; NHAIAN, non-Hispanic American Indian/Alaskan Native; Q, quintile.

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Appendix Table 4. Number of SDH Risks Among Montefiore Patients by Patient Characteristics, April–December 2018, Weighted Analyses

Characteristic	n	Weighted percent ^a	Weighted percent, ^a % (95% CI)			
			Any risk	1 risk	2 risks	≥3 risks
Total	24,633	100.0	19.8 (19.2, 0.0)	10.2 (9.8, 0.0)	4.6 (4.3, 0.0)	4.9 (4.6, 0.0)
Age, years						
0–5	4,884	13.5	18.0 (17.0, 19.1)	10.1 (9.2, 10.9)	4.0 (3.5, 4.6)	3.9 (3.4, 4.5)
6–11	3,036	10.8	18.2 (16.8, 19.6)	10.0 (8.9, 11.1)	3.5* (2.9, 4.2)	4.8 (4.0, 5.6)
12–17	2,415	9.2	16.9 (15.3, 18.5)	9.3 (8.2, 10.6)	3.9 (3.1, 4.9)	3.7 (3.0, 4.5)
18–29 (ref)	2,798	10.8	18.0 (16.5, 19.6)	9.1 (8.0, 10.3)	4.9 (4.1, 5.8)	4.1 (3.3, 4.9)
30–39	1,945	8.8	22.3** (20.3, 24.4)	11.0* (9.6, 12.7)	6.3 (5.1, 7.6)	5.0 (4.1, 6.1)
40–49	2,063	9.2	24.0*** (21.9, 26.2)	11.0** (9.5, 12.7)	5.5 (4.5, 6.6)	7.5*** (6.4, 8.9)
50–59	2,656	13.7	27.3*** (25.3, 29.3)	12.1 (10.7, 13.7)	6.9** (5.8, 8.2)	8.3*** (7.1, 9.7)
60–69	2,461	12.2	19.2 (17.5, 21.1)	9.7 (8.5, 11.0)	4.4 (3.5, 5.7)	5.1 (4.3, 6.2)
≥70	2,375	11.8	16.3 (14.8, 17.9)	10.2 (9.0, 11.6)	3.0*** (2.4, 3.7)	3.1 (2.4, 4.0)
Sex						
Male	10,172	40.4	19.2 (18.3, 20.1)	9.9 (9.2, 10.5)	4.2* (3.7, 4.6)	5.2 (4.7, 5.7)
Female (ref)	14,461	59.6	20.1 (19.4, 20.8)	10.3 (9.8, 10.9)	4.9 (4.5, 5.3)	4.9 (4.5, 5.3)
Race/ethnicity						
Hispanic (ref)	8,671	48.9	23.3 (22.3, 24.3)	11.6 (10.9, 12.4)	5.6 (5.1, 6.2)	6.0 (5.5, 6.6)
NHB	7,103	40.4	18.7*** (17.8, 19.7)	9.5*** (8.8, 10.3)	4.3*** (3.8, 4.9)	4.9** (4.3, 5.5)
NHW	944	7.5	15.7*** (13.3, 18.6)	8.0** (6.2, 10.3)	4.6 (3.1, 6.6)	3.2*** (2.3, 4.4)
NHAPI	393	2.7	13.6*** (10.0, 18.3)	7.9* (5.1, 11.9)	3.5 (2.0, 6.2)	2.2*** (1.0, 4.8)
NHAIAN	92	0.5	19.9 (13.7, 27.9)	13.2 (9.1, 18.8)	4.0 (1.2, 12.5)	2.7* (1.0, 7.2)
Missing	7,430	—	17.5*** (16.5, 18.5)	9.7*** (8.9, 10.5)	3.8*** (3.3, 4.3)	4.0*** (3.6, 4.5)

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Preferred language						
English (ref)	19,804	83.2	19.8 (19.1, 20.5)	10.2 (9.7, 10.7)	4.7 (4.4, 5.2)	4.9 (4.6, 5.3)
Spanish	3,274	14.3	24.0** (21.3, 27.0)	11.2 (9.8, 12.7)	6.6 (4.6, 9.4)	6.3* (5.2, 7.5)
Other	651	2.5	13.1*** (10.2, 16.8)	5.2*** (3.0, 8.7)	5.8* (5.0, 6.8)	2.1** (1.0, 4.5)
Missing	904	—	8.7*** (5.9, 12.6)	4.6*** (2.5, 8.4)	0.8*** (0.4, 1.7)	3.3 (2.0, 5.4)
Insurance status						
Medicaid	12,144	42.6	24.9*** (24.2, 25.7)	12.0*** (11.4, 12.6)	5.9*** (5.5, 6.4)	7.0*** (6.6, 7.5)
Medicare	3,763	19.3	21.3*** (20.1, 22.7)	11.5*** (10.6, 12.6)	4.6*** (4.0, 5.3)	5.2*** (4.5, 5.9)
Commercial (ref)	7,947	38.1	12.0 (11.3, 12.8)	7.0 (6.4, 7.6)	2.8 (2.4, 3.2)	2.2 (1.9, 2.6)
Missing	779	—	24.3*** (21.1, 27.8)	12.6*** (10.2, 15.5)	6.0*** (4.4, 8.2)	5.7*** (4.1, 7.8)
FQHC^b						
No (ref)	10,469	43.3	16.7 (15.9, 17.6)	8.8 (8.2, 9.6)	3.6 (3.2, 4.1)	4.2 (3.8, 4.8)
Yes	14,164	56.7	22.6*** (21.8, 23.4)	11.6*** (11.0, 12.2)	5.4*** (5.0, 5.9)	5.6*** (5.2, 6.0)
Value-based contract						
No (ref)	14,045	60.3	20.2 (19.5, 21.0)	10.4 (9.8, 10.9)	4.7 (4.3, 5.1)	5.2 (4.8, 5.6)
Yes	10,588	39.7	20.0 (18.9, 21.2)	9.5 (8.8, 10.2)	5.0 (4.2, 5.9)	5.5 (5.0, 6.0)
Public housing^c						
No (ref)	19,564	89.0	19.0 (18.3, 19.6)	9.8 (9.3, 10.3)	4.5 (4.1, 4.8)	4.7 (4.4, 5.0)
Yes	2,658	11.0	28.0*** (26.0, 30.2)	15.6*** (13.9, 17.5)	6.5*** (5.6, 7.5)	5.9 (4.8, 7.1)
Area-based poverty^d						
Q1: 0.0%–8.3% (ref)	4,703	21.8	14.6 (13.4, 16.0)	7.8 (6.8, 8.9)	3.5 (3.0, 4.2)	3.3 (2.7, 4.0)
Q2: 8.4%–19.2%	4,663	21.1	18.0*** (16.8, 19.2)	9.0 (8.2, 9.9)	4.9** (4.2, 5.7)	4.1 (3.5, 4.7)
Q3: 19.3%–31.4%	4,663	19.7	19.7*** (18.5, 21.0)	9.8** (8.9, 10.8)	4.6* (4.0, 5.2)	5.4*** (4.8, 6.1)

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Q4: 31.5%–43.4%	4,670	19.0	24.2*** (22.6, 25.7)	13.1*** (11.9, 14.3)	5.5*** (4.8, 6.3)	5.6*** (4.8, 6.6)
Q5: 43.5%–75.5%	4,646	18.3	25.0*** (23.4, 26.6)	13.1*** (12.0, 14.3)	5.3** (4.5, 6.3)	6.5*** (5.6, 7.6)
Area-based race/ethnicity^d						
% NHB						
Q1: 0.0%–10.8% (ref)	4,666	20.7	19.0 (17.6, 20.5)	10.2 (9.1, 11.3)	4.0 (3.5, 4.7)	4.8 (4.0, 5.7)
Q2: 10.9%–23.4%	4,700	19.9	21.2* (19.8, 22.6)	10.7 (9.7, 11.7)	5.0* (4.3, 5.8)	5.5 (4.7, 6.3)
Q3: 23.5%–35.5%	4,636	18.9	21.4* (20.0, 22.8)	11.4 (10.4, 12.5)	5.0 (4.3, 5.8)	5.0 (4.3, 5.7)
Q4: 35.6–55.9%	4,666	19.5	21.5** (20.3, 22.7)	11.3 (10.3, 12.4)	5.4* (4.6, 6.3)	4.8 (4.2, 5.4)
Q5: 56.0%–100.0%	4,677	21.0	18.4 (17.0, 19.9)	9.6 (8.6, 10.8)	4.3 (3.6, 5.2)	4.5 (3.8, 5.3)
% Hispanic						
Q1: 0.0%–24.8% (ref)	4,906	22.5	17.5 (16.2, 19.0)	9.4 (8.4, 10.5)	3.8 (3.2, 4.7)	4.3 (3.6, 5.1)
Q2: 24.9%–44.7%	4,470	19.7	18.0 (16.8, 19.3)	9.5 (8.6, 10.5)	4.4 (3.8, 5.1)	4.1 (3.5, 4.8)
Q3: 44.8%–59.2%	4,675	19.7	20.6** (19.4, 21.9)	10.6 (9.6, 11.6)	4.9* (4.3, 5.7)	5.1 (4.5, 5.8)
Q4: 59.3%–70.7%	4,660	19.0	22.2*** (20.8, 23.6)	11.4** (10.4, 12.6)	5.1* (4.3, 5.9)	5.7* (4.9, 6.6)
Q5: 70.8%–98.6%	4,634	19.2	23.9*** (22.4, 25.4)	11.7** (10.7, 12.9)	5.9*** (5.1, 6.8)	6.3** (5.4, 7.3)
Area-based rental burden^{d,e}						
<30% (ref)	7,220	32.8	18.0 (17.0, 19.0)	9.9 (9.1, 10.7)	3.7 (3.2, 4.2)	4.4 (3.8, 5.0)

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30%–50%	12,371	53.3	20.9*** (20.1, 21.8)	10.7 (10.1, 11.3)	5.0*** (4.6, 5.5)	5.2* (4.8, 5.7)
>50%	3,268	13.9	20.8** (19.3, 22.5)	10.5 (9.3, 11.8)	5.3** (4.5, 6.3)	5.0 (4.2, 5.9)

Note: Boldface indicates statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

^aWeighted by the age, race/ethnicity, and insurance distributions of the comparison population.

^bIndicates that the screener was completed at a Federally Qualified Health Center (FQHC).

^cOnly includes patients who live in NYC.

^dArea-level measures are at the Census Block Group level. They only include those who were successfully geocoded (n=443 were not geocoded). Residents who were geocoded to block groups with zero population (according to the Census) were excluded from the analysis for this variable.

^eRental burden is defined as median gross rent as a percentage of household income in the past 12 months.

SDH, social determinants of health; NHB, non-Hispanic black; NHW, non-Hispanic white; NHAPI, non-Hispanic Asian/Pacific Islander; NHAIAN, non-Hispanic American Indian/Alaskan Native; Q, quintile.

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Appendix Table 5. Individual SDH Risks among Montefiore Patients by Patient Characteristics, April–December 2018, Weighted Analyses^a

Characteristic	Weighted percent, ^a % (95% CI)									
	Housing		Food insecurity	Access to healthcare			Utilities cost	Care need	Legal	Interpersonal violence
	Quality	Instability		Health travel	Health cost	Getting along				
Total	6.2 (5.8, 6.5)	4.8 (4.5, 5.1)	6.0 (5.7, 6.4)	4.6 (4.3, 4.9)	4.3 (4.0, 4.6)	3.6 (3.4, 3.9)	3.2 (3.0, 3.5)	2.9 (2.7, 3.2)	2.9 (2.7, 3.2)	1.5 (1.3, 1.7)
Age, years										
0–5	6.2** (5.6, 6.9)	3.4 (2.9, 4.0)	4.2* (3.6, 4.8)	3.8 (3.3, 4.4)	2.0*** (1.7, 2.5)	1.9*** (1.5, 2.3)	3.0*** (2.6, 3.6)	5.2*** (4.6, 5.9)	3.1** (2.7, 3.7)	0.8*** (0.6, 1.1)
6–11	7.4*** (6.5, 8.4)	4.2 (3.5, 4.9)	5.5 (4.7, 6.5)	3.2* (2.6, 3.9)	2.3*** (1.8, 3.0)	2.1*** (1.6, 2.6)	3.8*** (3.2, 4.5)	3.7** (3.1, 4.5)	2.6 (2.1, 3.2)	1.2 (0.9, 1.7)
12–17	6.2** (5.3, 7.2)	3.5 (2.8, 4.4)	5.3 (4.5, 6.3)	3.4 (2.7, 4.3)	2.3*** (1.7, 3.0)	2.4*** (1.8, 3.2)	3.4*** (2.7, 4.2)	1.9 (1.4, 2.6)	2.6 (2.0, 3.5)	1.4 (0.9, 2.1)
18–29 (ref)	4.5 (3.7, 5.3)	4.1 (3.4, 5.0)	5.3 (4.4, 6.3)	4.2 (3.5, 5.1)	4.3 (3.6, 5.2)	4.9 (4.1, 5.8)	1.7 (1.3, 2.3)	2.2 (1.7, 2.9)	2.0 (1.5, 2.7)	1.8 (1.3, 2.3)
30–39	6.2* (5.2, 7.5)	5.8* (4.8, 7.1)	6.4 (5.3, 7.6)	4.6 (3.8, 5.7)	5.6 (4.5, 6.9)	5.9 (4.9, 7.2)	3.4*** (2.7, 4.4)	3.5* (2.7, 4.5)	2.7 (2.0, 3.6)	1.9 (1.3, 2.7)
40–49	6.7** (5.6, 8.0)	6.7*** (5.5, 8.0)	8.6*** (7.4, 10.0)	5.4 (4.4, 6.5)	6.2* (5.0, 7.6)	6.3 (5.1, 7.7)	5.0*** (4.0, 6.2)	1.9 (1.4, 2.5)	4.0*** (3.2, 5.1)	2.1 (1.6, 2.8)
50–59	8.8*** (7.5, 10.2)	7.9*** (6.7, 9.2)	9.7*** (8.4, 11.2)	7.9*** (6.7, 9.3)	7.5*** (6.2, 8.9)	5.4 (4.4, 6.5)	4.9*** (4.0, 6.0)	2.5 (1.9, 3.3)	4.7*** (3.7, 5.8)	2.7 (2.0, 3.6)
60–69	5.6 (4.8, 6.7)	5.7* (4.6, 7.0)	6.2 (5.3, 7.4)	6.0* (4.9, 7.4)	4.7 (3.8, 5.8)	3.3** (2.6, 4.2)	2.3 (1.8, 3.0)	2.2 (1.6, 2.9)	2.6 (2.0, 3.3)	1.3 (1.0, 1.8)

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≥70	4.2 (3.5, 5.1)	3.2 (2.6, 4.0)	4.4 (3.6, 5.4)	3.9 (3.2, 4.7)	3.9 (3.1, 4.9)	2.1*** (1.6, 2.7)	1.7 (1.3, 2.3)	2.7 (2.1, 3.4)	2.4 (1.8, 3.2)	0.9** (0.6, 1.4)
Sex										
Male	5.7 (5.2, 6.2)	5.4* (4.9, 5.9)	6.2 (5.7, 6.7)	4.5 (4.1, 5.0)	4.2 (3.8, 4.8)	3.4 (3.0, 3.9)	3.1 (2.7, 3.5)	2.8 (2.5, 3.2)	3.3* (3.0, 3.8)	1.4 (1.2, 1.7)
Female (ref)	6.4 (6.0, 6.8)	4.6 (4.2, 5.0)	6.0 (5.6, 6.5)	4.6 (4.3, 5.0)	4.3 (3.9, 4.7)	3.8 (3.4, 4.2)	3.3 (3.0, 3.6)	2.9 (2.7, 3.3)	2.7 (2.5, 3.0)	1.5 (1.3, 1.8)
Race/ethnicity										
Hispanic (ref)	7.8 (7.2, 8.4)	6.1 (5.5, 6.6)	7.5 (6.9, 8.1)	5.9 (5.3, 6.4)	5.3 (4.8, 6.0)	4.1 (3.7, 4.6)	3.9 (3.4, 4.3)	3.3 (2.9, 3.7)	3.4 (3.0, 3.8)	1.8 (1.5, 2.1)
NHB	5.5*** (5.0, 6.1)	4.7** (4.2, 5.3)	5.6*** (5.0, 6.2)	4.0*** (3.6, 4.6)	4.2** (3.7, 4.8)	3.8 (3.3, 4.3)	3.6 (3.1, 4.1)	2.7* (2.3, 3.1)	3.1 (2.7, 3.6)	1.1** (0.9, 1.4)
NHW	3.3*** (2.3, 4.7)	3.9** (2.6, 5.7)	4.3*** (3.3, 5.7)	4.3* (3.0, 5.9)	3.7 (2.4, 5.6)	3.3 (2.3, 4.8)	1.8*** (1.1, 2.8)	1.5*** (0.9, 2.4)	1.7** (1.0, 3.0)	2.5 (1.5, 4.0)
NHAPI	2.2*** (1.0, 4.9)	1.5*** (0.5, 4.4)	4.4* (2.4, 7.8)	2.9** (1.5, 5.6)	3.7 (2.2, 6.4)	0.9*** (0.4, 2.3)	1.1*** (0.5, 2.4)	2.0 (0.9, 4.7)	3.4 (1.8, 6.3)	0.2*** (0.0, 1.5)
NHAIAN	1.5*** (0.6, 3.7)	5.4 (2.0, 13.5)	3.2** (1.2, 8.1)	4.1 (1.5, 11.0)	6.2 (4.7, 8.2)	4.0 (1.2, 12.4)	1.5** (0.6, 3.7)	2.1 (0.7, 5.9)	2.3 (0.9, 5.7)	0.4** (0.1, 2.7)
Missing	5.6*** (5.1, 6.2)	3.7*** (3.3, 4.2)	5.1*** (4.5, 5.7)	3.7*** (3.3, 4.2)	3.1*** (2.7, 3.6)	3.0*** (2.5, 3.5)	2.4*** (2.1, 2.8)	3.1 (2.7, 3.5)	2.3*** (2.0, 2.7)	1.4 (1.1, 1.7)
Preferred language										
English (ref)	6.2 (5.8, 6.6)	4.7 (4.3, 5.0)	5.8 (5.4, 6.3)	4.5 (4.2, 4.9)	4.4 (4.1, 4.8)	4.0 (3.7, 4.3)	3.5 (3.1, 3.8)	2.8 (2.6, 3.1)	2.9 (2.7, 3.2)	1.6 (1.4, 1.8)
Spanish	7.4* (6.5, 8.5)	6.6*** (5.6, 7.6)	8.2*** (7.0, 9.6)	7.3* (5.2, 10.2)	5.9 (3.8, 8.9)	3.0* (2.4, 3.8)	2.8 (2.3, 3.5)	3.8* (3.1, 4.7)	3.2 (2.4, 4.3)	1.7 (1.2, 2.3)

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Other	3.0*** (1.7, 5.4)	1.8*** (0.8, 3.6)	7.0 (5.4, 8.9)	0.8*** (0.4, 1.4)	1.5*** (0.6, 3.8)	0.9*** (0.3, 3.1)	0.9*** (0.3, 2.9)	1.5** (0.9, 2.6)	8.7*** (6.4, 11.7)	0.1*** (0.0, 0.3)
Missing	2.8*** (1.9, 4.1)	1.1*** (0.5, 2.3)	2.4** (0.8, 6.7)	2.1** (1.0, 4.7)	2.1*** (1.6, 2.8)	0.5*** (0.2, 1.1)	1.8*** (1.6, 2.1)	2.3 (1.1, 4.9)	1.9 (0.8, 4.5)	0.3*** (0.1, 0.8)
Insurance										
Medicaid	8.3*** (7.9, 8.9)	6.7*** (6.2, 7.2)	8.2*** (7.7, 8.7)	6.4*** (6.0, 6.9)	4.1*** (3.7, 4.5)	4.3*** (4.0, 4.7)	4.6*** (4.2, 4.9)	4.4*** (4.1, 4.8)	4.2*** (3.8, 4.6)	2.0*** (1.7, 2.2)
Medicare	6.6*** (5.9, 7.4)	5.2*** (4.6, 5.9)	6.6*** (5.9, 7.4)	6.1*** (5.4, 6.9)	5.2*** (4.6, 6.0)	3.3 (2.8, 3.9)	2.7** (2.3, 3.3)	2.8*** (2.3, 3.4)	2.8*** (2.3, 3.4)	2.0*** (1.6, 2.5)
Commercial	3.7 (3.3, 4.1)	2.1 (1.8, 2.4)	3.1 (2.7, 3.5)	1.5 (1.2, 1.8)	2.8 (2.4, 3.2)	2.8 (2.4, 3.2)	1.8 (1.6, 2.2)	1.5 (1.3, 1.8)	1.2 (1.0, 1.5)	0.8 (0.6, 1.1)
Missing	5.4 (3.9, 7.5)	6.5*** (4.8, 8.8)	7.1*** (5.4, 9.3)	5.6*** (4.0, 7.7)	8.6*** (6.6, 11.2)	4.3 (3.0, 6.2)	3.7* (2.5, 5.5)	2.2 (1.3, 3.7)	4.2*** (2.9, 6.0)	1.0 (0.5, 2.2)
FQHC^b										
No (ref)	4.6 (4.1, 5.2)	4.1 (3.6, 4.7)	4.7 (4.2, 5.3)	3.8 (3.4, 4.4)	3.5 (3.0, 4.1)	3.8 (3.4, 4.2)	2.5 (2.1, 2.8)	2.6 (2.2, 3.0)	2.3 (2.0, 2.7)	1.5 (1.3, 1.8)
Yes	7.4*** (6.9, 7.9)	5.5*** (5.1, 6.0)	7.1*** (6.7, 7.6)	5.3*** (4.9, 5.7)	5.0*** (4.6, 5.5)	3.6 (3.3, 4.0)	3.9*** (3.5, 4.2)	3.2* (2.9, 3.5)	3.4*** (3.1, 3.8)	1.5 (1.3, 1.7)
Value-based contract										
No (ref)	6.3 (5.9, 6.8)	4.9 (4.5, 5.3)	6.3 (5.8, 6.7)	4.6 (4.2, 5.0)	4.2 (3.8, 4.6)	3.8 (3.5, 4.2)	3.3 (3.0, 3.7)	3.1 (2.8, 3.4)	3.3 (3.0, 3.7)	1.7 (1.5, 1.9)
Yes	7.1 (6.4, 7.8)	4.7 (4.1, 5.4)	5.9 (5.2, 6.6)	4.6 (4.0, 5.2)	5.2* (4.5, 5.9)	3.8 (3.1, 4.5)	3.0 (2.6, 3.5)	4.0*** (3.6, 4.5)	2.4*** (2.0, 2.8)	1.2** (1.0, 1.4)
Public housing^c										

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No (ref)	5.3 (5.0, 5.7)	4.8 (4.5, 5.2)	5.8 (5.5, 6.2)	4.3 (4.0, 4.6)	4.2 (3.8, 4.5)	3.5 (3.3, 3.8)	3.4 (3.1, 3.7)	2.9 (2.6, 3.1)	2.8 (2.6, 3.1)	1.5 (1.3, 1.7)
Yes	14.6*** (12.9, 16.4)	5.2 (4.2, 6.5)	6.8 (5.8, 8.1)	5.9** (4.9, 7.0)	5.3* (4.3, 6.5)	5.3** (4.3, 6.3)	2.3** (1.7, 3.1)	3.4 (2.7, 4.3)	3.2 (2.5, 4.0)	1.6 (1.0, 2.4)
Area-based poverty^d										
Q1: 0%–8.3% (ref)	3.2 (2.6, 3.9)	2.7 (2.2, 3.3)	3.7 (3.1, 4.4)	3.2 (2.6, 3.9)	3.4 (2.8, 4.2)	3.2 (2.6, 3.8)	2.5 (1.9, 3.3)	2.9 (2.2, 3.7)	2.0 (1.6, 2.5)	1.2 (0.9, 1.7)
Q2: 8.4%–19.2%	4.6** (4.0, 5.4)	4.8*** (4.2, 5.5)	5.3** (4.7, 6.0)	3.8 (3.3, 4.5)	4.5* (3.8, 5.3)	3.5 (3.0, 4.1)	3.2 (2.7, 3.9)	2.4 (2.0, 2.8)	2.5 (2.1, 3.0)	1.3 (1.0, 1.7)
Q3: 19.3%–31.4%	5.6*** (5.0, 6.2)	5.0*** (4.4, 5.8)	6.6*** (5.9, 7.4)	4.7*** (4.2, 5.4)	4.2 (3.7, 4.9)	3.4 (2.9, 4.1)	3.9** (3.4, 4.6)	3.0 (2.5, 3.5)	2.8* (2.4, 3.4)	1.9* (1.6, 2.3)
Q4: 31.5%–43.4%	8.2*** (7.2, 9.3)	6.0*** (5.1, 7.0)	7.6*** (6.7, 8.6)	6.1*** (5.3, 7.1)	4.8* (3.9, 5.8)	4.0 (3.3, 4.9)	3.4* (2.8, 4.2)	3.4 (2.9, 4.0)	3.2** (2.7, 3.8)	1.5 (1.2, 2.0)
Q5: 43.5%–75.5%	10.1*** (9.0, 11.3)	5.7*** (4.8, 6.6)	7.0*** (6.0, 8.0)	5.4*** (4.7, 6.3)	5.0** (4.1, 6.0)	4.9** (4.0, 5.9)	3.9** (3.2, 4.8)	3.4 (2.8, 4.2)	3.5*** (2.9, 4.1)	1.7 (1.3, 2.4)
Area-based race/ethnicity^d										
% NHB	5.1 (4.4, 5.9)	4.3 (3.7, 5.0)	6.3 (5.4, 7.3)	5.1 (4.3, 6.0)	4.2 (3.4, 5.0)	3.6 (2.9, 4.5)	3.3 (2.7, 4.1)	2.9 (2.4, 3.6)	2.6 (2.0, 3.4)	1.5 (1.1, 1.9)
Q1: 0%–10.8% (ref)	6.9** (6.1, 7.8)	5.0 (4.3, 5.9)	6.2 (5.5, 7.0)	5.0 (4.3, 5.7)	4.1 (3.4, 4.9)	3.6 (3.0, 4.3)	4.2 (3.5, 5.0)	3.0 (2.5, 3.6)	3.4 (2.8, 4.2)	2.0 (1.6, 2.5)
Q2: 10.9%–23.4%	7.0*** (6.2, 7.9)	5.3 (4.5, 6.1)	6.4 (5.6, 7.2)	5.1 (4.3, 5.9)	4.9 (4.2, 5.8)	4.1 (3.4, 4.8)	3.0 (2.5, 3.7)	2.6 (2.2, 3.0)	2.6 (2.1, 3.1)	1.5 (1.1, 2.0)
Q3: 23.5%–35.5%	7.2*** (6.5, 8.1)	5.1 (4.4, 6.0)	5.8 (5.2, 6.5)	5.0 (4.2, 5.8)	4.6 (3.8, 5.4)	3.5 (3.0, 4.1)	3.3 (2.8, 3.9)	2.9 (2.5, 3.4)	3.1 (2.6, 3.6)	1.3 (1.0, 1.7)

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Q4: 35.6%– 55.9%	5.5 (4.6, 6.4)	4.3 (3.5, 5.2)	5.1* (4.4, 5.9)	4.1 (3.4, 4.8)	4.0 (3.2, 4.9)	3.7 (3.1, 4.4)	3.2 (2.6, 3.9)	3.0 (2.4, 3.6)	2.9 (2.3, 3.6)	1.1 (0.8, 1.5)
Q5: 56.0%– 100%	5.1 (4.4, 5.9)	4.3 (3.7, 5.0)	6.3 (5.4, 7.3)	5.1 (4.3, 6.0)	4.2 (3.4, 5.0)	3.6 (2.9, 4.5)	3.3 (2.7, 4.1)	2.9 (2.4, 3.6)	2.6 (2.0, 3.4)	1.5 (1.1, 1.9)
% Hispanic										
Q1: 0%– 24.8% (ref)	4.9 (4.1, 5.9)	3.9 (3.2, 4.7)	4.4 (3.8, 5.1)	3.8 (3.2, 4.5)	4.3 (3.5, 5.2)	3.3 (2.7, 4.0)	2.9 (2.4, 3.6)	2.8 (2.2, 3.5)	2.7 (2.1, 3.3)	1.3 (0.9, 1.7)
Q2: 24.9%– 44.7%	5.4 (4.8, 6.2)	3.9 (3.3, 4.6)	5.1 (4.4, 5.9)	4.2 (3.5, 5.0)	3.7 (3.0, 4.4)	3.6 (3.0, 4.2)	2.9 (2.4, 3.6)	3.2 (2.6, 3.8)	2.7 (2.3, 3.2)	1.1 (0.9, 1.5)
Q3: 44.8%– 59.2%	6.8** (6.1, 7.6)	5.3** (4.6, 6.2)	6.1*** (5.4, 6.8)	4.7 (4.0, 5.5)	4.4 (3.7, 5.1)	3.3 (2.8, 3.9)	3.2 (2.7, 3.8)	2.5 (2.1, 3.0)	3.0 (2.5, 3.7)	1.3 (1.0, 1.7)
Q4: 59.3%– 70.7%	7.7*** (6.8, 8.7)	5.5** (4.7, 6.4)	7.1*** (6.2, 8.1)	5.3** (4.6, 6.2)	4.5 (3.8, 5.4)	4.3 (3.6, 5.1)	3.6 (3.0, 4.3)	2.7 (2.3, 3.3)	3.4 (2.8, 4.0)	2.2** (1.7, 2.8)
Q5: 70.8%– 98.6%	7.7*** (6.8, 8.7)	5.6** (4.9, 6.4)	7.7*** (6.8, 8.8)	6.0*** (5.2, 6.9)	5.3 (4.4, 6.3)	4.5* (3.7, 5.4)	4.1* (3.4, 5.0)	3.8* (3.1, 4.6)	3.2 (2.6, 3.8)	2.1** (1.7, 2.7)
Area-based rental burden ^{d,e}										
<30% (ref)	6.1 (5.3, 7.1)	4.1 (3.5, 4.7)	5.2 (4.6, 5.8)	3.8 (3.3, 4.3)	3.9 (3.3, 4.5)	3.6 (3.1, 4.1)	2.3 (1.9, 2.8)	3.1 (2.6, 3.7)	2.5 (2.1, 3.0)	1.5 (1.2, 1.9)
30%–50%	6.5 (6.0, 7.0)	5.1** (4.7, 5.6)	6.5*** (6.0, 7.0)	5.2*** (4.8, 5.7)	4.5 (4.1, 5.0)	3.6 (3.3, 4.0)	3.6*** (3.2, 4.0)	2.9 (2.6, 3.2)	3.0 (2.7, 3.4)	1.6 (1.3, 1.8)
>50%	6.1 (5.5, 6.8)	5.6* (4.6, 6.8)	6.1 (5.3, 7.0)	4.4 (3.7, 5.2)	4.0 (3.3, 4.8)	3.6 (2.9, 4.3)	4.3*** (3.5, 5.2)	2.7 (2.2, 3.3)	2.9 (2.3, 3.7)	1.5 (1.2, 2.0)

Note: Boldface indicates statistical significance (* p <0.05, ** p <0.01, *** p <0.001).

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^aWeighted by age, race/ethnicity, and insurance distributions of the comparison population.

^bIndicates that the screener was completed at a Federally Qualified Health Center (FQHC).

^cOnly includes patients who live in NYC.

^dArea-level measures are at the Census Block Group level. They only include those who were successfully geocoded (n=443 were not geocoded). Residents who were geocoded to block groups with zero population (according to the Census) were excluded from the analysis for this variable.

^eRental burden is defined as median gross rent as a percentage of household income in the past 12 months.

SDH, social determinants of health; NHB, non-Hispanic black; NHW, non-Hispanic white; NHAPI, non-Hispanic Asian/Pacific Islander; NHAIAN, non-Hispanic American Indian/Alaskan Native; Q, quintile.

Appendix
Social Risks Among Primary Care Patients in a Large Urban Health System
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Appendix Table 6. Number of SDH Risks Among Montefiore Patients by Targeted Screening Group,^a April–December 2018

Risk	n	%	Any risk, % (95% CI)	1 risk, % (95% CI)	2 risks, % (95% CI)	≥3 risks, % (95% CI)
Normal risk	18,365	74.6 (74.1, 75.2)	18.2 (17.7, 18.8)	9.7 (9.3, 10.1)	4.1 (3.8, 4.4)	4.4 (4.1, 4.7)
Higher risk	6,244	25.4 (24.8, 25.9)	25.2 (24.2, 26.3)	12.2 (11.4, 13.0)	6.1 (5.5, 6.7)	6.9 (6.3, 7.6)

^aTargeted screening group determined at departmental level; higher risk refers to clinics that screened patients who were recently discharged, had recent emergency department visits, or were social work patients, for example.

SDH, social determinants of health.

Appendix
Social Risks Among Primary Care Patients in a Large Urban Health System
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Appendix Table 7. Individual SDH Risks Among Montefiore Patients by Targeted Screening Group,^a April–December 2018

Risk	Housing		Access to healthcare							
	Quality, % (95% CI)	Instability, % (95% CI)	Food insecurity, % (95% CI)	Health travel, % (95% CI)	Health cost, % (95% CI)	Getting along, % (95% CI)	Utilities cost, % (95% CI)	Care need, % (95% CI)	Legal, % (95% CI)	Interpersonal violence, % (95% CI)
Normal risk	6.3 (5.9, 6.6)	4.2 (3.9, 4.5)	5.3 (5.0, 5.6)	3.9 (3.7, 4.2)	3.1 (2.8, 3.3)	2.7 (2.5, 3.0)	3.2 (2.9, 3.4)	3.3 (3.1, 3.6)	2.6 (2.4, 2.8)	1.3 (1.1, 1.4)
Higher risk	7.2 (6.5, 7.8)	6.6 (6.0, 7.2)	8.5 (7.9, 9.3)	6.9 (6.3, 7.5)	6.1 (5.6, 6.8)	5.9 (5.4, 6.6)	3.9 (3.5, 4.4)	3.1 (2.7, 3.6)	4.2 (3.8, 4.8)	2.2 (1.9, 2.6)

^aTargeted screening group determined at departmental level; higher risk refers to clinics that screened patients who were recently discharged, had recent emergency department visits, or were social work patients, for example.

SDH, social determinants of health.